

<http://blog.iec61850.com>

**This PDF Document contains all 1230 blog posts from
2008 to 2020-03-01**

for your convenience.

Enjoy!

**Best Regards,
Karlheinz Schwarz
schwarz@scc-online.de**



Mehr ▾

News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Saturday, February 29, 2020

How Many Information Models are defined in IEC 61850?

I guess you have heard that IEC 61850 defines a lot of Information Models. Yes, You are right.

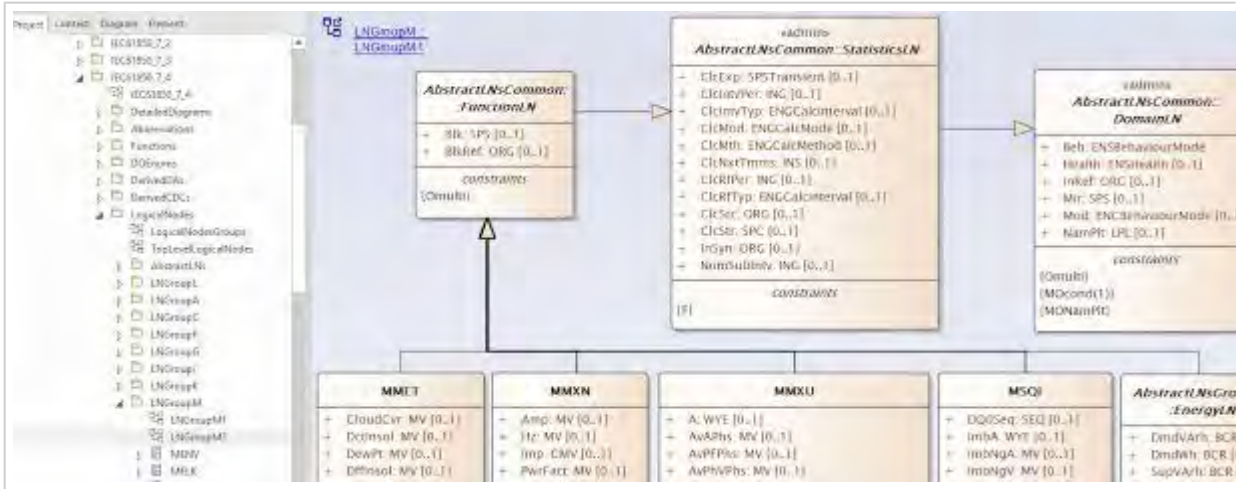
The models are managed exclusively by the corresponding working groups with the Enterprise Architect UML Tool (the UML data base is for internal use only). The model version:

UML model of 61850 (wg10built6-wg18built3-wg17built5-jwg25built2-tc17built1-tc38built1.eap)

comprises the following number of Logical Node Classes, Data Objects (Attributes), Enumerations and Abbreviations:

	LN Classes	Attributes	Enums	Abbreviations
WG10	279	1847	133	976
WG17	118	966	81	81
WG18	51	646	19	
JWG25	15	152	39	
OTHER	5	51	1	8
Total	468	3662	273	1065

An excerpt from the UML modes looks like this:



The UML Model is the single source data base that is used for the extensions and maintenance of the model, as well as the generation of Word or PDF documents ... The PDF documents are sold by IEC and other organizations.

You may complain that the standards are **not for free** ... hmm ... BUT look: You can download the various **Code Components for free**.

Click [HERE](#) for the Code Component for **IEC_61850-7-4.NSD.2007A2.light**.zip (IEC 61850-7-4 2007A2 NSD light, see the IEC 61850-7-4:2010 for full legal notices). The full version has additionally the semantic descriptions of the models.

Example of Enumeration:

```
<Enumeration name="PIDAlgorithmKind" titleID="IEC 61850-7-4:PIDAlgorithmKind.title"
  <Literal name="P" literalVal="1"/>
  <Literal name="I" literalVal="2"/>
  <Literal name="D" literalVal="3"/>
  <Literal name="PI" literalVal="4"/>
  <Literal name="PD" literalVal="5"/>
  <Literal name="ID" literalVal="6"/>
  <Literal name="PID" literalVal="7"/>
</Enumeration>
```

Example of excerpt of LN Class MMU:

For your Convenience

[An All NEW Evaluation, Demo, and Hands-On Package for IEC 61850 \(IEC 61400-25\) available \(2017-07-03\)](#)

[Personal experience and capabilities of Karlhein.z Schwarz \[PDF 3.5 MB\]](#)

[Old Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[NEW! Blog as single PDF until 23 April 2017 \[17 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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Posts

All Comments

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```
<LNClass name="MMXU" titleID="IEC 61850-7-4:MMXU.title" base="CommonLN">
  <DataObject name="TotW" type="MV" descID="IEC 61850-7-4:MMXU.TotW.desc" presCond="0"/>
  <DataObject name="TotVAr" type="MV" descID="IEC 61850-7-4:MMXU.TotVAr.desc" presCond="0"/>
  <DataObject name="TotVA" type="MV" descID="IEC 61850-7-4:MMXU.TotVA.desc" presCond="0"/>
  <DataObject name="TotPF" type="MV" descID="IEC 61850-7-4:MMXU.TotPF.desc" presCond="0"/>
  <DataObject name="Hz" type="MV" descID="IEC 61850-7-4:MMXU.Hz.desc" presCond="0"/>
  <DataObject name="PPV" type="DEL" descID="IEC 61850-7-4:MMXU.PPV.desc" presCond="0"/>
  <DataObject name="PNV" type="WYE" descID="IEC 61850-7-4:MMXU.PNV.desc" presCond="0"/>
  <DataObject name="PhV" type="WYE" descID="IEC 61850-7-4:MMXU.PhV.desc" presCond="0"/>
  <DataObject name="A" type="WYE" descID="IEC 61850-7-4:MMXU.A.desc" presCond="0"/>
  <DataObject name="W" type="WYE" descID="IEC 61850-7-4:MMXU.W.desc" presCond="0"/>
  <DataObject name="VAr" type="WYE" descID="IEC 61850-7-4:MMXU.VAr.desc" presCond="0"/>
  <DataObject name="VA" type="WYE" descID="IEC 61850-7-4:MMXU.VA.desc" presCond="0"/>
  <DataObject name="PF" type="WYE" descID="IEC 61850-7-4:MMXU.PF.desc" presCond="0"/>
  <DataObject name="Z" type="WYE" descID="IEC 61850-7-4:MMXU.Z.desc" presCond="0"/>
  <DataObject name="AvAPhs" type="MV" descID="IEC 61850-7-4:MMXU.AvAPhs.desc" presCond="0"/>
  <DataObject name="AvPPVPhs" type="MV" descID="IEC 61850-7-4:MMXU.AvPPVPhs.desc" presCond="0"/>
  <DataObject name="AvPhVPhs" type="MV" descID="IEC 61850-7-4:MMXU.AvPhVPhs.desc" presCond="0"/>
  <DataObject name="AvWPhs" type="MV" descID="IEC 61850-7-4:MMXU.AvWPhs.desc" presCond="0"/>
```

- 2013 (130)
- 2012 (188)
- 2011 (159)
- 2010 (153)
- 2009 (162)
- 2008 (82)

Contributors

-  [Karlheinz Schwarz](#)
-  [Michael Schwarz](#)

Click [HERE](#) to see the list of all Code Components as per today ... more to come soon:

To my understanding you can model many required information generated and consumed by a huge number of applications in almost all application domains of automation in the electrical system and beyond.

As the above example of MMXU shows, you can use this LN Class wherever you have 3 phase AC system!! In a building heating system for the electrical values of a compressor or a fan or a pump or ... the blue sky is the limit for the applications.

Click [HERE](#) to learn about crucial details discussing the LN Class MMXU and how it can be applied ... you may have never expected this comprehensiveness of the MMXU.

Note that the 3 phase system was first (more than 100 years ago) - then we have put a facade in front of the measurement function which exposes the measurements as data objects of the class MMXU. The application has driven the class - not vice versa.

In case you find any error in the standards, please visit the Tissue Database:

<https://iec61850.tissue-db.com/parts.mspx>

Posted by [Karlheinz Schwarz](#) at 10:55 AM No comments: 

Labels: [Code Components](#), [data object](#), [Enterprise Architect](#), [hydro power](#), [IEC 61850](#), [logical node](#), [measurements](#), [MMXU](#), [modeling method](#), [models](#), [name space documents](#), [Object model](#), [SCL](#), [Substation](#), [UML](#), [wind power](#)

Friday, February 28, 2020
Is Industry 4.0 Really a Revolution? And IEC 61850?

There are so many discussions, concerns, arguments ... Pros and Cons regarding Industry 4.0 or the Fourth Industrial Revolution (4.0, IoT, IIoT, Cloud, Edge, data lake, ...).

The most remarkable statements I have heard are from Mr. Ralph Langner who does not believe that it is a revolution at all ...

"Is Industrie 4.0 actually the 4th Industrial Revolution as touted by it's many proponents. Ralph Langner tackles that question in this 20 minute video from S4xEurope."

Click [HERE](#) for the youtube video of his presentation (20 min)

Please find some personal opinions:

Please find a paper discussing the "sprint" versus "marathon" in automation of electric power systems I wrote in 2012 through the following post:

<http://blog.nettedautomation.com/2012/03/smart-grids-19th-century-invention.html>

Here is part of my experience:

I was (as a 21 year old skilled worker in 1973 ... just married) responsible for maintaining a fire alarm system with 6,000 alarm buttons (from a famous vendor ... full of TTL chips ...). The system stopped almost every night ... I had to drive downhill 60 km ... to switch it off and on and go back home ... I was not skilled enough to do anything serious about it ... just wrote reports to my boss ... he ignored everything ... I quit my job in 1974 and went back to high school in January 1995 and university in 1977 ... 7 1/2 years later I finished university with four kids in 1982 ... went back to that same company ... quit again in 1992 partly, in 1997 completely ...

The most crucial reason to quit in 1992/1997 was: The standardization of industrial communication systems in IEC TC 65 released a myriad of **non-interoperable Fieldbusses** ... good for selling standards ... **very BAD for maintenance people and many others** ... can you imagine to be an expert in tens of fieldbusses?!

Check out this post:
<http://blog.nettedautomation.com/2017/04/iec-sc-65c-published-5000-pages-of-new.html>

Oh my dear ...

I just checked my personal records from the 70s and found the weekly reports of my daily maintenance activities ... spent many days to switch off/on the Fire Alarm System ...

This may happen every hour these days where maintenance people just switch IEDs off and on ... in the hope that it will work after restart.

We need more well educated and skilled experts!!! ... grey hair seniors ...

What's about IEC 61850? Is the introduction of this standard series different compared to the fieldbus standard series IE 61158? Sure ... there is a crucial difference:

MANY Fieldbus standards for **ONE** application (real-time data exchange) ...

ONE IEC 61850 for **MANY** applications (real-time, protection, asset data, configuration, engineering, ...SCADA, ...).

IEC 61850 series is quite comprehensive and complex ... Yes. But: it seems to be easier to learn and experience ONE complex standard than to do this for 50+ solutions!! IEC 61850 is not a revolution - it could be used to extend existing solutions ... it provides a new approach that could prevent the proliferation of hundreds of vendor-specific solutions ...

And when it comes to security, there is **ONE standard series (IEC 62351)** for IEC 61850, IEC 60870-6 (TASE.2), IEC 60870-5-104, DNP3, ...

Posted by [Karlheinz Schwarz](#) at [8:56 AM](#) [No comments:](#) 

Labels: [fieldbus](#), [IEC 61850](#), [IEC TC 65](#), [IIOT](#), [industrial revolution](#), [industry 4.0](#), [IOT](#), [maintenance](#), [SCADA](#), [senior experts](#)

Thursday, February 27, 2020

IXXAT Smart Grid Gateway With NEW Possibilities

IXXAT (HMS) has offered their Smart Grid Gateways for some time. Click [HERE](#) for some blog posts that give you a good overview of the possibilities so far ([HERE](#) for HMS or [HERE](#) for Beck).

The other day IXXAT has published an extended range of possibilities to share information between many different communication solutions in almost ALL automation applications:

SG-gateway IO
SG-gateway M-Bus Master
SG-gateway EtherNet/IP
SG-gateway PROFIBUS
SG-gateway PROFINET

New:

SG-gateway Media Converter
SG-gateway Switch

All types support as well:

Modbus-RTU master/slave via RS232/485
Modbus-TCP master/slave
DHCP server, SNTP, Network trace (pcap), SNMPv2c
OPC-UA server
MQTT
Codesys network variables

Optional:

IEC 60870-5-104 client/server with redundancy (Norwegian User Convention)
IEC 60871-5-101 master/slave
IEC 61850 client/server (both roles and GOOSE pub/sub are supported simultaneous)
IEC 61850 GOOSE publisher/subscriber
Outstation DNP3
Hardware versions with 3G or 4G modem

Click [HERE](#) to visit the IXXAT website for an overview ([German](#)).
Click [HERE](#) to download a new 12 page pdf bochure ([German](#)).

Posted by [Karlheinz Schwarz](#) at [10:48 AM](#) [No comments:](#) 

Labels: [Beck IPC](#), [DNP3](#), [EthernNet/IP](#), [Gateway](#), [GOOSE](#), [HMS](#), [iec 60870-5](#), [IEC 61850](#), [IXXAT](#), [M-Bus](#), [Modbus](#), [OPC UA](#), [Profibus](#), [Profinet](#), [Smart Grid](#)

Wednesday, February 12, 2020

Fundamentals of IEC 61850 training programme

Smart Grid Forums offers a 3 day training on **IEC 61850 Fundamentals**:

17-19 March 2020


London, UK

Click [HERE](#) for details.

You may download selected presentations from 2019:

1. [IEC 61850 Standardisation Update](#) - Christoph Brunner
2. [New Industrialised Substation Automation System](#) - David MacDonald
3. [IEC 61850 System and Tool Testing](#) - DNV GL

Enjoy.

Posted by [Karlheinz Schwarz](#) at 5:47 AM [No comments:](#) 

Labels: [Christoph Brunner](#), [IEC 61850](#), [seminar](#), [testing](#), [Training](#)

Friday, December 6, 2019

How Serious Are You About Cyber Security For Power Systems?

I know: A lot has been talked and written about Cyber Security for power delivery and many other systems.

BUT: What about insurance that specify coverage for cyber damage?

You may figure out that your company has insurance covering cyber damage. So far - so good!

Be careful and read the latest development regarding the question, if all damages will be covered by your policy.

Please check the following report and ensure this article is made available to all senior managers and executives immediately ... a famous case (Merck) explains that there may be cases where the insurance companies may not pay at all ... **in case of big bang attack** ...

Click [HERE](#) for the wake-up call for everybody - from Bloomberg!!

Posted by [Karlheinz Schwarz](#) at 1:56 AM [No comments:](#) 

Labels: [Cyber Attack](#), [Cyber Security](#), [insurance](#), [reliable power delivery](#)

Wednesday, November 20, 2019

IEC 61850 Deadband Reporting and Logging - What Does It Provide?

IEC 61850 **Reporting and Logging** are very useful services to keep the needed bandwidth for messaging low. It is a bit tricky to understand how it works ... due to the fact that there are two documents that need to be studied to understand the function (IEC 61850-7-2 and IEC 61850-7-3). And: You need to know that **some changes** in the operation of Reporting and Logging happened from Edition 2 to Edition 2.1 (soon to be published as International Standard).

Deadbanding in IEC 61850 provides a filter mechanism that defines, **when** an analogue value will be reported by the IED (Server side) to another system (Client side).

Edition 2 of IEC 61850-7-3 defines:

"Deadband. Shall represent a configuration parameter used to calculate all deadbanded attributes (for example mag attribute in the CDC MV). The value shall represent the percentage of difference between max. and min. in units of 0,001 %.

If an integral calculation is used to determine the deadbanded value, the value shall be represented as 0,001 % s.

A db value of 0 shall suppress reporting events on the analog value, so that only changes of the range value will lead to events."

Edition 2.1 of IEC 61850-7-3 will define:

"Deadband is a configuration parameter used to calculate deadbanded value 'mag'. The value of 'db' shall represent the percentage of 'dbRef' in units of 0.001 %. Therefore, 'db' = [0...100000], corresponding to [0 %...100 %], respectively. If an integral calculation is used to determine the deadbanded value, the value of 'db' shall be represented as 0.001 %s.

With a 'db' = 0 the attribute 'mag' follows the instantaneous value.

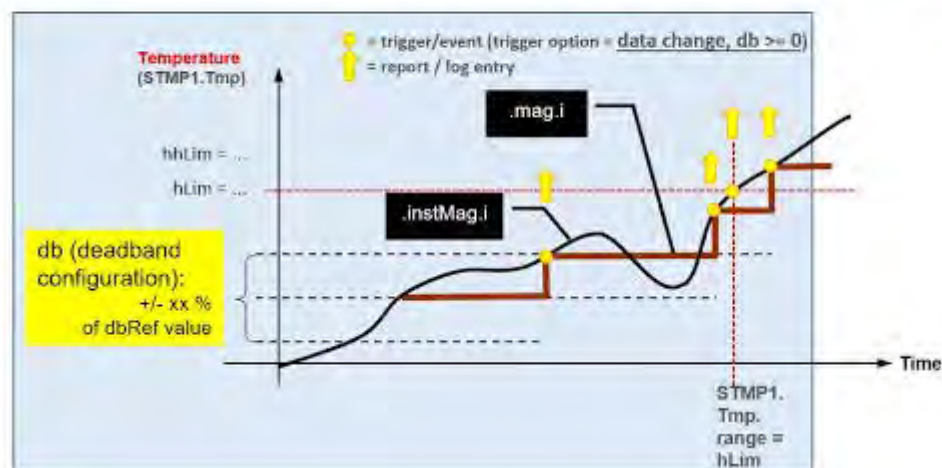
If 'db' is not present in the model, then the deadband calculation is a local issue."

[See Tissue Data Base on deadbanding.](#)

"db" = 0 is a dangerous configuration value!! It is like divide by "0". Any (small) change of "instMag" will issue a report or log entry. I am a little bit confused ... but finally it may help with the following use case: Output of the Schedule "ValMV" that is of CDC "MV". See the following figures for some details:

Introduction of crucial Common Data Classes (MV – IEC 61850-7-3) applied

2019-11-20



Note: If db = 0 then the number of events will be unlimited !!!

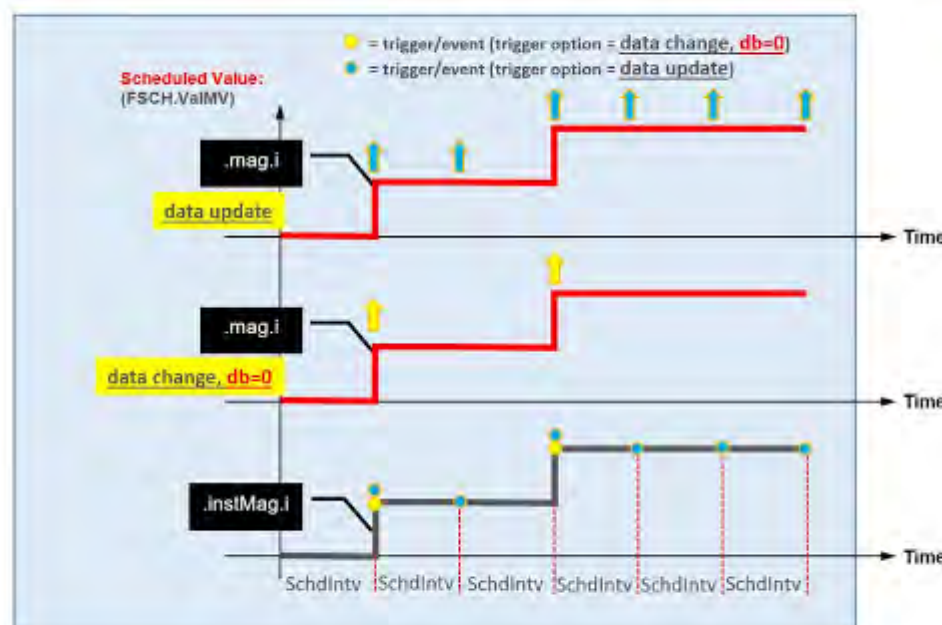
"db" >= 0 could reduce the number of events (reports/log entries) for analogue values. Usually an analogue value is a measurement or a calculated value.

In case of modeling schedules (FSCH in IEC 61850-90-10 / IEC 61850-7-4 Ed2.1) it is required to report/log a scheduled value - which is similar to a measurement ... but it is a non-continuous value (has "jumps" only) ... OK. CDC MV is used for the Output of a Schedule. What is the impact of the "db" value?!? Be careful!

The following figure discusses the impact of trigger option "data change" and "db"=0 as well as "data update":

Introduction of crucial Common Data Classes (MV – IEC 61850-7-3) applied

2019-11-20



Finally: If you need to see (as a client) changes only, then "db"=0 is the right configuration. If you want to receive/log a "confirmation" of any new value at the beginning of a new Schedule Interval (SchdIntv) then "data update" is the right configuration.

You need to understand your needs before you decide how to configure deadbanding.

Posted by [Karlheinz Schwarz](#) at 6:27 AM No comments: [✉](#)

Labels: [CDC](#), [deadband](#), [IEC 61850](#), [IEC 61850-7-3 Edition 2](#), [IEC 61850-7-4 Ed2](#), [logging](#), [Reporting](#), [Schedule](#)

Tuesday, November 19, 2019

The History Of The IEC 61850 Modelling

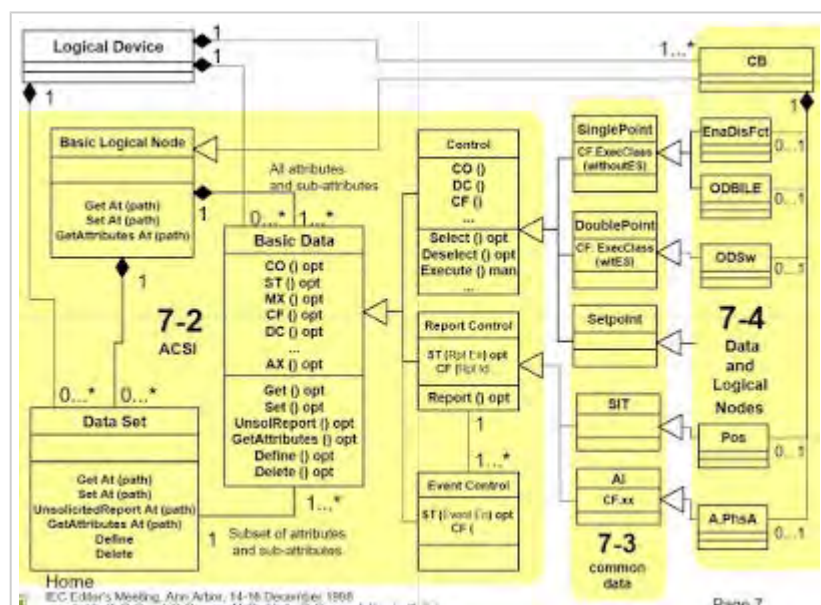
The standardization of IEC 61850 started in 1995 when the IEC TC 57 Working Groups 10, 11, and 12 had been setup. Later all projects have been moved to the Working Group 10 - that is still (very!) active today.

Prior to the new project proposal for IEC 61850 the EPRI UCA project developed core models for many signals and communication services. UCA used a simple table notation for defining "models".

The experts involved have discussed several options how to model the signals. In December 1998 the editors of the core documents (including myself) met in Ann Arbor (MI, USA).



We discussed modelling with ASN.1 or our own notation:

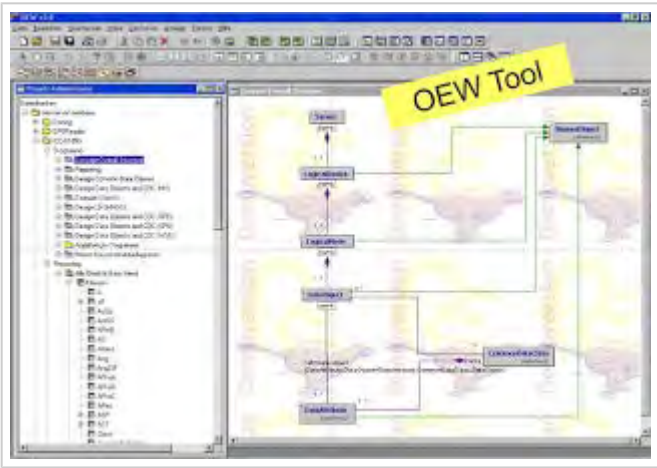


we were not quite happy ... then we discussed trying UML ... walked across the street to the University bookshop to purchase some 10 Books about UML Modelling. I purchased several books, too:

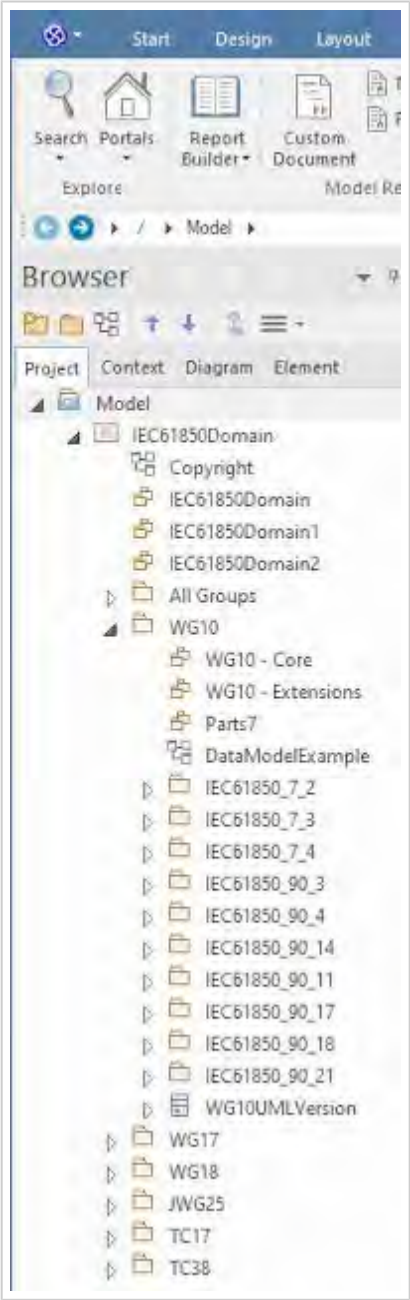


... a senior development manager of protection relays was strictly against UML ... he said, it will never be used for protection and automation. Some weeks later I met his engineers in their office ... and saw that they used UML for developments ...

Later I tried OWL with some success:

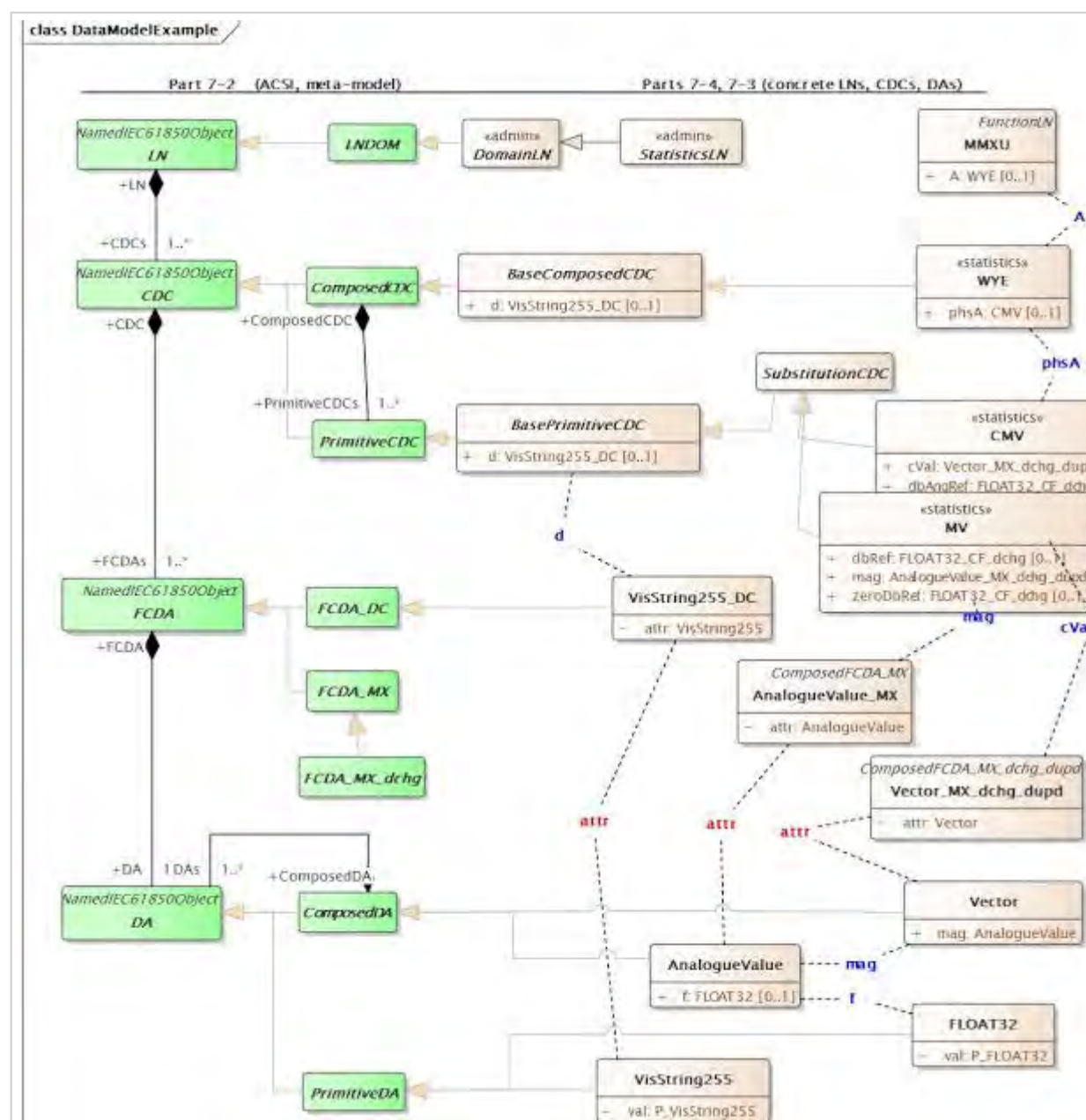


Experts involved in CIM (Common Information Models) used UML - with the [SPARX tool Enterprise Architect \(EA\)](#). It took several years before UML (and EA) was used to define all models of IEC 61850. Today (end of 2019) almost all models and other definitions are managed with the EA - it is a big success! The latest version comprises the following parts:



There are tools available to export parts of the model from EA as Word documents, html pages, pdf ...

Example of a model:



With the application of the SPARX EA we have a single source of all crucial definitions.

Note: The EA package "IEC61850Domain" is only available for the experts writing, publishing and maintaining the various standard parts.

Some exported documents (the so-called code components) are available for free access: Click [HERE](#) for accessing these documents.

Thanks to the experts that have continuously pushed for using UML and EA. It took several years ... and it was not easy for engineers to use a formal language and tool to get where we are today.

These days the EA is used also for many other tasks: use cases, design state machines like for IEC 61850-90-16 (System management), ... IEC TC 57 has done a good job in using UML for CIM and IEC 61850. But another generation of engineers is needed to understand the full benefit of using UML.

Posted by [Karlheinz Schwarz](#) at 8:07 AM No comments: [✉](#)

Labels: [CIM](#), [Enterprise Architect](#), [EPRI](#), [IEC 61850](#), [Information Model](#), [modeling method](#), [SPARX](#), [UCA](#), [UML](#)

Wednesday, November 13, 2019

E-Book verfügbar: etz Report 34 "Offene Kommunikation nach IEC 61850 für die Schutz- und Stationsleittechnik"

Der lange Zeit vergriffene etz Report 34 (2004, 159 Seiten):

"Offene Kommunikation nach IEC 61850 für die Schutz- und Stationsleittechnik"

ist als E-Book verfügbar!

[Hier klicken](#), um die E-Book-Version zu erwerben.

Posted by [Karlheinz Schwarz](#) at 6:27 AM No comments: [✉](#)

Labels: [etz Report](#), [IEC 61850](#), [Netzleittechnik](#), [schutztechnik](#), [Stationsleittechnik](#)

Friday, November 1, 2019

Draft IEC TR 61850-90-18 on Alarm Handling Published

IEC TC 57 just published a new 50 page draft part of IEC 61850 (57/2157/DC):

IEC Draft TR 61850-90-18

Communication networks and systems for power utility automation –

Part 90-18: Alarm handling in IEC 61850 based systems

Comments are expected by Nov 29, 2019.

Work is done by TC 57/WG 10 together with TC 88/JWG 25 (Wind Turbines).

This part defines a methodology to handle alarms. The crucial concept is defining an “Alarm Server”.

Use-cases considered are related to:

WG 10: IED communications & associated data models in power systems

WG 17: Distributed Energy Resources

WG 18: Hydroelectric power plants

JWG 25: Wind Power

Sample Use case: Wind power system

"Several clients connected either to an alarm concentrator handling alarms from a system of identical distributed IED’s or directly to one specific IED. Some of the alarms are defined as latched and all alarms are defined either with or without acknowledgement.

If a wind turbine is maintained and thus in service state, all alarms must still be captured and exposed, but marked with an “in-service” flag for filtering (and not to be annunciated).

The IED’s may either be proprietary devices or comply with IEC 61850.

Domain: Common in wind-power domains."

Posted by [Karlheinz Schwarz](#) at 7:55 AM [No comments:](#) 

Labels: [Alarm handling](#), [DER](#), [hydro power](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-90-18](#), [SCADA](#), [Substation](#), [wind farm](#)

IEC TC 57 WG19 proposes CIM Profiles to JSON schema Mapping

IEC TC 57 WG is discussing the use of JSON for transferring message payload

DRAFT 62361-104:

POWER SYSTEMS MANAGEMENT AND ASSOCIATED INFORMATION

EXCHANGE – INTEROPERABILITY IN THE LONG TERM –

Part 104: CIM Profiles to JSON schema Mapping

The introduction says:

"This standard is one of the IEC 62361 series which define **standards that may be used by all**

Working Groups within TC57. These standards address areas of interest that impact multiple

standards and provide consistency for implementations.

This part 104 describes a **mapping from CIM profiles to IETF JSON schemas and defines the**

rules that CIM JSON message payloads must adhere to.

The principle objective of this part 104 is to facilitate the exchange of information in the form of JSON documents whose semantics are defined by the IEC CIM and whose syntax is defined by an IETF JSON schema. ..."

JSON is applicable for encoding of CIM (IEC 61968/70) message payload and - as I believe - also for IEC 61850 message payload!

By the way: The post on "[IEC 61850-8-2 Versus IEC 61850-8-1](#)" discussing the use of JSON in addition to MMS/ASN.1/BER and MMS/ASN.1/XER has been visited 2,000 times since July 5, 2019 --> or 16 times per day.

Click [HERE](#) for additional discussion on the use of JSON ...

Posted by [Karlheinz Schwarz](#) at 6:26 AM [No comments:](#) 

Labels: [ASN.1](#), [BER](#), [IEC 61850](#), [IEC 61850-8-1](#), [iec 61850-8-2](#), [IEC 61968](#), [IEC 61970](#), [IEC TC 57 WG19](#), [interoperability](#), [JSON](#), [MMS](#), [XER](#), [XML](#)

3-Day Training for Electrical Engineers New to IEC 61850

3-Day Training for Electrical Engineers New to IEC 61850

17-19 March 2020 | London, UK

Day One: Tuesday 17 March

Core Concepts

Overview of IEC 61850 and introduction to the core concepts, including the hierarchical data model, communication services and the range of applications possible.

Day Two: Wednesday 18 March

Engineering and Configuration

Deep-dive into the IEC 61850 engineering process, learning how to use Substation Configuration Language and engineering tools for IEC 61850 specification, system design and IED configuration.

Day Three: Thursday 19 March

Testing

Learn how to thoroughly test IEC 61850 systems, including functional and system testing as well as gaining an overview of cybersecurity considerations for IEC 61850 systems.

Click [HERE](#) to learn more.

Posted by [Karlheinz Schwarz](#) at [4:30 AM](#) [No comments:](#) 

Labels: [configuration language](#), [engineering](#), [IEC 61850](#), [SCL](#), [seminar](#), [Training](#)

Monday, October 7, 2019

Megger Organizes the First Latin American Protection Conference 6-7 November

Primera edición del Congreso Latinoamericano de Protecciones

La primera edición del Congreso Latinoamericano de Protecciones (<https://www.eventosmeggercsa.com>) a desarrollarse los días 6 y 7 de noviembre del corriente año en el Hotel Meliá, Buenos Aires, Argentina.

El evento reúne a especialistas y líderes en la implementación de sistemas de protecciones orientado a la experiencia del usuario final. Se dirige a lograr un panorama sobre el estado actual y futuro de los sistemas de protecciones dentro de la subestación y en la red más amplia en América Latina.

El programa de dos días abarca ponencias de usuarios, fabricantes, especialistas y expertos, seguido del tutorial de dos horas de duración sobre los Factores de éxito para la utilización de IEC 61850 dirigido por el Ing. Carlos Samitier centrada en los estudios de caso de implementación de IEC 61850 a nivel global, los errores más frecuentes y cómo evitarlos. Además, de los paneles sobre futuras aplicaciones en mantenimiento en IEC 61850 con la participación de los especialistas en tecnologías de ensayo de protecciones.

Los ejes temáticos están relacionados con los Avances y tendencias en IEC 61850, Esquemas avanzados en protecciones, Ensayos automatizados de protecciones eléctricas, Lecciones aprendidas en activaciones de protecciones, Comunicaciones para protecciones, entre otros.

In case you are interest to share your experiences at the conference, contact Mr. Roberto Sartori (Roberto.Sartori@megger.com).

Posted by [Karlheinz Schwarz](#) at [12:55 AM](#) [No comments:](#) 

Labels: [Argentina](#), [Buenos Aires](#), [conference](#), [Cyber Security](#), [IEC 61850](#), [Megger](#), [protection](#), [Smart Grid](#)

Sunday, October 6, 2019

Next week: IXXAT Smart Grid Gateways at IEC 61850 Global 2019 in London, UK

IXXAT (HMS) will be available at the conference to demonstrate you the latest gateway family supporting IEC 61850, IEC 60870-5-104, Profibus, ProfiNet, Ethernet/IP, M-Bus, ...

IEC 61850 Global 2019

London, UK

Oct 14, 2019, 02:00 AM - Oct 19, 2019, 02:00 AM

Drawing together 150+ IEC 61850 specialists and implementation leaders, this end-user-driven programme focuses on achieving **multi-vendor, multi-edition interoperability** within the substation and across the **wider smart grid**.

Click [HERE](#) for more details on the event.

New IIoT gateways from HMS allow industrial equipment to communicate with smart grids ...

Click [HERE](#) for more details to solve smart grid information models and communications.

Note that the gateway will come with MQTT as well ...

Click [HERE](#) for the Gateway with MQTT support.

Posted by [Karlheinz Schwarz](#) at [9:41 AM](#) [No comments:](#) 

Labels: [Beck IPC](#), [Brunner](#), [Gateway](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [IXXAT](#), [MQTT](#), [Profibus](#), [Profinet](#)

Cyber Security and SAFETY in Power Systems

The National Cybersecurity Center of Excellence (NCCoE) at NIST just released a draft of the NIST Cybersecurity Practice Guide, SP 1800-23, **Energy Sector Asset Management**, on September 23, 2019, and is requesting your feedback. Public comments on the draft will close on November 25, 2019. "...that will **help energy organizations address the security**

challenges of OT asset management. ..."

The main objective is to have a look at "programmable logic controllers (PLCs) and intelligent electronic devices (IEDs), which provide **command and control information on operational technology (OT) networks** ..."

Click [HERE](#) for the Guide.

The Guide seems to be written by mainly non-protection engineers or even non-electrical engineers. I have read the other day in a discussion about the Guide that the term **SAFETY** was not mentioned in the guide ... huhh ...

Here is my explanation why SAFETY is not in the scope:

The safety in electric power systems is mainly managed by PROTECTION devices. These devices protect humans, equipment and power flow. Protection has the highest priority in electric power systems. Protection is also crucial for availability and reliability. Protection engineers are - in my view - the most critical engineers.

My experience is that IT and OT people fear the high voltage ... starting at 100 Volt or so ... so, that may be the reason the document NIST SP 1800-23 does not discuss any protection (SAFETY) related function.

They don't have Sr. protection engineers in their mind ... maybe they don't know what these engineers are doing ... and how important they are to keep the power flowing.

A friend of mine (a senior protection engineer) and I have conducted many IEC 61850 seminars together ... I have always admired him!!

My friend answered:

In general unfortunately it is as you describe.

The circuit breaker doesn't work? The protection engineers have invented the "breaker failure". This is a bit biased, any component can fail of course...

The Sampled Values are not delivered? The relay has to manage that. They are "delivered wrong"? The relay has to try to understand it and be robust.

Yes, it is probably more difficult to design and set a good protection system (including the design of the relay) than doing an airplane...

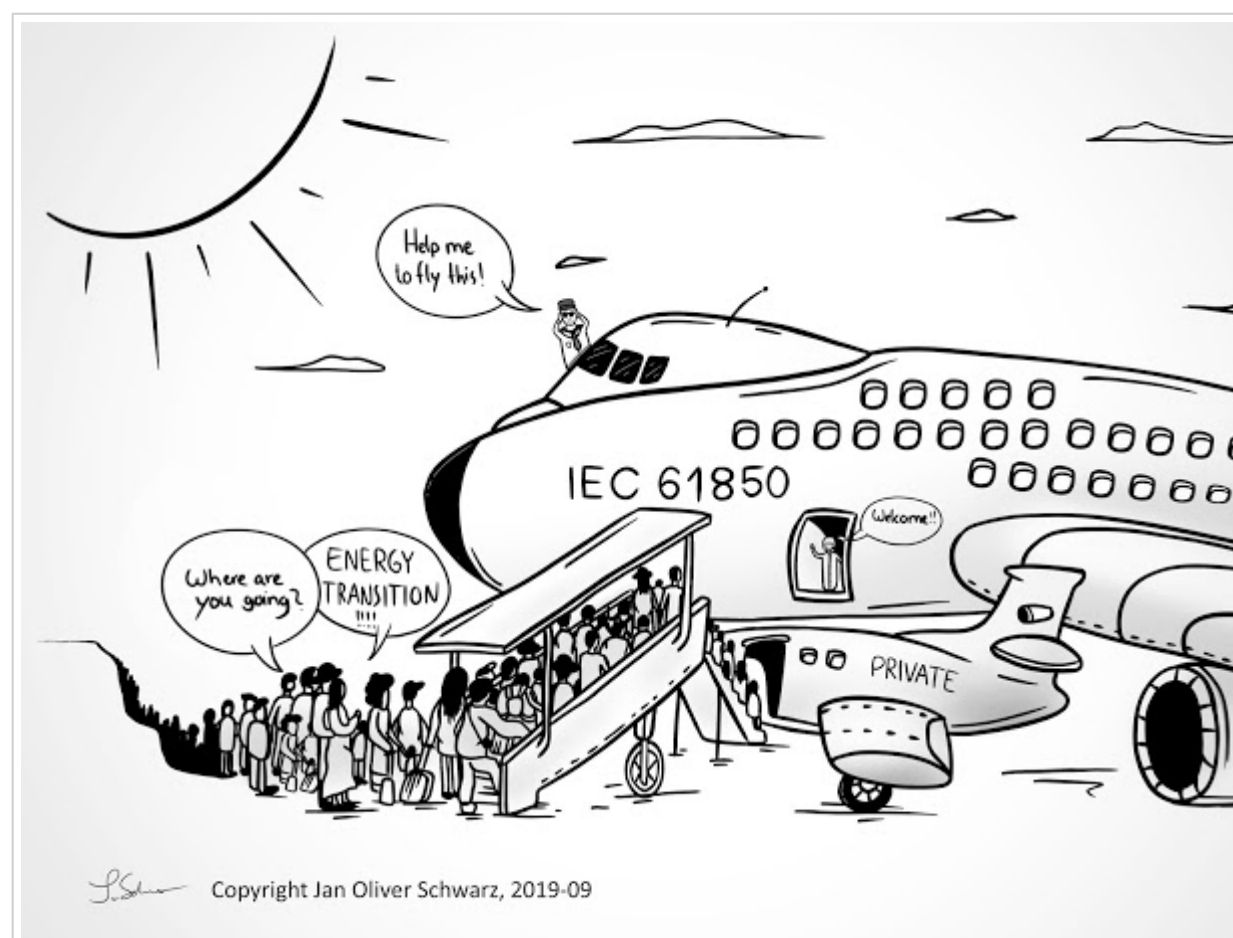
Posted by [Karlheinz Schwarz](#) at 9:15 AM [No comments:](#) 

Labels: [IEC 61850](#), [IED](#), [NIST](#), [PLC](#), [protection](#), [safety](#), [security](#), [Substation](#)

IEC 61850 For Monitoring Data - Private or Standard?

One of the most crucial issues in the management of energy systems is: HOW TO share or exchange useful information generated by a myriad of sensors and applications needed by hundreds of applications?

Lets assume that lakes of information are generated every second. Usually this information is stored in silos of vendors specific solutions and communicated using one or more vendor specific communication solutions ... as shown in the following sketch drawn by our grandson Jan Oliver:



The expectations to apply IEC 61850 are high! BUT quite often vendors argue, that it is easier to use their private solutions - faster and saves time and costs! This may be true for the first phase of a project - but in the long run and in the view of the life time cost it may be completely opposite.

Three experts from Vattenfall DSO (Sweden; Vincent GLINIEWICZ, David EROL Anders JOHNSON) have reported at the CIRED conference 2019-06 in Madrid (Spain) from an implementation of a pilot project using IEC 61850 and CIM with the title:

LEVERAGING INDUSTRY STANDARDS TO BUILD AN ARCHITECTURE FOR ASSET MANAGEMENT AND PREDICTIVE MAINTENANCE

Excerpt from the paper:

"... However the data unfortunately currently often remain unused and unshared outside of the substation or specific silos for various reasons, some technical (e.g. cyber security, system incompatibility), some and organizational (e.g. vendor lock-in, siloed applications and organizations).

Additionally, with an increasing number of use cases requiring access to information, there is a growing number of information flows needed not only between data sources and central level applications but also between these central level applications. Without an IT architecture that allows reuse of information flows, there are legitimate concerns that the opportunities that digitalization promises might be delayed and costly or even worse, not be achievable.

As a result, Vattenfall Eldistribution sees a standard based integration approach as a cost-effective approach that seems to offer in the long run low integration costs and more importantly a greater flexibility, going from supplier specific integrations to a more generic approach. ...

We would also like to highlight some of the deviations from the standards that were observed during this pilot:

The pilot made use of a REST API towards the real time data historian (RTDH in fig. 2), although there was no mention of REST in the 61968-100 standard. One could however expect, given the increasing popularity and use of RESTful services in most industries, that the standard will soon follow and that the mention will be added in a further edition on the standard.

The gateway used in the pilot was a prototype base on a technical report (IEC TR 61850-90-2) [Using IEC 61850 for communication between substations and control centres] which is not yet a standard. This might explain why there doesn't seem yet to be a complete and robust 61850-90-2 compliant product on offer in the market. Another alternative considered for the pilot gateway was the use of IEC 61850/MMS towards the substation and the use of web services (either RESTful+ JSON or SOAP) to communicate northbound instead of the IEC 61850/MMS used in the pilot. SOA has indeed a robust and well developed architecture for distributed computing, and this should be leveraged. There however did not seem to be any products available on the market. This alternative will be explored in a coming pilot. ..."

The paper concludes:

"Although the pilot was made for a primary substation, the widespread use of the IEC 61850 standards series make the results of this pilot not only applicable for primary substations, but potentially also secondary substations and microgrid.

Following the successful pilot, the next step is to look at how to fully implement and verify the concepts in a real substation and to secure production grade components where prototypes have been used as well as test the architecture through other smart grid use cases."

Click [HERE](#) for the full paper.

I have run an UCA/IEC 61850 pilot project with Anders Johnsson some 20 years (!) ago:

Two reports out of this pilot project and other discussions have been published in 2002:

Wind Power Communication Verification report and recommendation

Click [HERE](#) for the Report.

Wind Power Communication - Design & Implementation of Test Environment for IEC61850/UCA2

Click [HERE](#) for the Report.

Enjoy the reports.

By the way: It took some 20 years to understand that the mapping of IEC 61850 models and communication protocols to MMS (ISO 9506) should be extended by a much easier and simpler mapping to JSON and, e.g., MQTT or http ...

It is not too late for such an additional standardized mapping ... e.g., as IEC 61850-8-3.

It may take another 10 years before this becomes true! Hope it will happen a bit earlier!

[Further reading on the subject see discussion of IEC 61850-8-1 versus 8-2 \(some 1,800 visits of the post since July 2019\).](#)

Other people have [similar ideas and published the following paper](#):

International Electronical Committee (IEC) 61850
Mapping with Constrained Application Protocol
(CoAP) in Smart Grids Based European
Telecommunications Standard Institute
Machine-to-Machine (M2M) Environment

Posted by [Karlheinz Schwarz](#) at 7:07 AM No comments: 

Labels: [ASN.1](#), [BER](#), [CIM](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [iso 9506](#), [JSON](#), [microgrid](#), [MMS](#), [Modbus](#), [MQTT](#), [OPC](#), [OPC UA](#), [Substation](#), [Vattenfall](#)

Friday, October 4, 2019

IEC 61850 All Over At CIRED Conference 2019-06 in Madrid Spain

I was really surprised to browse through some of the 51 papers presented at the CIRED Conference 2019-06 in Madrid Spain **that refer to IEC 61850 !!**

Click [HERE](#) for the CIRED search engine. Enter "**61850**" and you will find the links to the 51 papers presented this year that mention IEC 61850 by some means or other.



Unfortunately I don't have time to study them all in detail ... hope to find some time soon.

While searching the web, I found another very interesting paper:

International Electronical Committee (IEC) 61850
Mapping with Constrained Application Protocol
(CoAP) in Smart Grids Based European
Telecommunications Standard Institute
Machine-to-Machine (M2M) Environment

Click [HERE](#) for accessing that paper. More to come ...

Posted by [Karlheinz Schwarz](#) at 11:00 AM No comments: 

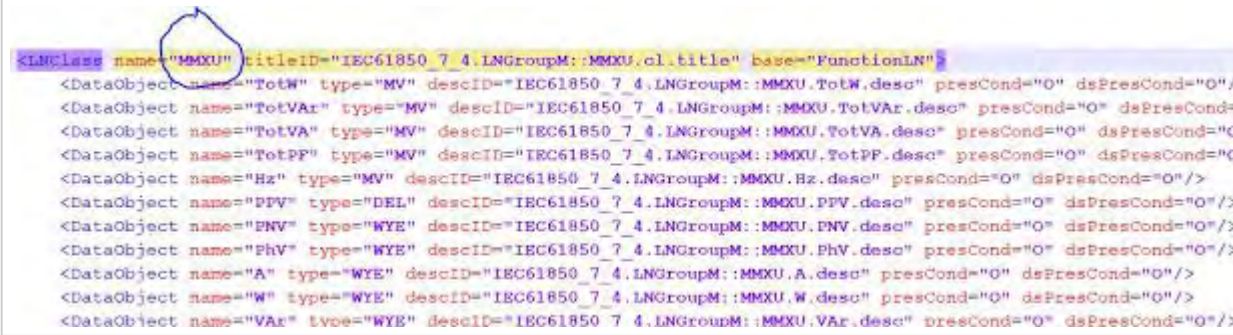
Labels: [IEC 61850](#), [M2M](#), [mapping](#), [message encoding](#), [MMS](#), [MQTT](#), [SCSM](#)

Saturday, September 28, 2019

IEC Offers Code Components for IEC 61850 and other standards

One of the most crucial benefits of IEC 61850 information models is the availability of code components - the possibility to get a computer processable document that contains the formal definition of a model, e.g., the measurements of a three phase system.

Excerpt of MMXU:



The following document has just been published:


Handling of Code Components in IEC Standards Including Copyright Licensing

Handling of Code Components v8.0 2019-08-29

This document sets out the process and rules to be used by IEC groups (TCs, SCs, PCs, WGs, SyCs, ...) and experts in charge of editing IEC documents to ensure a proper handling of copyright licensing of code components included in IEC deliverables. It also defines the technical and process requirements to consider to optionally offer a free access to certain code component(s) through the IEC web site. At the current time this document only applies to IEC TC57

Click [HERE](#) for the full document.

Click [HERE](#) for the list of name space available for immediate access.

Posted by [Karlheinz Schwarz](#) at 4:46 AM [No comments:](#) 

Labels: [Code Components](#), [IEC 61850](#), [name space documents](#)

Wednesday, August 28, 2019

Why Is It So Easy To Map IEC 61850 Signals to JSON Objects?

IEC 61850 defines Device Models for the exchange of information between any two or more entities. The Models are structured as unique branches of a tree. That means:

Each **path from the Device (Root)** to
any **node or leave** of the trees is unique

The signals are composed of an access reference (LDName/LNName.DOI. ...) and the value that corresponds with the path.

Example of two leaves:

LDName/Tran1STMP1.Tmp.mag.f = 23.5 (Temperature value)

LDName/Tran1STMP1.Tmp.units.SIUnit = °C (Temperature engineering units)

These are **key-value pairs** that could easily map to JSON Objects:

```
"LDName/Tran1STMP1.Tmp.mag.f" : "23.5"  
"LDName/Tran1STMP1.Tmp.units.SIUnit" : "°C"
```

These JSON objects are

- Light-weight
- Language independent
- Easy to process with Python, ...
- Text based and human readable
- JSON Schemas could support automatic (syntax and semantic) checks
- JSON is supported by many controllers

The controller of our PV inverter from Fronius has an http/JSON interface. The following request (lines 1-3) returns many common inverter data (line 21ff):

```
1 http://192.168.178.xxx/solar_api/v1/GetInverterRealtimeData.cgi?  
2 Scope=Devices&DeviceId=1&DataCollection=CommonInverterDataScope=Devices&  
3 DeviceId=1&DataCollection=CommonInverterData  
4  
5  
6 {  
7   "Head" : {  
8     "RequestArguments" : {  
9       "DataCollection" : "CommonInverterData",  
10      "DeviceClass" : "Inverter",  
11      "DeviceId" : "1",  
12      "Scope" : "Device"  
13    },  
14    "Status" : {  
15      "Code" : 0,  
16      "Reason" : "",  
17      "UserMessage" : ""  
18    },  
19    "Timestamp" : "2019-08-30T13:31:06+02:00"  
20  },  
21  "Body" : {  
22    "Data" : {  
23      "DAY_ENERGY" : {  
24        "Value" : 24590,  
25        "Unit" : "Wh"  
26      },  
27      "FAC" : {  
28        "Value" : 49.98,  
29        "Unit" : "Hz"  
30      },  
31      "IAC" : {  
32        "Value" : 22.36,  
33        "Unit" : "A"  
34    }  
35  }  
36 }
```


Lesson learned: Controller in inverter could easily provide an http/JSON interface.

The Device Model is a virtual model that could be configured using the SCL (System Configuration Language, IEC 61850-6). The Device Model is implemented in an IED and could be accessed to get the self-description, read, write, send/receive reports, publish/subscribe, ...

An IEC 61850 Server hosted by an IED could easily map the model to JSON objects that may be communicated with MQTT, HTTP, ...

The mapping to JSON is quite easy. It could be implemented by a simple automatic process that parses the model (SCL/XML), searches for the paths and concatenates the names from the root to the leaves to get the reference! AND: the mapping preserves the semantic - the meaning represented by the path name.

The mappings of IEC 61850 Models to IEC 60870-5-104, DNP3 or Modbus would result in messages that have lost the semantic of the signals. These solutions have mainly numbers as reference - these numbers have no meaning in the communication.

Posted by [Karlheinz Schwarz](#) at [7:50 AM](#) [No comments:](#) 

Labels: [hierarchical model](#), [http](#), [IEC 61850](#), [JSON](#), [mapping](#), [MQTT](#), [Object model](#), [SCL](#)

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WEITERE INFORMATIONEN OK

Wednesday, August 28, 2019

FDIS Ballot for Amendment 1 for IEC 61850-7-2, 7-3 and 7-4 Edition 2 Approved

The ballot of the three amendments (Amendment 1 for IEC 61850-7-2, 7-3 and 7-4 Edition 2) passed the FDIS process. All three amendments have been approved by 100 %.

The next step will be the IS publication of the three amendments.

It is likely that there will be a consolidated version of each of the three parts - means: the amendment is merged into the edition 2 versions and become edition 2.1.

Posted by [Karlheinz Schwarz](#) at [5:35 AM](#) [No comments:](#) 

Labels: [amendment](#), [Edition 2.1](#), [IEC 61850-7-1](#), [IEC 61850-7-2](#), [IEC 61850-7-3 Edition 2](#)

IEC 61850 Sampled Values and GOOSE Messages Reduce Complexity and Cost

Synaptec Ltd (a spin-out technology company from the University of Strathclyde, UK) developed a distributed electrical sensing technology platform using IEC 61850. The approach allows measured values from up to 50 current transformers to be acquired passively using a single optical fibre core over a distance of up to 50 km. These measured values can then be utilised as part of centralised PAC schemes, or communicated to traditional PAC devices for analysis via IEC 61850-9-2 / 61869-9. By centralising current measurements, this method eliminates the need of having multiple protection relays at each line ends, complex time synchronisation systems at measurement points, and complex telecommunications equipment among the distributed PAC devices.

Click [HERE](#) for downloading the 12 page paper (*Differential protection of multi-ended transmission circuits using passive distributed current sensors*) describing the application and approach to solve a very crucial challenge.


Another paper (*Implementation of centralised, numerical busbar protection using distributed photonic current sensors*) describes the design and testing of the first centralised busbar protection scheme that makes use of distributed photonic current sensors and IEC 61850. By utilising distributed, passive sensors which are interrogated purely using standard optical fibre, the requirement for active units in the substation yard is completely eliminated. Additionally, the use of copper wiring from CTs to measurement units may be eliminated. The scheme, designed and built for Statnett by Synaptec, will be installed and trialled at Statnett’s Furuset R&D substation near Oslo, Norway. A prototype centralised busbar protection algorithm, validated with the University of Strathclyde, will run on the central merger unit to prove the principle of centralised busbar protection using a single active IED.

Click [HERE](#) for downloading the paper.

Click [HERE](#) for the Synaptec news (Norwegian TSO Statnett innovates with Synaptec technologies):

With one system able to instrument 50 locations synchronously, 6 busbar feeders will be independently and simultaneously protected by one system, with capacity to spare for novel temperature and vibration monitoring of nearby HV assets, such as transformers.

The development and the applications show that the standard series IEC 61850 has all the "tools" helping to keep the power flowing and the grass green - at all voltage levels.

Posted by [Karlheinz Schwarz](#) at [2:38 AM](#) [No comments:](#) 

Labels: [9-2LE](#), [GOOSE](#), [IEC 61850](#), [IEC 61850-9-2](#), [protection](#), [sampled value](#), [Sensors](#), [Stattnet](#), [Synaptec](#)

Monday, August 19, 2019

Tissue Process for IEC 61850-8-2 open for posting Tissues

Please note that the Tissue Database is now open for part IEC 61850-8-2:

Communication networks and systems for power utility automation –
Part 8-2: Specific communication service mapping (SCSM) – **Mapping to Extensible Messaging Presence Protocol (XMPP)**

<http://tissue.iec61850.com/part/52>

Posted by [Karlheinz Schwarz](#) at [2:19 AM](#) [No comments:](#)

For your Convenience

[An All NEW Evaluation, Demo, and Hands-On Package for IEC 61850 \(IEC 61400-25\) available \(2017-07-03\)](#)

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[Old Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[NEW! Blog as single PDF until 23 April 2017 \[17 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

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Labels: [iec 61850-8-2](#), [tissue database](#), [XMPP](#)

Friday, August 16, 2019

VDMA-Leitfaden: "Interoperabilität durch standardisierte Merkmale"

Der VDMA (Verband Deutscher Maschinen- und Anlagenbau) hat diese Woche einen sehr interessanten 70-seitigen Leitfaden zu **Industrie 4.0** veröffentlicht!

**Interoperabilität durch
standardisierte Merkmale
Leitfaden für Industrie 4.0**

[HIER](#) klicken für mehr Information und den Kontakt.

„Der Leitfaden „Interoperabilität durch standardisierte Merkmale“ beschreibt, wie **Signale und Werte zwischen Fertigungseinheiten ausgetauscht werden** und folgt so der Industrie 4.0-Idee.

Das Schlüsselwort ist "Standardisierung". Produkte, Einzelteile Baugruppen oder Anlagenelemente sind durch Merkmale beschrieben, die in einem Format übertragen werden. Die Merkmalbeschreibung sowie das Übertragungsformat liegen in **standardisierter Form vor und bilden eine gemeinsame "Sprache". Diese Sprache bildet die Basis dafür, dass empfangende Systeme die Daten korrekt verstehen, ...**“

Der Leitfaden hat natürlich meine Neugierde und mein Interesse geweckt!

Die hier empfohlenen Maßnahmen und Vorgehensweisen gehen genau in die richtige Richtung ... sie setzen im Prinzip da auf, wo wir Anfang der 90er Jahre mit MAP 3.0 und den MMS-Companion-Standards aufgehört haben!

Seit 2005 haben wir zwei Normenreihen (IEC 61850 und IEC 61400-25), mit denen ein guter Teil der im Leitfaden vorgeschlagenen Methoden realisiert wurde und global angewendet wird – leider „nur“ im Bereich der elektrischen Energieversorgung (und hier anfangs zunächst im Hochspannungsbereich). Vor allen elektrischen Systemen mit mehr als 400 V haben die meisten Automatisierer ohnehin großen Respekt – und lassen die Finger von Automatisierungslösungen in diesem Bereich. Das hat sich heute schon vielfach als Fehler herausgestellt.

Die meisten Experten - auch aus dem Maschinen- und Anlagenbau - erwarten nicht, dass wir für die anfangs auf die elektrische Energieversorgung fokussierte Automatisierungswelt Lösungen definiert haben, die auch in vielen anderen Bereichen angewendet werden können!! Ja wirklich!

Es ist ja schon (fast) alles definiert und genormt worden – nur noch nicht von allen!!

Posted by [Karlheinz Schwarz](#) at [8:29 AM](#) [No comments:](#)

Labels: [IEC 61400-25](#), [IEC 61850](#), [Industrie 4.0](#), [interoperability](#), [MAP](#), [MMS](#), [VDMA](#)

Monday, August 12, 2019

IEC TC 57 Just Published the IEC 61850-90-11 on Logics

IEC TC 57 Just Published the 90 pages of the Draft Technical Report IEC 61850-90-11 (57/2129/DTR)

Communication networks and systems for power utility automation –
Part 90-11: Methodologies for **modelling of logics for IEC 61850 based applications**

Voting closes 2019-10-04

"This Technical Report of IEC 61850 describes the methodologies for the modelling of logics for IEC 61850 based applications. ... the technical report

- Defines different application uses cases where all aspects to be considered are clearly identified.
- Describes the functional requirements and the intended engineering process
- Proposes a suitable solution in the context of IEC 61850 based on an investigation of the different possibilities to model the logic.
- Describes the impact on various parts of IEC 61850"

If, when and how this Technical Report will impact implementations of tools and IEDs is quite open. I remember that we had heated debates on the question how to deal with (internal) logics already some 10 years ago.

If you are planning to apply IEC 61850 - please DO NOT wait until this part 90-11 offers stable definitions ... IEC 61850 (as it is defined today) has enough to get started! ;-)

Posted by [Karlheinz Schwarz](#) at [2:41 AM](#) [No comments:](#)

Labels: [engineering](#), [IEC 61131-3](#), [IEC 61850](#), [IEC 61850-90-11](#), [Logics](#)

► [2013](#) (130)

► [2012](#) (188)

► [2011](#) (159)

► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Thursday, August 8, 2019

Crucial Vulnerabilities Exist in the VxWorks IPnet Stack

According to Security Week (reported the other day):

"In late July, IoT security firm Armis disclosed eleven vulnerabilities found by its researchers in the VxWorks real time operating system (RTOS). The flaws, six of which have been described as critical, can allow a remote attacker to take control of impacted systems. Armis said the vulnerabilities exist in the VxWorks IPnet stack and they **expose over 200 million mission-critical devices from around the world** to attacks, including in the healthcare, manufacturing, cybersecurity, tech, and industrial automation sectors. ..."

Devices from several vendors might be impacted ...

Click [HERE](#) for the full report. There you find links to the vendor's recommendations ... You know what that could mean? One vendor notes: **"Applying the update causes the device / module to go through a single restart cycle."**

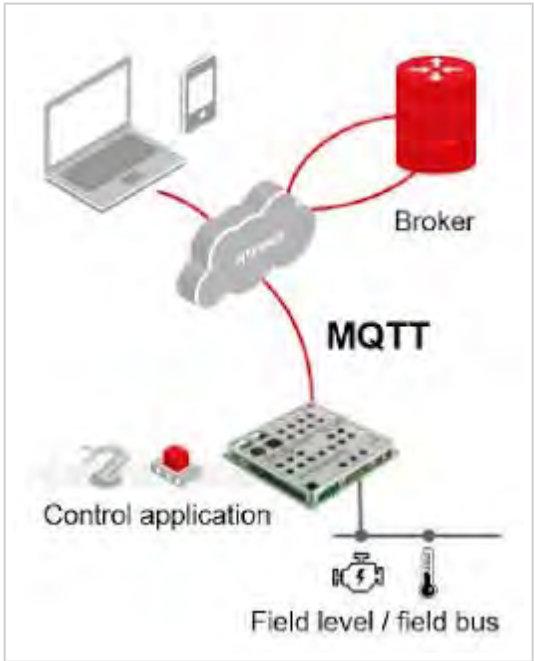
Posted by [Karlheinz Schwarz](#) at 5:05 AM [No comments:](#) 

Labels: [ABB](#), [Belden](#), [Cyber Security](#), [Rockwell](#), [Schneider Electric](#), [Siprotect 5](#), [vulnerability](#), [VxWorks](#)

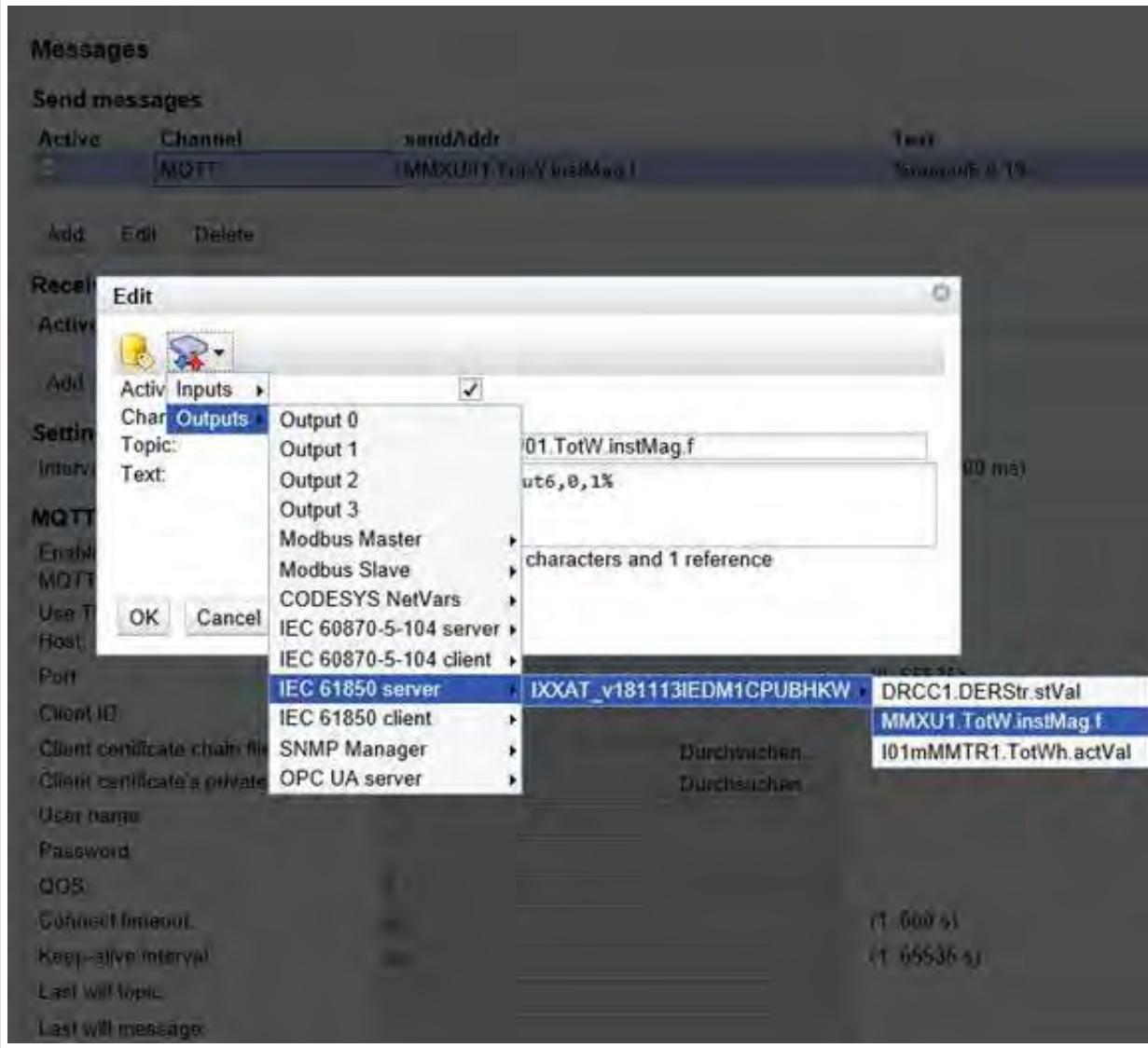
Monday, August 5, 2019

Beck IPC offers MQTT@CHIP in addition to IEC 61850 and other protocols

[Beck IPC \(Wetzlar, Germany, a subsidiary of HMS\)](#) is known for their solutions on a single CHIP offering support for IEC 60870-5-104, IEC 61850, Modbus, CANBus, Profibus, Profinet, OPC UA, ... now offers [MQTT@CHIP as an additional solution](#).



The MQTT can be configured on the WEB PLC like it is implemented for other protocols:

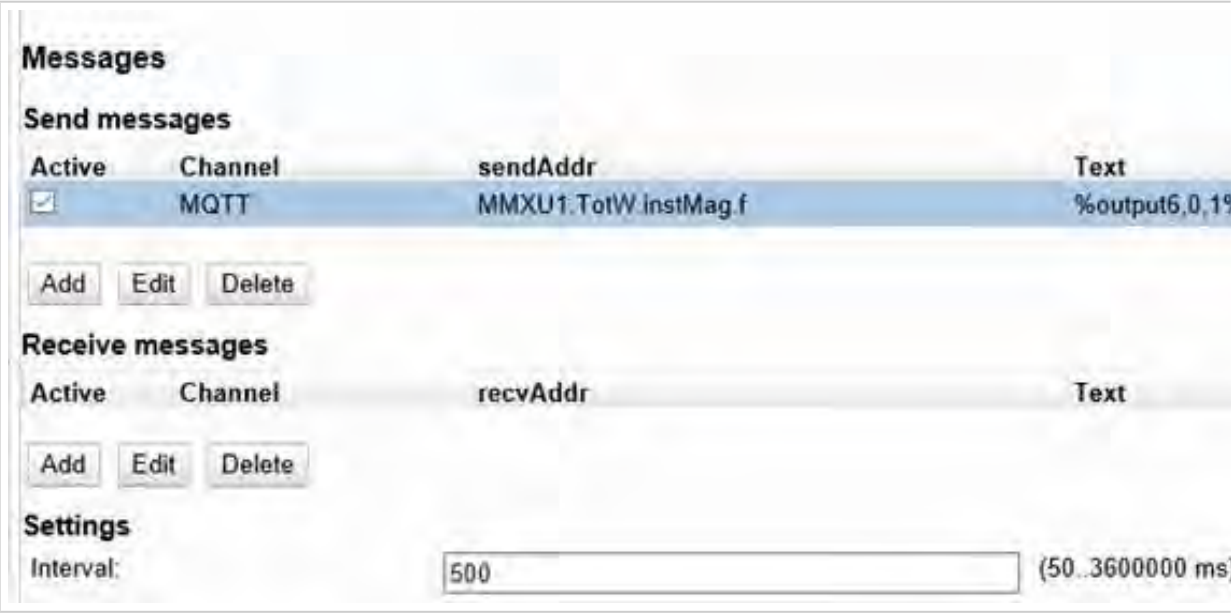


In the above example I have mapped a signal from an IEC 61850 Server the signal MMXU1.TotW.instMag.f to a MQTT message. This way you can tag the signal as a JSON Object!!

JSON Objekte:

{ „MMXU01.TotW.instMag.f“: 2325, „MMXU01.Hz.instMag.f“: 49.98 }

Message specification:



This way you can send MQTT messages with values from any other protocol or from the IEC 61850 client or server model. This way you can even map to/from GOOSE messages.

I have used the solution running on the [IXXAT Smart Grid Gateway](#). The WEB PLC version 19.2 is required to run MQTT on the gateway.

Very well done!

Posted by [Karlheinz Schwarz](#) at 4:35 AM No comments:

Labels: [Beck Chip](#), [CAN](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [IXXAT](#), [JSON](#), [Modbus](#), [MQTT](#), [OPC UA](#), [Profibus](#), [Profinet](#)

IEC Draft TR 61850-90-9 - "IEC 61850 for Electrical Energy Storage Systems" Published

IEC TC 57 just published the 138 page IEC Draft TR 61850-90-9

IEC 61850 for Electrical Energy Storage Systems

57/2128/DTR
Voting closes 2019-09-27

This is one of the next crucial extensions for DER-Models of IEC 61850-7-420. This TR will be merged into the 7-420 later on.

The Introduction states: " ...This technical report is primarily based on the recommendation 5.7.4. "interface, control and standard data elements", of the IEC white paper "Electrical Energy Storage" published in December 2011 by the MSB. The recommendation proposes the necessity of a standardization of interfaces between storage and other grid elements, protocols for data exchange and control rules, and data elements for input, output and control information supplied by or to storage systems. ..."

Click [HERE](#) for the mentioned IEC White Paper.

"This technical report describes IEC 61850 information model for electrical energy storage systems (EESS). Therefore the report only focuses on storage functionality in the purpose of grid integration of such systems at the DER unit level. Higher level Interactions are already covered in IEC 61850-7-420. ... "

The draft defines more than 150 new Data Objects. Excerpt of the first 15 Data Objects:

AhrMinRtg	(DBAT) Minimum resting amp-hour capacity rating allowed
AhrRtg	(DBAT) Amp-hour capacity rating
Amp	(DBAT) Battery drain DC current
AvlChaAhr	(DBAT) Available charge capacity: not yet stored and available for being charged in Amp-hours
AvlChaW	(DER_StorageLN) Available charging power
AvlChaWTm	(DER_StorageLN) Available charging time
AvlDschAhr	(DBAT) Available discharge capacity: stored and available for discharging in Amp-hours
AvlDschW	(DER_StorageLN) Available power
AvlDschWTm	(DER_StorageLN) Available discharging time
BatEF	(SBAT) If true, Battery Earth Fault is present
BatSt	(DBAT) State of the battery
BatTestRsl	(DBAT) Battery test results
BatTyp	(DBAT) Type of battery: Lead-acid Nickel-metal hydrate Nickel-cadmium (NiCd) Lithium ion Carbon zinc Zinc chloride Alkaline Rechargeable alkaline Sodium sulphur (NaS) Flow Not applicable / Unknown Other
CellParCnt	(DBAT) Number of cells in parallel
CellSerCnt	(DBAT) Number of cells in series

The blue marked text refers to the Logical Node from which this Data Object is inherited.

This document refers to the standards IEC 61850-7-x and defines additional very crucial information for the configuration, control, monitoring of a battery system. It is very crucial for the success of the DER models to get implementation and application experience with these very comprehensive and complex models. Taking into account that the mentioned White Paper was already published in 2011, we learn a crucial lesson: It took a lot of time to get where we are today. And it will take years to get these definitions implemented and used in the power delivery systems. In the mean time you need to tap the experience of engineers that understand the possible use-cases that can harvest the benefits of applying these standards.

Posted by [Karlheinz Schwarz](#) at 2:46 AM [No comments:](#) 

Labels: [batteries](#), [EES](#), [Electrical Energy Storage](#), [IEC 61850](#), [IEC 61850-90-9](#), [logical node](#)

Thursday, July 18, 2019
VDE-Studie "Lösungsansatz für Zellulares Energiesystem"

In dem neuen Papier „Zellulares Energiesystem“ zeigt jetzt der Technologieverband VDE eine effiziente und konsensfähige Lösung für eine erfolgreiche Umsetzung der Energiewende: Die VDE-Experten empfehlen den Strom direkt dort zu verbrauchen, wo er erzeugt wird, nämlich auf lokaler und regionaler Versorgungsebene. Bei diesem „zellularen Ansatz“ erfolgt die Umsetzung der dezentralen Energieversorgung auf Basis zellulärer Strukturen.

[Hier](#) zum kostenlosen Download der Studie klicken.

Die Studie verdient vollen Respekt! Der holistische Ansatz verbindet viele der bisher versprengten, wenig aufeinander abgestimmten Lösungen zu einem ganz Neuen (dem zellularen Ansatz). Herzlichen Glückwunsch!

Der zellulare Ansatz wirkt teilweise futuristisch ... man darf natürlich auch mal träumen! Konkrete Leitlinien für einen Teil der Bürger unserer Gesellschaft sind allerdings rar und insbesondere der Aspekt der „überlebensdienlichen“ Notwendigkeiten scheinen etwas unterbelichtet zu sein. So heißt es auf Seite 26 : „Der Inselnetzbetrieb im zellularen

Energiesystem soll nur im Notfall eine Option sein. Im Normalfall sind der Verbundbetrieb und die Solidarität die Regel.“

Es müssen unbedingt „überlebensdienliche“ Lösungen in Form von kleinen (vorübergehend) autarken, kostengünstigen Systemen (beispielsweise PV-System mit ein paar kWp, einem Batteriewechselrichter und ein paar Batterien) implementiert werden, um im wirklich großen oder kleinen Notfall Überlebenschancen für viele – besonders für Schwache – zu bieten.

Hintergrund für diese Position:

Meine Frau benötigt 24/7 ununterbrochene nicht-invasive Beatmung durch zwei Geräte mit jeweils 4-h-Akku Notfallversorgung. Ein Gerät für den Tag und eines für die Nacht. Ein 10-stündiger Stromausfall würde wahrscheinlich ... unvorstellbar.

Beatmungsgeräte für invasive beziehungsweise nicht-invasive Beatmung sind zigtausendfach im Einsatz! Manche gehen von mehreren 100.000 aus!

Auf der anderen Seite haben wir eine netzgekoppelte PV-Anlage mit knapp 10 kWp ... soweit so gut. Die nützt uns im Notfall nicht, weil sie nur mit dem öffentlichen Netz zusammen funktioniert.

Bei einem Netzausfall würden unsere PV-Module nutzlos auf dem Dach liegen und sich „sonnen“ ohne einen Sonnenbrand zu bekommen ... sie würden allerdings weiter Schutz für nistende Tauben bieten.

Momentan überlegen wir, wie wir die Module im Notfall manuell auf einen Batterie-Wechselrichter umschalten könnten. Das würde helfen, einen Teil der für Notfälle benötigte Energie vom Dach zu ernsten ... der Salat und die Tomaten im Garten würden ohnehin auch ohne Strom wachsen. Wasser können wir per Handpumpe aus dem Rheingraben pumpen.

Wir alle sollten mal überlegen, wie wir diese oder eine ähnliche Notfalloption unter die Leute bringen könnten ... das wäre zwar nicht netzdienlich – aber auf jeden Fall auch gemeinschaftsdienlich! Geladene Batterien und mobile Inverter könnten auch an die Nachbarn oder ... ausgeliehen werden.

In unserem Fall haben wir zwei Notstromaggregate, Benzinvorräte und ein paar Bleiakkus mit zugehörigen Invertern. Für den Notfall würde ich gerne einfach einen Teil der Module manuell auf einen Batteriewechselrichter (vielleicht 2 kWp) umschalten. Wenn das Netz wieder verfügbar ist, dann kann man wieder zurückschalten.

Noch eine kleine Nebenbemerkung zum Thema IEC 61850 auf Seite 38:


„Für die Kommunikation und das Datenmanagement im Prozessnetz haben sich in den letzten Jahren u.a. die IKT-Standards IEC 60870 (Datenmodelle für Energiemanagement) und IEC 61850 (Kommunikation) etabliert.“

Hier wurden offensichtlich die beiden Normen verwechselt! IEC 61850 bietet Datenmodelle ... u.v.a. mehr und IEC 60870 bietet nur Kommunikation.

Beim Thema „Kommunikationsstandard“ haben wir mittlerweile mit den vielen neuen Ansätzen bei IEC 61850 eine hinreichende Basis, um die meisten notwendigen Informationsaustauschmechanismen ((Funktions)Modelle, Dienste und Protokolle) implementieren zu können. DER-Modelle (61850-7-420) werden zurzeit beispielsweise am KIT bei der Realisierung mehrerer Forschungsprojekte verwendet ... das sind erfolgsversprechende Ansätze!

Ich würde mich freuen, wenn der Aspekt „überlebensdienlich“ im hier beschriebenen Usecase in Zukunft in einfache technische und sinnvolle Lösungen einen zielführenden Niederschlag finden würde!

Dieser Vorschlag, den ich einigen Experten aus dem VDE-Umfeld vorgestellt habe, hat bereits nach zwei Tagen viele positive Rückmeldungen bewirkt!

Posted by [Karlheinz Schwarz](#) at 2:49 AM [No comments:](#) 

Labels: [blackout](#), [IEC 61850](#), [Notstrom](#), [zellulare Lösung](#)

Wednesday, July 17, 2019

How to ring the front door bell in case of power outage?

Today I had a phone call with a friend discussing what happens when we suffer a blackout. I was sitting in my home office in the basement when the door bell was ringing. I asked my friend: What would happen, when we would have a power outage here at home?

He sent me a nice picture that I used as an instruction to install a very useful (new) SuperCat bell push at our front door:



The blackout-resisting front door bell

If you push the left button ... Auuuuutsch ... we would hear you crying ... haha.

Nice blackout-resisting door bell. I have removed it later ;-)

Posted by [Karlheinz Schwarz](#) at [7:34 AM](#) [No comments:](#)

Labels: [blackout](#), [power outage](#)

Thursday, July 11, 2019

Holistic Engineering and IEC Standards

One of the most crucial challenges in Electric Power Systems in the future is the fact that multiple aspects like planning, design, configuration, data acquisition, operation, protection, error detection, maintenance, ... security, ... at several layers (process, asset management, ...) are so co-joined with each other and interdependent.

Is this new? No! Some 400 years (!) ago, Rene Descartes was recommending to apply a holistic approach for all sciences ... he did not know the huge interconnected Power systems in Europe, China, USA, ... here is what he has written [extended by myself]:

"Hence we must believe that all the sciences *[of the real word of the electric power delivery system and the models of that world that describe different aspects of overall control (CIM), Substation control & protection (IEC 61850), maintenance of assets (RDS PP), ... security]* are so interconnected, that it is much easier to **study them all together** than to isolate one from all others.

If, therefore, anyone wishes to search out the truth of things *[standardize the various aspects of the electric power delivery system]* in serious earnest, he ought not to select one special science *[CC control, SS control & protection, asset monitoring, ... security]*, for all the sciences *[aspects]* are cojoined with each other and interdependent."

Rene Descartes (1596-1650)
[text] by Karlheinz Schwarz, 2019-07-11

I highly recommend to educate young people in a way that they get a holistic understanding of the many aspects of the electric power system ... focusing on one or two aspects may cause at the end of the day many problems. The main aspect still is to understand the physics of such a huge system. Any programmer of software impacting the safety of the power delivery system should be educated in physics and especially electrical systems. So, understanding MMS, IEC 61850 or OPC UA is good - BUT engineers should understand the process (electrical system) they are manipulating with some lines of code. Engineers should also be trained thoroughly in the many aspects.

Unfortunately there is quite often little budget for comprehensive training in several aspects. Ask your management for more training - better: more hands-on training!!

Posted by [Karlheinz Schwarz](#) at [8:30 AM](#) [No comments:](#)

Labels: [CIM](#), [education](#), [IEC](#), [IEC 61850](#), [IEC Standards](#), [OPC UA](#), [peopleware](#), [smart people](#), [Training](#)

Friday, July 5, 2019

IEC 61850-8-2 Versus IEC 61850-8-1

Many people have complained that IEC 61850 is far too complex ... especially because of the mapping defined in IEC 61850-8-1 as the SCSM (Specific Communication Service Mapping)

using ISO 9506 MMS as the carrier to exchange IEC 61850 client/server messages. MMS (Manufacturing Message Specification) offers generic objects (NamedVariables, NamedVariableLists, ...) and services (Read, Write, InformationReport, ...). The application of MMS for IEC 61850 requires to define very tricky mappings ...

Click [HERE](#) for downloading the FDIS of ISO 9506-1.

Click [HERE](#) for downloading the FDIS of ISO 9506-2.

As the convenor of ISO TC 184/SC WG2 (responsible for MMS for many years) I have supported MMS allover ... and I still do it. It is a solution that works well for years ... especially in the domain of substation automation. Other application domains, e.g., DER devices connected directly to a control center (without the need of horizontal communication with up to hundreds of devices), could make use of a lighter message service and mapping concept. The idea of using webservices was discussed many years ago. The IEC TC 57 set up a team to look into it.

The following document written in 2012 discusses the:

IEC 61850-8-2 Web Services Justification

Excerpt:

"IEC 61850/MMS is an open scalable suite of protocols that can support real-time operation. However, these protocols are not well understood by typical IT professionals that work in these stakeholder environments, even though the rich information models of IEC 61850 meets the semantic needs of the distributed applications. ...

Therefore it makes economic sense to map the rich abstract IEC 61850 information models to the more ubiquitously deployed and understood communication and security profiles. This requirement can be satisfied by mapping IEC 61850 to **web services, which are the most commonly implemented technologies.**

IEC 61850/Web Services is not a replacement for MMS used in the substation. Rather, IEC 61850/Web Services would be targeted to customer environments where information is used to interact with customer-owned equipment, including Distributed Energy Resources (DER) systems and facility energy management systems. In these situations, information flows between utility systems, customer systems, and third party systems, straddling utility and customer ownership, sometimes within a single application deployment.

The stakeholders deploying DER systems understand that IEC 61850 **over web services provide least cost protocols** to interact with their DER devices because:

- **Web Services provide greater** compatibility with widely deployed IT infrastructures, tools and skills, including cyber security.

..."

Finally the work ended in the following standard:

Communication networks and systems for power utility automation – Part 8-2: Specific communication service mapping (SCSM) – **Mapping to Extensible Messaging Presence Protocol (XMPP)**

The published document 8-2 uses principles of IEC 61850-8-1 as well as MMS services and protocols! Really? Yes. The main difference regarding message exchange is in the encoding of the MMS messages: 8-1 uses ASN.1 BER and 8-2 uses XML messages (with the structure of MMS services defined as XML Schema). Strange? Yes!

You can find the XML schema for the MMS messages using XML encoding here:

Code component of the IEC 61850-8-2, reflecting the XML namespace described in this document. It includes as well the virtual API with IEC 62351-4.

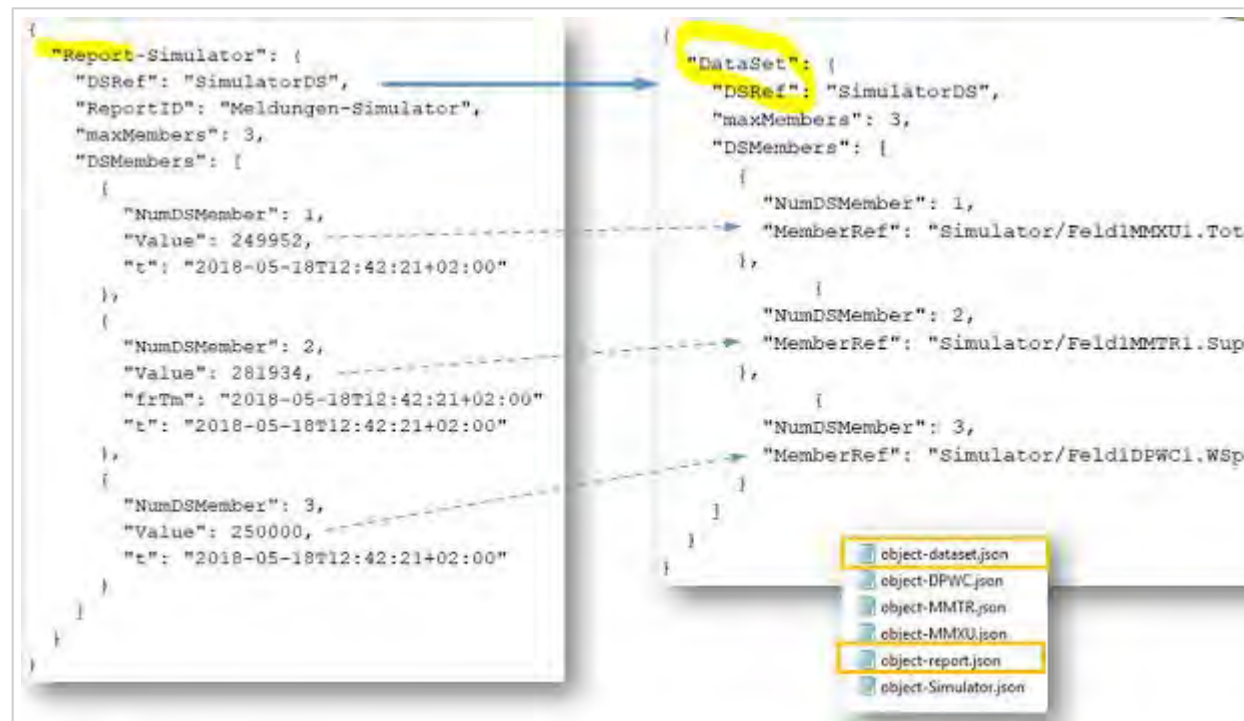
https://www.iec.ch/public/tc57/IEC_61850-8-2.2018_ed1.0.XSD.2018A1.full.zip

Summary on the protocol issues: IEC 61850-8-2 does NOT provide a direct mapping of IEC 61850-7-2 ACSI models and services to webservices!

I am involved in defining a third mapping (of a subset of services) ... to use JSON schema (and objects) for the models and the messages ... in order to offer really light weight messaging carrying a subset the original semantic of IEC 61850 models!!

We have successfully implemented client and server using http Get and Set services that carry JSON objects representing IEC 61850 Objects.

Example of DataSet and Report (showing the basic idea of mapping to JSON):

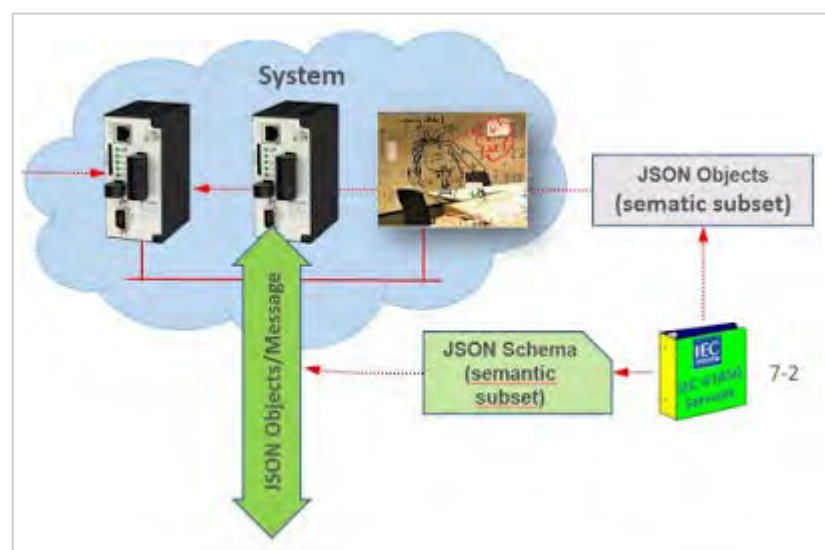


The decision to propose the JSON mapping officially to IEC TC 57 is expected later in 2019.

By the way, our granddaughter (20, Student in EE and IT) has implemented this example in Python running on Windows and on two Raspberry Pi3 (one playing the role of server and the other one as client).

We expect that this mapping will push the application of IEC 61850 models and services in domains that need simple solutions that can be programmed by many engineers and programmers.

The JSON mapping could easily be used as an interface from an original IEC 61850 Server (e.g., a bay controller or protection device) to underlying systems:



Sample JSON response from our Fronius PV Inverter with some values:

Request:

[http://192....solar_api/v1/GetInverterRealtimeData.cgi?](http://192....solar_api/v1/GetInverterRealtimeData.cgi?Scope=Device&DeviceId=1&DataCollection=CommonInverterData)
Scope=Device&DeviceId=1&DataCollection=CommonInverterData

Response (JavaScript):

```
"Head" : {
  "RequestArguments" : {
    "DataCollection" : "CommonInverterData",
    "DeviceClass" : "Inverter",
    "DeviceId" : "1",
    "Scope" : "Device"
  },
  "Status" : {
    "Code" : 0,
    "Reason" : "",
    "UserMessage" : ""
  },
  "Timestamp" : "2019-07-05T14:18:10+02:00"
},
"Body" : {
  "Data" : {
    "DAY_ENERGY" : {
      "Value" : 32605,
      "Unit" : "Wh"
    },
    "FAC" : {
      "Value" : 49.99,
      "Unit" : "Hz"
    },
    "IAC" : {
      "Value" : 28.3,
      "Unit" : "A"
    },
    "IDC" : {
      "Value" : 12.94,
      "Unit" : "A"
    },
    "PAC" : {
      "Value" : 6381,
      "Unit" : "W"
    },
    "TOTAL_ENERGY" : {
```

Stay tuned to learn more ...

Posted by [Karlheinz Schwarz](#) at 5:16 AM [No comments:](#) 

Labels: [ASN.1](#), [IEC 61850](#), [IEC 61850-8-1](#), [iec 61850-8-2](#), [JSON](#), [light implementation](#), [MMS](#), [SCSM](#), [webservice](#)

Thursday, July 4, 2019
Additional Information on the EPEX Problems

Please note additional Information on the EPEX problems introduced in:

<http://blog.nettedautomation.com/2019/07/1-mwh-electric-energy-may-cost-37856.html>

Additional details can be found here:

http://www.epexspot.com/de/presse/news-archive/details/news/Root_cause_for_the_incident_of_07_June_2019

http://www.epexspot.com/de/presse/press-archive/details/press/EPEX_SPOT_assesses_course_of_events_and_lessons_learned_from_the_Day-Ahead_incident

Posted by [Karlheinz Schwarz](#) at 2:55 AM [No comments:](#) 

Labels: [APEX](#), [blackout](#), [spot market](#)

Tuesday, July 2, 2019
1 MWh Electric Energy May Cost 37.856 Euro - You Don't believe it?

Belief me, this is true: You could have sold **1 MWh electric power to the German Grid for 37.856 Euro** the other day (used for primary frequency control) - if you would have had the opportunity to sell it on the spot market ...

We have our roof PV system some 10 kWp since Sept 2016. The energy produced since then is 25 MWh ... this would sum up to 25 x 37.856 Euro = **946.400 Euro** !! WOW !! Unfortunately I did not have the opportunity to influence the German electricity market and to make such a sale ...

See some [news in German](#) regarding the situation.

Something went wrong on the 6., 12. and 25. June 2019.

The belief in the Market to fix everything ... may end up in a big blackout.

Add-On (2019-07-03):

Today I found more details on the reasons why we were so close to big trouble:


"**Due to a faulty data package**, the European electricity exchange EPEX in Paris decoupled the European electricity market on June 7, 2019. This caused a great deal of excitement on the markets. Johannes Päßgen, Head of Energy Trading at Next Kraftwerke, explains the causes and consequences in an interview. Christian Sperling: Johannes - What happened? Why was there so much trouble at EPEX on the Friday before the Whitsun holidays? Johannes Päßgen: Well - **in the end it's a computer error**... but we should go into that later. At about 11:40 this Friday we noticed that something was wrong at EPEX. We couldn't place any more bids for the day-ahead electricity auction on Saturday. ..."

Clicke [HERE](#) for the full report.

I guess it was a human error ... somebody didn't take into account that corrupted data packages will be sent and received ... how could a faulty package have such a dangerous result?!?!

Unbelievable.

Stay tuned for more information once available.

Posted by [Karlheinz Schwarz](#) at [6:09 AM](#) [No comments:](#) 

Labels: [blackout](#), [Energy](#), [frequency control](#), [spot market](#)

Monday, July 1, 2019

IEC TC 57 Just Published Amendment 1 of FDIS of IEC 61850-9-2


The following FDIS has been published last week:
57/2112/FDIS

Amendment 1 – Communication networks and systems for power utility automation – Part 9-2: Specific communication service mapping (SCSM) – **Sampled values** over ISO/IEC 8802-3

The ballot closes: 2019-08-09

Compared to the second edition, this first revision of the second edition:

- a) updates the normative references
- b) adds a synchronization clause (Clause 9); adds references to IEC 61588:2009 and IEC/IEEE 61850-9-3 for SV synchronization;
- c) modifies physical layer specification in T-Profile;
- d) modifies MSVCB components (Table 9 and Table 10);
- e) deprecates usage of USVCB;
- f) modifies encoding for the transmission of the sampled value buffer (Table 14);
- g) adds Table 20;
- h) adds Table 21;
- i) adds Annex C related to possible backward compatibility issues between revisions of this standard;
- j) provides clarifications and corrections to the second edition of IEC 61850-9-2, based on the [tissues](#) = { 1349, 1272, 1055, 944, 863 }.

Posted by [Karlheinz Schwarz](#) at [9:29 AM](#) [No comments:](#) 

Labels: [amendment](#), [Edition 2.1](#), [IEC 61850](#), [IEC 61850-9-2](#), [IEEE 1588](#), [sampled value](#)

Saturday, June 22, 2019

Dangerous Situation in the European Electric Power System Caused by "frozen" Measurements

Measurements of power flow (Watts in export or import) are very crucial for Load Frequency Controller ... wrong (i.e., "frozen"!) measurements have caused almost a big blackout in Europe in January 2019.

What happened: the measurement of power of the lines between two transmission systems (Germany – Austria) were frozen when the export value of 723 MW from Germany to Austria was measured (which was a result of 34 GW wind power generation in Germany). Later the wind power generation decreased to 4 GW ... and the measurement (as input to the controller) many hours later still used the input value of 723 MW !!! In such a meshed power network it is unlikely that such a value is constant ...

Oops ... something went absolutely wrong!

Report by exception (on a value change as used for the above measurement) is great ... as

long as there are changes figured out and reported. A frozen value does not cause a change and thus no new value will be reported ... No receiver should expect that the export power is constant (723 MW) for days!! The sensors may have worked fine ... but the software and communication failed ... on both sides (sender and receiver). A receiver should not trust that the software and communication is working fine all time.
Here are some measures to monitor the communication (by the receiver) to figure out if the communication is OK:

- 1. Ping (in case of TCP/IP) (if no response after some time: raise flag)
- 2. TCP Keep-alive (if no keep-alive message in t bigger keep-alive: raise flag)
- 3. Polling by receiver (if no response after some time: raise flag)
- 4. Periodic reporting (if no report in t greater period: raise flag)
- 5. In case of no message received in a configured time period (in case of using IEC 61850 Reporting) the receiver should check if the report control block is enabled and is using the correct configuration values like trigger option, ...
- 6. Check if the sequence of received values are plausible
- 7. Use redundant systems (comm, ...)
- 8. ...

Check out the official Entso-E report (with links to more details):

<https://www.entsoe.eu/news/2019/05/28/entso-e-technical-report-on-the-january-2019-significant-frequency-deviations-in-continental-europe/>

This reminds me on the Boeing 737 MAX disaster ... maybe a programmer left the vendor of the load frequency controller and hired with Boeing ... I am kidding.

How many programmer or people that configure power control systems and communication systems that lack experience with complex systems like a plane or a power system. Where are the "grey-hair" experts that would tell you in minutes how to ... ? They may enjoy the beach with warm water and sun shine – relax and spend the pension for ...

It is not sufficient to have no ideas – one should also be unable to implement them.

I expect that more of these problems will hit the street once we have far more control, monitoring and communication in the smart(er) grids of medium and low voltage. Note that the problem in January 2019 occurred at transmission level!! ... where more resources (higher budgets) are available (in the past).

Have a great weekend – with power.

Posted by [Karlheinz Schwarz](#) at 6:44 AM [No comments:](#) 

Labels: [blackout](#), [communication](#), [IEC 61850](#), [measurements](#), [Reporting](#), [SCADA](#)

Wednesday, June 12, 2019

The IEC 61850 Tissue Database is a Great Resource of Hints and Background Information

The IEC 61850 tissue database is a comprehensive resource of hints and background information that can help you to understand why a particular change or correction has been implemented:
<https://iec61850.tissue-db.com>

Many tissues are posted that end up in the category "blue" (This is a question only). The discussion of the experts is often very helpful ... here you find answers that you may not get from the original published documents.
Example of discussion:
<https://iec61850.tissue-db.com/tissue/1649>

Discussion	Created	Status
There exists no such concept as "the value of SecondSinceEpoch contains all leap seconds occured". During a positive leap second, the SecondSinceEpoch counter is paused for one second. The count of seconds is always since 1970-01-01 00:00 UTC (epoch), but this origin is moving at each leap second(currently in 2019, 1970-01-01 00:00:00 UTC is 1970-01-01 00:00:37 TAI).	01 Mar 19	blue
Only a TAI time stamp contains all leap seconds that occured since 1970-01-01 00:00 TAI, but expressing TAI has been excluded in 2.1.		
I agree, this has been taken care of in Amendment1.	28 Feb 19	blue
This issue has already been taken care for in the IEC 61850-7-2 Ed.2 Amendment1, which is estimated to be circulated as FDIS in March 2019. Therein, an indication for the positive leap second in a timestamp is defined as specific combination of the TimeQuality attributes.	28 Feb 19	blue

Enjoy the tissue database. As a registered user you can post tissues and see more details.

Posted by [Karlheinz Schwarz](#) at 5:57 AM [No comments:](#) 

Labels: [IEC 61850](#), [maintenance](#), [tissue database](#), [tissue process](#)

Many IEC 61850 Projects Under Progress

37 new parts and parts under revision are under progress as listed in the following table:

Guideline for extending IEC 61850	61850-1-2
System and project management	61850-4
Communication requirements for functions and device models	61850-5
Configuration description language extensions for human machine interfaces	61850-6-2
Guideline for function modeling in SCL for substation automation	61850-6-100
Basic communication structure – Principles and models	61850-7-1
Abstract communication service interface (ACSI)	61850-7-2
Common data classes	61850-7-3
Compatible logical node classes and data classes	61850-7-4
Hydroelectric power plants - Communication for monitoring and control	61850-7-410
Communications systems for distributed energy resources (DER) - Logical nodes	61850-7-420
IEC 61850 modelling concepts	61850-7-5
Hydroelectric plants – Modelling concepts and guidelines	61850-7-510
DER - Modelling concepts and guidelines	61850-7-520
Mappings to MMS (ISO/IEC 9506-1 and ISO/IEC 9506-2) and to ISO/IEC 8802-3	61850-8-1
Mapping to Webservices	61850-8-2
Sampled values over ISO/IEC 8802-3	61850-9-2
Conformance testing	61850-10
Functional testing of IEC 61850 based systems	61850-10-3
Mapping between Modbus and IEC 61850	61850-80-5
Network engineering guidelines for substations	61850-90-4
Object models for electrical energy storage	61850-90-9
Methodologies for modelling of logics for IEC 61850 based applications	61850-90-11
Wide area network engineering guidelines	61850-90-12
Deterministic network topologies	61850-90-13
Using IEC 61850 for FACTS and power conversion data modelling	61850-90-14
IEC 61850 based DER Grid Integration	61850-90-15
Requirements for System Management	61850-90-16
Modeling Alarmhandling for IEC 61850	61850-90-18
Applying role based access to IEC 61850	61850-90-19
Guideline for redundant IEDs with IEC 61850	61850-90-20
Use of IEC 61850 for traveling wave fault location system	61850-90-21
Network autorouting	61850-90-22
Model extensions to IEC 61850 to support microgrids	61850-90-23
Mapping of IEC 62351-7 on IEC 61850	61850-90-24
Model update based on users feedback	61850-90-25
IED Specification description	61850-90-26

As you can see here: IEC 61850 is a bit more than another protocol.

Other parts are published already (some of them are under revision - see above):
<https://webstore.iec.ch/publication/6028>

IEC TR 61850-1:2013
IEC TS 61850-2:2019
IEC 61850-3:2013
IEC 61850-4:2011
IEC 61850-5:2013
IEC 61850-6:2009+AMD1:2018 CSV
IEC 61850-7-1:2011
IEC 61850-7-2:2010
IEC 61850-7-3:2010
IEC 61850-7-4:2010
IEC TR 61850-7-6:2019
IEC TS 61850-7-7:2018
IEC 61850-7-410:2012+AMD1:2015 OSV
IEC 61850-7-420:2009
IEC TR 61850-7-500:2017
IEC TR 61850-7-510:2012
IEC 61850-8-1:2011
IEC 61850-8-2:2018
IEC 61850-9-2:2011
IEC/IEEE 61850-9-3:2016
IEC 61850-10:2012
IEC TS 61850-80-1:2016
IEC TR 61850-80-3:2015
IEC TS 61850-80-4:2016
IEC TR 61850-90-1:2010
IEC TR 61850-90-2:2016
IEC TR 61850-90-3:2016
IEC TR 61850-90-4:2013
IEC TR 61850-90-5:2012
IEC TR 61850-90-6:2018
IEC TR 61850-90-7:2013
IEC TR 61850-90-8:2016
IEC TR 61850-90-10:2017
IEC TR 61850-90-12:2015
IEC TR 61850-90-17:2017

Unfortunately many "grey-hair experts" with a lot of experience regarding IEC 61850 have been retired and a lot of experience has been wasted ... politics cares more about wasting food than wasting "experience" good for human survival! It's really a pity when we take into account that the **comprehensiveness and complexity of IEC 61850 is growing so fast** ...

Posted by [Karlheinz Schwarz](#) at [5:19 AM](#) [No comments:](#) 

Labels: [DNP3](#), [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [IEC 60870-5-104](#), [IEC 61850](#), [MMS](#), [Modbus](#), [Role Based Access](#), [SCL](#), [Smart Grid](#), [update](#)

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WEITERE INFORMATIONEN OK

Saturday, June 8, 2019

IEC just Published Amendments to Three Core Parts of IEC 61850 as FDIS

Hurrah, after long wait ... now they are published:

IEC just Published **amendments** of the following three Core Parts of IEC 61850 as **FDIS**:

- IEC 61850-7-2 - Services (57/2100/FDIS) - 138 pages
- IEC 61850-7-3 - Common data classes (57/2101/FDIS) - 108 pages
- IEC 61850-7-4 - Logical Nodes and Data Objects (57/2102/FDIS) - 422 pages

These amendments will be merged into the previous editions and made available as consolidated documents after FDIS ballot (Edition 2.1).

The consolidated documents (published as INF documents) comprise:

- IEC 61850-7-2 (181 pages)
- IEC 61850-7-3 (135 pages)
- IEC 61850-7-4 (440 pages)

One of the most crucial issue solved now is the harmonization of definitions used in different domains like substation, protection, wind, hydro, DER, batteries, schedules, ...

NOTE: The three new documents (and the many other parts published or underway, e.g., 80-x, 90-x) **make the standard series IEC 61850 even more comprehensive and MORE COMPLEX.**

I hope that there will be enough people responsible for the future of the digitalization in the energy world understanding that there is no free lunch!! Education and training is key!

IEC 61850-7-2

This edition includes the following significant technical changes with respect to the previous edition, based on almost 100 tissues ... and other issues.

IEC 61850-7-3

Compared to the second edition, this first revision of the second edition provides mainly clarifications and corrections to the second edition of IEC 61850-7-3, based on almost 100 tissues ... and other issues.

IEC 61850-7-4

The motivation and goal of the amendment is to improve consistency of the data model over all application domains of IEC 61850. Data (Logical Nodes, Data Objects, Data Attributes) with the same semantics shall have the same naming where this part of IEC 61850 refers to Logical Nodes and Data Objects and IEC 61850-7-3 to the Data Attributes. Therefore, the amendement complements and updates the second edition of this part of IEC 61850, which was published in 2010. It constitutes editorial revisions for consistency and technical corrections of bugs as far as interoperability is touched. To reach this goal and to keep it for all future as common working source a comprehensive back-office UML version was created and will be maintained for future standard development. The published parts of IEC 61850 such as IEC 61850-7-4, on which the amendment is based, are generated automatically from the UML version. This allows publishing, voting and reading the various parts of IEC 61850-7 as in the past. This amendment includes changes with respect to IEC 61850-7-4:2010 based on almost 200 Tissues ... and other issues.

Posted by [Karlheinz Schwarz](#) at [6:07 AM](#) [No comments:](#) 

Labels: [amendment](#), [complexity](#), [Consolidated Edition 2.1](#), [IEC 61850 edition 2](#), [tissues](#)

Could the Utility Industry learn from the Boeing 737 Max Disaster?

The other day I read the IEEE article:

How the Boeing 737 Max Disaster Looks to a Software Developer

<https://spectrum.ieee.org/aerospace/aviation/how-the-boeing-737-max-disaster-looks-to-a-software-developer>

Everybody working in the power utility world SHOULD study this paper in detail - and take some time thinking about it and plan and implement consequences ... by some means or

For your Convenience

[An All NEW Evaluation, Demo, and Hands-On Package for IEC 61850 \(IEC 61400-25\) available \(2017-07-03\)](#)

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[Old Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[NEW! Blog as single PDF until 23 April 2017 \[17 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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- 2017 (87)
- 2016 (110)
- 2015 (94)
- 2014 (129)

other.

We are in danger to end up here:

I have slightly modified a quotation from the above paper:

“Long ago there was a joke that in the future control centers would control themselves, and the only thing in the control room would be an operator and a dog. The operator’s job was to make the customers comfortable that someone was in the control room. The dog’s job was to bite the operator if he tried to touch anything.”

This 737 Max problem is a symptom of a trend that is happening in many domains: power production, power delivery, ... even education (from Kindergarten to university).

A senior developer sent me the other day the following link with the subject:

When management thinks 100 trainees can do work of 3 fully qualified senior developers

<https://youtu.be/JeB19gvJcxs>

This statement and clip is very very true - in my training business with more than 4,500 attendees all over I have experienced that in some cases training (regards IEC 61850 and other subjects) had to be paid by the attendees ... using annual vocation! Unbelievable! HR has a big (often negative) impact on the training of the employees as well. The complexity of, e.g., IEC 61850 is usually totally underestimated! ... no need for a training ... read the myriad of papers and study slides ... that is quite often the recommendation of the management and HR.

This understanding is widespread in the utility domain, too ... students are hired (for low wages) to investigate and figure out how new technologies (especially digitalization) could be used ...

I hope that the utility industry will wake up and do a better job than the people at Boeing - but it will cost a lot of money ... shareholders and customers may not want to spent.

The European electric power system is under more stress since January 2019 ... see the following link (first German and second English text):

Switzerland was on the brink of a blackout on May 20, 2019:

https://gridradar.net/schweiz_blackout_entgangen.html

On the left side bar you can see that we faced three additional critical situations (two in January and one in April 2019)!

One reason behind all this is the "market driven" power delivery ... more and more relying on software that processes a lot of data to get forecasts and set schedules for the energy flow. Hope that this software is better than ...

We all rely 24/7 on electric power. Have you thought about the possibility of local, regional or total blackouts? How would your life change?

I am nursing my wife here at home. She needs ventilation 24/7. The two ventilators have each a battery good for four hours ... so a blackout of 10 hours would mean that my wife ... For that reason I have several batteries, two emergency generators and some 30 liter gasoline.

I hope that not many "old grey-hairs are sitting in the corner" - BUT walking around and helping the young people to understand why we have the electric power system as it is now - developed in more than 130 years. Senior experts like Gregory Travis (author of the IEEE article) are very rare ... and not well understood ... and maybe too expensive for the bean counters.

The cumulative experience of the "old grey-hairs" (many retired years ago) that has been collected between the 60s and 90s and that are still involved one way or the other should have reasonable influence on young engineers ... in order to keep the power flowing.

In some time down the road we may have 200 trainees on the play field ... and no "old grey-hair" left. In this case the "w" in the German "Energiewende" will drop - means Energie-Ende" ... end of energy.

I am one of these "old grey-hair" engineers (66). Just a few young people are listening to me - I have to stay at home 24/7 ... no travel anymore ... One of the young people listening to me is our grand-daughter (20, finishes her bachelor in EE and IT this year). She is really eager to learn from my experience with MAP, Fieldbus, UCA, IEC 61850, Modbus, ... power systems, renewables, ... As an intern at a distribution company she transfers part of my knowledge to the utility - it is cheaper for the utility than to renew the contract with me ... ;-)

Maybe they will contract with me for the second time - but then it may be too late.

Posted by [Karlheinz Schwarz](#) at [5:06 AM](#) [No comments:](#) 

Labels: [blackout](#), [Boeing 737 Max](#), [digitalization](#), [disaster](#), [engineer](#), [safe energy](#), [security](#)

- ▶ [2013](#) (130)
- ▶ [2012](#) (188)
- ▶ [2011](#) (159)
- ▶ [2010](#) (153)
- ▶ [2009](#) (162)
- ▶ [2008](#) (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

Friday, May 31, 2019

IEC 61850 Products at CIRED June 3-6, 2019 - Madrid (Spain)

3-6 June 2019, Madrid, Spain

SystemCORP will participate together with Advantech in the CIRED Exhibition in Madrid, Spain. It promotes the SystemCORP ADH Software, a flexible and complete data communication and process automation package, fully integrated in Advantech data gateways.

Based on a distributed real-time database and application management system almost any SCADA communication protocol can now be used as client or server on Advantech modules. SystemCORP offers most commonly used communication protocols such as IEC 61850, IEC 60870-5, DNP3, Modbus and JSON/MQTT as part of a standard communication library for SCADA and Cloud integration. An integrated IEC 61131 compliant programmable logic controller (PLC) extends the capability of the ADH as a true virtual SMART Grid device ready to be installed in distribution automation and smart grid projects.

For application configuration, the eNode Designer, IEC 61850 ICD Designer and IED Configurator tools simplify system engineering and result in reduction of project costs and implementation time. No special tools are required for establishing secure communication with cloud applications.

To know more visit our booth no H1/G2 at the IFEMA North Convention Centre. Address: IFEMA, Av. Partenón, Nº 5, 28042 Madrid, Spain. Entrance is free.

For any more information please check the event website: http://www.cired2019.org/

Posted by Karlheinz Schwarz at 5:39 AM No comments: ➡

Labels: Advantec, Cired, DNP3, iec 60870-5, IEC 61850, JSON, Modbus, MQTT, SystemCorp

Tuesday, May 28, 2019

When management thinks 100 trainees can do work of 3 fully qualified senior developers

A senior developer sent me the following link with the subject:

When management thinks 100 trainees can do work of 3 fully qualified senior developers

https://youtu.be/JeB19gvJcxs

This statement and clip is very very true - in my training business I have experienced that in some cases training (regards IEC 61850 and other subjects) had to be paid by the attendee itself ... using annual vacation! Unbelievable! This understanding is widespread in the utility domain, too ... students are hired (for low wages) to investigate and figure out how new technologies (especially digitalization) could be used ... Hope you like the clip.

Posted by Karlheinz Schwarz at 2:43 AM No comments: ➡

Labels: experience, peopleware

Monday, April 22, 2019

Prolan Offers One Of The First CLS "Steuerboxes" Based On IEC 61850

Prolan (based in Hungary) offers one of the first Steuerboxes according to the German FNN Specification "Steuerbox":



Prolan's own-developed and manufactured device offers a solution to German energy suppliers for tariff and power control and for regeneration of renewable power plants. The device is connected to the new smart measuring system in Germany, called "Intelligent Messsysteme", one of its system elements.

- The role of electricity distribution: the establishment of network balance by influencing decentralized energy producers and consumers.

Characteristic feature: use of modern communication technologies (bidirectional communication, encrypted data transfer).

Click [HERE](#) for general information (EN)
[HIER](#) klicken für eine Broschüre (DE)
[HIER](#) klicken für eine Kurzinformation des VDE FNN (DE)

Posted by [Karlheinz Schwarz](#) at [12:48 AM](#) [No comments:](#) 

Labels: [CLS](#), [FNN-Steuerbox](#), [IEC 61850](#), [Smart Grid](#), [smart metering](#), [Steuerbox](#)

Monday, March 25, 2019

New TC 57 CDVs For Public Comments Posted

IEC TC 57 has posted two new CDVs for [public comments](#) (for everybody to read the document for free):

[57/2068/CDV](#)

IEC 62351-3/AMD2 ED1: Amendment 2 - Power systems management and associated information exchange - Data and communications security -

Part 3: Communication network and system security - Profiles including TCP/IP

[57/2069/CDV](#) (67 pages)

IEC 62351-8 ED1: Power systems management and associated information exchange - Data and communications security -

Part 8: Role-based access control

This effort will transform the existing IEC TS 62351-8 ED1 from an IEC TS (Technical Specification) into an IS (International Standard) ED1

Excerpt from the Scope:

"The scope of this standard is to facilitate role-based access control (RBAC) for power system management. RBAC assigns human users, automated systems, and software applications (called "subjects" in this document) to specified "roles", and restricts their access to only those resources, which the security policies identify as necessary for their roles.

As electric power systems become more automated and cyber security concerns become more prominent, it is becoming increasingly critical to ensure that access to data (read, write, control, etc.) is restricted. As in many aspects of security, RBAC is not just a technology; it is a way of running a business. RBAC is not a new concept; in fact, it is used by many operating systems to control access to system resources. Specifically, RBAC provides an alternative to the all-or-nothing super-user model in which all subjects have access to all data, including control commands. ..."

Be aware that RBAC is required in systems where multiple clients (in the sense of, e.g., IEC 61850) need to access a server. One use case is where multiple power market participants want to manage a power resource.

Posted by [Karlheinz Schwarz](#) at [11:12 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 62351](#), [IEC 62351-8](#), [public comments](#), [RBAC](#), [Role Based Access](#), [security](#)

Friday, March 22, 2019

Smart Grid Interface Modul (SGIM) auf der Hannover Messe 2019

Vom 01. bis 05. April 2019 findet die Weltleitmesse der Industrie in Hannover statt.



beenergy SG zeigt eine interessante Neuheit:

Smart Grid Interface Modul (SGIM) für die Energieverteilung - unterstützt IEC 60870-5-104 und IEC 61850!

Die Sicherstellung der Verteilnetzfunktion sowie kostenoptimierte strukturelle Anpassungen durch die Versorgungs-netzbetreiber erfordern ein fortlaufendes Messen und Überwachen der dynamischen Belastungen in den Verteilnetzen. Mit dem BeEnergy SG Smart Grid Interface Modul lassen sich in Verteilnetzen an neuralgischen Stellen einfach und kostengünstig Messpunkte realisieren.

[Hier](#) klicken und mehr Information finden.
[Hier](#) für eine Broschüre klicken



Treffen Sie die SGIM-Experten persönlich in **Halle 13, Stand E81 (Efen GmbH)**.

Posted by [Karlheinz Schwarz](#) at [11:37 AM](#) [No comments:](#) 

Labels: [beenergy SG](#), [IEC 60870-5-104](#), [IEC 61850](#), [Smart Grid](#), [VHPready](#)

Monday, March 18, 2019

IEC TC 57 Just Published IEC 61850-90-20 - Guideline to Redundancy Systems

IEC TC 57 Just Published 39 page document 57/2080B/DC

IEC TR 61850-90-20 ED1, Communication networks and systems for power utility automation

Part 90-20: Guideline to redundancy systems

Excerpt:

Scope

This part of IEC 61850 describes use cases of redundant systems.

The purpose of this document is to suggest how to model redundancy systems within the IEC 61850 domain and provide a guideline on implementation possibilities.

This report considers duplication of function and devices and not systems.

The report is not a guideline on the design of redundancy systems, guidance on designing redundancy systems can be found in textbooks like

- High Availability and Disaster Recovery: Concepts, Design, Implementation by Kalus Schmidt, ISBN-10: 3540244603
- Blueprints for High Availability: Designing Resilient Distributed Systems by Evan Marcus, ISBN-10: 0471356018

Comments to this draft are due by 2019-04-12 at the latest

Posted by [Karlheinz Schwarz](#) at [7:17 AM](#) [No comments:](#) 

Labels: [disaster](#), [IEC 61850](#), [recovery](#), [redundancy](#), [resilient](#)

IEC TC 57 Just Published IEC 61850-10-3 on Functional Testing of IEC 61850 Based Systems

IEC TC 57 published 79 page document 57/2082/DC:

IEC TR 61850-10-3 – Communication networks and systems for power utility automation –

Part 10-3: Functional testing of IEC 61850 based systems

Excerpt:

The growing success of the IEC 61850 series calls for guidelines for testing of substations implementing this standard. This technical report aims at producing a practical guide for

protection, automation and control (PAC) engineers on best practise for testing of IEC 61850 Edition 2 with Tissues/Ed. 2.1 based devices and systems. Since the release of the first edition of the IEC 61850 standard in 2002-2005 thousands of substations have been built making use of the new multi-part standard. Most of those systems are more integrated and complex than the previously deployed, making use of multi-function capable IEDs and the rich feature set of IEC 61850. Especially the sending and receiving of protection trips via GOOSE messaging control commands/indications, monitoring and time synchronisation information over the same shared equipment or network will need to drive changes to existing test methods and practices as many of the traditional test boundaries have changed. Despite the large number of commissioned IEC 61850 substations considerable uncertainty among end-users (system integrators and power utilities) regarding the correct testing procedures still exists. Devices implemented according to the first edition of the standard also utilized a limited part of the test related functionality in the standard. Much of the functionality included in IEC 61850 to allow efficient, functional oriented testing has been clarified and extended in the second edition of IEC 61850 parts, 6, 7-1 to 7-4, 8-1 and 9-2. Therefore, there is a need to help the industry by describing the methods and principles for testing the IEC 61850 based applications. This Technical Report provides insight into the changing requirements and practice of testing following the introduction of IEC 61850 based devices and systems. One example is the disappearance of so-called 'hardwired' connections between substation automation devices. These connections are replaced by communication networks and this means that traditional simulation and isolation of signals for the purpose of testing is no longer possible.

Comments to this draft are due by 2019-04-19

Posted by [Karlheinz Schwarz](#) at [6:40 AM](#) [No comments:](#) 

Labels: [functional testing](#), [Functions](#), [IEC 61850](#), [testing](#)

Saturday, March 16, 2019

IEC TC 57 Just Published Draft IEC TS 618540-1-2 - Extending IEC 61850

IEC TC 57 just published the 43 page draft 57/2084/DTS:

Communication networks and systems for power utility automation IEC 61850-1-2 - **Guideline on extending IEC 61850**

CLOSING DATE FOR VOTING: 2019-06-07

Excerpt of the draft:

1 Scope

This document is intended for any users but primarily for standardization bodies that are considering using IEC 61850 as a base standard within the scope of their work and are willing to extend it as allowed by the IEC 61850 standards. The document identifies the required steps and high-level requirements in achieving such extensions of IEC 61850 and provides guidelines for the individual steps. Within that scope, the document addresses the following cases:

- The management of product-level standards for products that have an interface based on IEC 61850
- The management of domain-level standards based on IEC 61850
- The management of transitional standards based on IEC 61850
- The management of private namespaces based on IEC 61850
- The development of standards offering the mapping of IEC 61850 data model at CDC level
- The development and management of IEC 61850 profiles for domains (underlying the role of IEC 62361-103 and IEC 61850-7-6)

The document includes both technical and process aspects :
On the technical side, the document:

- Reminds the main basic requirements (mostly referring to the appropriate parts of the series which host the requirements or recommendations)
- Lists all possible flexibilities offered by the standards
- Defines which flexibilities are allowed/possible per type of extension cases

On the process side, the document covers:

- The initial analysis of how the existing IEC 61850 object models and/or communication services may be applied and what allowed extensions may be required for utilizing them in new or specific domains (including private ones). The results of that step are expected to be documented
- The extension of the IEC 61850 object models for new domains. The typical associated work is to identify existing logical nodes which can be reused "as is", to determine if existing logical nodes can be extended, or to define new logical nodes
- The purpose and process to use transitional namespaces, which are expected to be merged eventually into an existing standard namespace
- The management of standard namespaces
- The development of private namespaces

It is highly recommended to have a closer look at this document and review the content in

detail. Because in the end it will be used as a very crucial "cook-book" for those that need to extend the standard series IEC 61850 and IEC 61400-25.

Posted by [Karlheinz Schwarz](#) at 6:14 AM [No comments:](#) 

Labels: [Extensions](#), [Guideline](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-1-2](#), [profile](#)

Wednesday, March 13, 2019

Smart Grid Communication Challenges With IXXAT SG Gateways

Smart Grid communication challenges can easily be solved with IXXAT SG-gateways

New IIoT gateways from HMS allow industrial equipment to communicate with smart grids.

IXXAT SG-gateways...

- Enable easy remote control and management of electrical systems
- Support [IEC 61850 client/server, GOOSE, proxy gateway](#), IEC 60870-5-104 client/server and VHPready
- Provide Modbus-TCP client/server and Modbus-RTU master/slave interfaces
- Enable SNMP, SNTP, and cloud connectivity
- Provide I/O, M-Bus, PROFIBUS, PROFINET and EtherNet/IP interfaces
- Are safe – firewall, OpenVPN & password protection
- Support IEC 60870-5-104 redundancy acc. edition 2 (Norwegian Convention)

Click [HERE](#) to enter the world of IEC protocols for power delivery systems [EN, [DE](#), [FR](#), [CN](#)].

[Hier](#) klicken ... für ein Kurzvideo und weitere Informationen ... von Martin Matt, Produktmanager Energy Communication bei HMS Networks, über intelligente Smart-Grid-Gateways.

Posted by [Karlheinz Schwarz](#) at 10:01 AM [No comments:](#) 

Labels: [61850](#), [Ethernet/IP](#), [Gateway](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61158](#), [IEC 61400-25](#), [IEC 61850](#), [IIOT](#), [M-Bus](#), [PLC](#), [Profibus](#), [Profinet](#), [proxy gateway](#), [Smart Grid](#), [Substation](#), [wind power](#)

Saturday, March 2, 2019

IEC TC 57 Just Published Draft IEC 61850-90-20 On Redundancy

IEC TC 57 just published the first Draft IEC 61850-90-20 on System Redundancy:

57/2080A/DC

IEC TR 61850-90-20 ED1

Communication networks and systems for power utility automation –

Part 90-20: Guideline to redundancy systems

Excerpt from the Introduction:

"The paper "CIGRE B5-109: Redundancy challenges on IEC 61850 systems and Migration Paths for IEC 61850 Substation Communication Networks" introduce redundancy concepts as follows

"Device redundancy of substation control units may be required in order to increase the availability of the substation automation system at the station level. System level redundancy is achieved by hot-hot or hot-standby configuration of duplicated station units that need to exchange information to ensure data consistency as well as coordinated and safe operation.

IEC 61850 communications in redundant configuration of duplicated clients faces challenges how to ensure that database in both central station control units are synchronized and that no events are lost during the switchover from the primary to secondary IEC 61850 client."

A proposed redundancy system consists of two IED entities forming a logic IED. One or more lower level IEDs, e.g. merging units or circuit breaker, delivering the input data for the IED entities and getting results from the IED entities. One or more higher level clients receives output data from the IED entities for supervision or HMI.

Additionally, a higher level IED might exist, which supervises the state of the redundant system. In this context this concerns especially the state of the IED entities, so that a failed IED can be detected and repaired before the second IED fails.

The communication between the redundant system application and the lower level IEDs takes place with IEC 61850, mainly based on IEC 61850-8-1(MMS) reporting and commands, for time critical functions with IEC 61850-8-1(GOOSE) and IEC 61850-9-2(SV).


The communication to station level clients based on IEC 61850 is typically MMS based for supervision, commands and settings configuration changes. Since MMS is acknowledged service, server and client are aware of each other and the client supervises the servers. If both redundant system IEDs are hot, the client might select which of them it takes for executing a service request."

The TC57 P-members are invited to submit comments to this draft by [2019-03-29](#) at the latest.

Please note:

The application domains that need redundant systems may be crucial (for some high voltage systems) but may not be applicable for most systems in the energy delivery domain. This document is really of interest for a small, special group of experts ... not everybody interested in using IEC 61850 for exchanging some signals may need to check that draft document.

One challenge with IEC 61850 is: Which subset out of a big standard series do I need to understand for my application - that means: YOU HAVE TO KNOW YOUR APPLICATION !!

Posted by [Karlheinz Schwarz](#) at 2:43 AM [No comments:](#) 

Labels: [Cigré](#), [GOOSE](#), [IEC 61850](#), [MMS](#), [protection](#), [redundancy](#), [sampled value](#), [Substation Automation](#), [system](#)

Saturday, February 23, 2019

OPC-UA@TSN, Profinet@TSN or CC-Link@TSN - and IEC 61850

Automation and industrial communication are buzzwords for decades. They mean something quite different when you look at the 80s, 90s, 00s, 10s, today ... Where are we today? Not really far away from the 80s.

In February 1985 I attended the first time the GM MAP Team in Detroit (MI) - it was a cold week:



This was my first trip to the USA. At that time I did not expect to come back to the US for more than 130 times ... almost all trips related to standardization: MAP, MMS, UCA, IEC, IEEE, ...

The MAP (Manufacturing Application Protocol) project and especially the MMS (Manufacturing Message Specification) standard where the first combined attempt to define a single set of international standards for manufacturing automation systems. As you may know: they failed - because they were far too early.

[MMS](#) (ISO 9506) defines many services that have been smiled at. But if you read today (2019-02-23) what experts in the OPC-UA World are looking at - then you wonder how it was possible in the 80s to define most of the basic services the industry is looking for TODAY:

- Client/Server
- Selfdescription
- Read/Write/Report
- Two-Way-DataExchange (like RPC)
- Standard Configuration
- Semaphore
- Event Management
- Journaling (Logging)
- ...

It really took 30+ years before the industry understood what is really needed besides the myriad of [Fieldbusses](#)!!

Since the MAP days we have learned some crucial lessons:

- In addition to Client/Server we need **Publisher/Subscriber** (as defined some 15 years after the MAP project in IEC 61850; GOOSE and Sampled Values)
- In addition to ISO/OSI Transport we need **TCP/IP** ... done in IEC 61850.
- We need many **semantic models** ... as the many Hundred Logical Nodes in IEC 61850, e.g., for electrical measurements [MMXU](#) or Temperature Supervision [STMP](#), ...
- Standardized **system configuration** is key for any future automation system ... as defined in [SCL](#) (IEC 61850-6) for energy systems.

Fieldbusses are understood today as the "**maximum credible accident**". Heinrich Munz (Lead Architect Industry 4.0 at KUKA) says in the just published special issue of the magazine "tsn & opc ua 2019" (www.computer-automation.de) on page 12: "Jeder Gerätehersteller muss die Anschaltung und das Engineering jedes seiner Produkte an mehr als zehn unterschiedliche Feldbusse entwickeln und pflegen - ein betriebs- und volkswirtschaftlicher Super-GAU." **[Each vendor has to develop and maintain hardware and engineering tools for each of his products to be compliant with more than 10 different fieldbusses - economically a maximum credible accident.]**

My personal resume after reading through the special magazine is this:

- The **third fieldbus war** started some years ago and is expected to go on for many years.
- The standard series IEC 61850, IEC 62351, IEC 61968/70 (CIM), IEC 61400-25, ... provide most of what OPC-UA and TSN are looking for.
- It is likely that the providers of traditional and Ethernet-based Fieldbusses will migrate during the next years to OPC UA and TSN.
- OPC UA and TSN will be implemented and used - why not?
- In the meantime the energy domain is already using and extending the semantic


models, applying the needed services and feeling happy with the standardized configuration language.

- What else do you need?

The French novelist Andre Gide nailed it when he wrote, "Everything that can be said has been said, but we have to say it again because no one was listening."

According to my 50 years of experience as a technician, the most crucial challenge in automation is this: People of different application domains (control center, RTU, protection, PLC programming, robot controlling, communication, security, engineering, maintenance, ... telecomms, internet, web, ...) **DO NOT LISTEN TO EACH OTHER!!!** If one expert of a specific domain talks - no one from the other domains is listening!

Talk together and have a look at what people have said and done even decades ago! It may be better than what you were told. It may save you hours and days and weeks ... of struggling.

Posted by [Karlheinz Schwarz](#) at [10:21 AM](#) [No comments:](#) 

Labels: [ASN.1](#), [configuration](#), [configuration language](#), [engineering](#), [Ethernet](#), [fieldbus](#), [IEC 61850](#), [iso 9506](#), [MAP](#), [MMS](#), [OPC UA](#), [SCL](#), [TSN](#)

Workshop „IEC 61850 und CIM – Durchgängige Automatisierung im Netz der Zukunft“

Am 11. April 2019 findet in Frankfurt ein interessanter Workshop zu den Themen IEC 61850 und CIM (IEC 61968/70) statt:

Workshop „IEC 61850 und CIM – Durchgängige Automatisierung im Netz der Zukunft“

Die konkrete Anwendung von CIM mit aktuellen Praxisbeispielen, Fragen und Antworten sowie Diskussionsgrundlagen erwarten Sie auf dem diesjährigen Workshop.

Folgende Themen sind u. a. geplant:

- Kurzeinführung IEC 61850 und Smart Grid Architecture Model (SGAM)
- Vertikale Integration und End2End-Nutzung auf Basis der IEC 61850 Datenmodelle
- Anwendung von IEC 61850 für Kommunikation in der FNN Steuerbox und Abbildung in CIM
- Anwendungsbeispiele Verteilnetze
- IT-Security aus Sicht der Verteilnetzautomatisierung
- Podiumsdiskussion „Wie sehen Standards der Zukunft aus?“

Klick [hier](#) für weitere Informationen.

Es ist ratsam, an diesem Workshop teilzunehmen und mit den Experten zu diskutieren, welcher Weg in der Zukunft zielführend sein wird (soll)!

Posted by [Karlheinz Schwarz](#) at [2:00 AM](#) [No comments:](#) 

Labels: [CIM](#), [DKE](#), [FNN-Steuerbox](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [Smart Grid](#)

Sunday, February 10, 2019

IEC 61850 Series is Growing Very Fast: 50+ parts soon

The standard series IEC 61850 (Communication networks and systems for power utility automation) is growing faster than expected some years ago. Currently the series comprises 50+ parts published, under revision or new content:

IEC 61850 Series				
Communication networks and systems for power utility automation				
Compiled by Sipi-Ing. Karsten Behrns, carsten@spis-Ing.de , 2019-09-07				
Bald Internet Index: Core Parts of IEC 61850				
Title	Part	Published Edition	Work in Progress + design*	
1. Introduction and overview	IEC 61850-1			
2. Guidelines for modeling IEC 61850	IEC 61850-2		1	
3. Glossary	IEC 61850-3			2
4. General requirements	IEC 61850-4		1	
5. System and project management	IEC 61850-5			2
6. Communication requirements for functions and device models	IEC 61850-6			2
7. Configuration description language for communication in power utility automation systems related to IEC 61850	IEC 61850-7		2	
8. Configuration description language extensions for IEC 61850-7	IEC 61850-8			WIP
9. Configuration description language for physical concepts related to IEC 61850 network systems	IEC 61850-9			WIP
10. Guidelines for function modeling in IEC 61850 for substation automation	IEC 61850-10			2
11. Basic communication structure – Principles and models	IEC 61850-11			2
12. Abstract communication service interface (ACSI)	IEC 61850-12			2
13. Abstract data classes	IEC 61850-13			2
14. Concrete logical data classes and data classes	IEC 61850-14			2
15. Multiple data value classes	IEC 61850-15			2
16. Communication systems for distributed energy resources (DER)	IEC 61850-16			2
17. Basic information and communication structure – Use of logical nodes for modeling application functions and related concepts and guidelines for substations	IEC 61850-17			2
18. Web services interface – Modeling interface and guidelines	IEC 61850-18			2
19. DER – Modeling concepts and guidelines	IEC 61850-19			1
20. Guidelines for IEC 61850 web services	IEC 61850-20			1
21. Mapping to IEC 61850-17 and to IEC 61850-19	IEC 61850-21			2
22. Mapping to Web services	IEC 61850-22			1
23. Sampled values in IEC 61850-17 and IEC 61850-19	IEC 61850-23			1
24. IEC 61850-17 and IEC 61850-19 specifies a protocol stack protocol (P1) profile	IEC 61850-24			2
25. Performance testing	IEC 61850-25			2
26. Functional testing of IEC 61850 data systems	IEC 61850-26			1
27. Guidelines for exchanging information from a CID-based data model using IEC 61850-17 or IEC 61850-19	IEC 61850-27			2
28. Mapping to web protocols – Requirements and technical choices	IEC 61850-28			2
29. Interrelation between the CID-based object model IEC 61850-17 to the IEC 61850 data model	IEC 61850-29			2
30. Mapping between Modbus and IEC 61850	IEC 61850-30			1

Klick on picture to magnify.
Enjoy!

Posted by [Karlheinz Schwarz](#) at 6:39 AM [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [Edition 3](#), [IEC 61850](#), [new work](#)

Saturday, February 9, 2019

Difference between IEC 60870-5-104 and IEC 61850

There seems to be a growing interest to understand what the difference is between IEC 60870-5-104 and IEC 61850. There have been many discussions, complaints, and frustrations ... no wonder. Here is what I have answered to somebody this week:

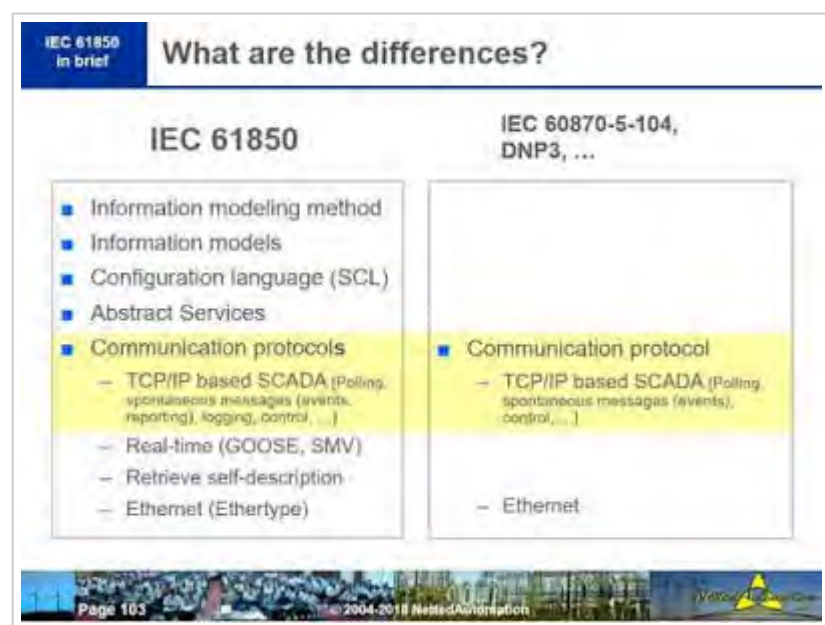
Dear xxx,

I guess I got it ... you are analyzing the communication inside a station ... to the IEDs (protection, control, ...).

The IEC 60870-5-104 plus a lot of utility or project specific (signal) engineering will do the job – has done it for decades.

The engineering is the key issue when comparing the two standards ... if you can compare them at all!!

IEC 61850 offers a lot more than 104 or DNP3 ...



From a message overhead point of view, you can say, that both are more or less the same ... because they use both Ethernet and TCP/IP. There is no benefit to use one or the other.

It is likely that IED vendors will mainly focus on IEC 61850 ... and may get rid of 104 in the long run.

I have always said that utilities using 104 in all substations should continue to use it – until they build new substations or do major refurbishments. There is no need to replace a running 104 solution with IEC 61850 ...

Another issue is: To use GOOSE for interlocking ... to get rid of copper ... or use it for tripping ... and use sampled values some time down the road.

Finally there is an issue with manpower: If the utility has senior experts in 104 close to retirement ... they should wait until they have retired. Yes! I have seen many old engineers not willing to learn something completely new!!

[Click HERE for a detailed comparison written by domain experts.](#)

Hope that helps a bit more.

Best Regards,

Karlheinz

Posted by [Karlheinz Schwarz](#) at 6:52 AM [No comments:](#) 

Labels: [configuration language](#), [DNP3](#), [Ethernet](#), [GOOSE](#), [IEC 60870-5-104](#), [IEC 61850](#), [Information Model](#), [sampled value](#), [SCL](#), [self-description](#), [TCP/IP](#)

IEC TC 57 Has Published New Work Proposal For IEC 61850-6-3

IEC TC 57 has just published a new work proposal for IEC 61850-6-3 proposed by the Chinese National Committee:

57/2075/NP

Communication networks and systems for power utility automation –

Part 6-3: Configuration description language for physical resource related to IEDs in substation network systems

CLOSING DATE FOR VOTING:
2019-05-03

Scope:
"The international standard defines the emerging requirements from physical resource description side to facilitate the design, system integration, test, fault analysis and commission, etc. during different stages when IEC 61850 is applied. It described how the physical resource information, such as IED’s dimension, communication port and optical connection, is to be modelled using the System Configuration Language (SCL) which is incorporated under IEC 61850. The application scenarios include but are not limited these mentioned stages.

Furthermore, IEC 61850-6-X helps to fill a gap and establish a relationship between logic function and physical resource information according to the existing IEC 61850 communication structure and configuration description language. The initial focus on application within substations, includes following cases:

- Physical information related to infrastructure in electrical substations, including cubicle, trench, optical, wire, etc.
- Physical information related to devices in electrical substations, including device dimension, amount model, physical port, etc.

The proposed international standard specifies a file format for describing dimension, communication connection port, optical wire, cubicle, trench related to IEDs within substations, and the relations between them and logical functions."

The NP notes that "In China, by the end of 2016, nearly 3,000 substations of 110 kV or above based on IEC 61850 had been under operation."

The standard series IEC 61850 is really growing in 2019, see extra post.

Posted by [Karlheinz Schwarz](#) at 6:43 AM No comments: 

Labels: [China](#), [configuration language](#), [IEC 61850](#), [IEC 61850-6-3](#), [IED](#), [SCL](#), [Substation Automation](#)

Monday, January 14, 2019

Omicron offers new ways for IEC 61850 Substation Automation System testing

Testing the automation, control, and SCADA communication in IEC 61850 Substation Automation System (SAS) is as time consuming as testing the protection – or often even more.

StationScout simplifies the testing and reduces the required effort significantly.

With its powerful functions, StationScout is a specialist for the whole lifecycle of a SAS – from engineering to continuous maintenance. The clear status overview provides ideal support for commissioning and maintenance engineers during the different tasks in Substation Automation Systems utilizing IEC 61850.

Key features:

Status overview: StationScout provides a clear overview of the substation, visualizing the communication according to IEC 61850 in SCL files, values and states in the substation.

Signal tracing: The communication diagram of StationScout allows for signal tracing, from the overview down to the detailed communication message attributes.

Automated testing: StationScout is able to re-use predefined test plans for an automated testing procedure.

Cyber security: The dedicated hardware of StationScout ensures cyber secure operation within the substation communication network.

Simulation: The powerful simulation features of StationScout simplify testing and commissioning. Missing IEDs and IOs can also be simulated.

Defining own names: IEC 61850 abbreviations are quite cryptic. Defining of own names in StationScout allows for comfortable asset handling.

Click [HERE](#) for detailed information about the StationScout (English)
Click [HERE](#) for detailed information about the StationScout (German)

Posted by [Karlheinz Schwarz](#) at 5:48 AM No comments: 

Labels: [commisioning](#), [IEC 61850](#), [Omicron](#), [protection](#), [SCADA](#), [StationScout](#), [testing](#)

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WEITERE INFORMATIONEN OK

Monday, January 14, 2019

Smart Grid Interface Modul (SGIM) supports IEC 60870-5-104, DNP3, IEC 61850 and OPC UA

Smart Grid Interface Modul offered by BeEnergy (Pohlheim/Germany)

The Smart Grid Interface Module (SGIM) is a ready-to-use system to monitor measured electrical values in switch cabinets and cable distribution cabinets. The mechanical design of SGIM is in line with industrial standards and is especially meant to be installed in a **185mm busbar system**.

SGIM is built from two main parts: the installation platform and the plug-in unit. The plug-in unit contains all necessary control, communication and measurement functions to provide measured data either to a **cloud-based data management system or via standard IEC protocols like IEEE 1815 - DNP3, IEC 60870-5-104 and IEC 61850 as well as industrial protocols like OPC/UA.**

The device includes a local web server for the visualisation of the acquired data, the configuration of drivers and communication protocols as well as an interface to the WEB-PLC editor.



Click [HERE](#) for more information (Data Sheet).
Click [HERE](#) to visit BeEnergy

Posted by [Karlheinz Schwarz](#) at 5:38 AM [No comments:](#)

Labels: [Cloud Computing](#), [DNP3](#), [IEC 60870-5-104](#), [IEC 61850](#), [OPC UA](#), [Smart Grid](#)

Wednesday, December 12, 2018

TÜV SÜD closes their IEC 61850 / UCAIUG Test Lab

TÜV SÜD (Munich, Germany) a long time provider of IEC 61850 Interoperability and Conformity Testing Services closes their Test Lab.
They emailed today says: "... Unfortunately, we do not supply Interoperability and Conformity Testing Services according to IEC 61850 any longer, which have been replaced by other focus areas in our portfolio. ...".
There was no specific reason for their decision provided.
You may ask me about my opinion. Here it is first brief statement:

- The standard series IEC 61850 is very comprehensive - applicable in many different application domains.
- Implementations of the communication software for Client/Server (MMS based), Publisher/Subscriber (GOOSE), general APIs, and appropriate IED specific configuration tools are very comprehensive (and very complex!) as well.
- The IEDs tested and certified will likely operate in applications that need many times more logical nodes (and associated FUNCTIONS) than what was tested to get a certificate.
- MMS is also very complex regarding services and protocol. Unfortunately requires a lot of best skills to implement ... it has been implemented very well by a few companies like SystemCorp.
- The most crucial aspect of IEC 61850 is the huge number of logical nodes (that represent so many functions). This semantic is of great importance to the energy industries.
- One of the key issues in the years to come is this: Use the **semantic of IEC 61850** and **configuration language** and **map the needed (usually very simple and restricted) semantic configured in a SCL file automatically to JSON-Objects** and **communicate the JSON encoded information via http(s) or similar protocols.**
- This will allow to use IEC 61850 in any project that requires to exchange the well defined semantic of IEC 61850. E.g., the semantic of the schedule logical node (FSCH and FSCC) can easily be configured in JSON. The underlying function (the SCHEDULING) needs to be implemented independently of using MMS/ASN.1 or JSON. The benefit of using JSON is here: Everybody that can program in Python or JS or ... can use the JSON encoded messages directly in the application program.

For your Convenience

[An All NEW Evaluation, Demo, and Hands-On Package for IEC 61850 \(IEC 61400-25\) available \(2017-07-03\)](#)

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[Old Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[NEW! Blog as single PDF until 23 April 2017 \[17 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)
[New Flyer for Training with crucial topics](#)
[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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- 2015 (94)
- 2014 (129)

I am working on such a solution that makes IEC 61850 really applicable for simple applications ... http(s) and JSON are used everywhere and can be applied by everybody.

- More to come!
- Stay tuned.

For those simple applications with a dozen of points or so ... there would be a need for just a very simple and basic interoperability and conformance test.

Posted by [Karlheinz Schwarz](#) at [11:52 AM](#) [No comments:](#) 

Labels: [ASN.1](#), [conformance test](#), [IEC 61850](#), [interoperability tests](#), [JSON](#), [MMS](#), [test lab](#), [TÜV SÜD](#)

Thursday, November 15, 2018

IEC 61850 Seminar in INDIA CHENNAI 19 Nov, VADODARA 21 NOV

Dear All,

Please note the invitation to a great Seminar by Andrea Bonetti in INDIA

- CHENNAI 19 Nov
- VADODARA 21 NOV

Click [HERE](#) for details.

- [2013](#) (130)
- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

Invitation

You are invited to attend the

Seminar on “IEC 61850 Standard”

By

Andrea Bonetti

Senior Specialist Protection Relay and IEC 61850 Applications
Megger Sweden AB



Andrea Bonetti graduated as electrotechnical engineer at Sapienza University of Rome, Italy in 1993. After five years in ABB Italy as protection engineer, Andrea worked 10 years as HV relay protection specialist at ABB Grid Automation Products in Västerås, Sweden, for relay post-fault analysis, commissioning support, IEC 61850 applications and trainings. From 2008 to 2013 Andrea worked at Megger in Stockholm, as product manager and technical specialist for relay test equipment, dealing with the development of IEC 61850 test set and tools, test algorithms for distance protection and transformer differential protection relays. From 2013 to 2018 Andrea worked as consultant in Relay Protection and IEC 61850 Applications procurement specification for TSOs, IEC 61850 specification and attendance for FAT/SAT, IEC 61850 troubleshooting in operative substations, trainings, IEC 61850 top down specification and engineering process, development of IEC 61850 test equipment and tools. From April 2018, Andrea works at Megger in Stockholm, as senior specialist in relay protection and IEC 61850 applications. Andrea holds a patent in the area of IEC 61850 testing tools and algorithms. Active member of the IEC TC 95/MT 4 since 2006, Andrea has been sub-group leader for the development of the IEC 60255-121 standard and has received the IEC 1906 Award in 2013.

CHENNAI - 19 Nov 2018 (Mon)
VADODARA - 21 NOV 2018 (Wed)
Timing : 11:00 to 15:00 Hrs.

Posted by [Karlheinz Schwarz](#) at [10:28 AM](#) [No comments:](#) 

Labels: [Andrea Bonetti](#), [IEC 61850](#), [India](#), [Megger](#), [seminar](#), [Training](#)

Saturday, November 3, 2018

IEC 61850 Tissue Data Base - In Operation Under IEC


The IEC 61850 Tissue Data Base is in operation again - now under IEC Logo.

Click [HERE](#) for accessing the Data Base:



The registration as a new user will be possible soon.

Enjoy the crucial resources.

Posted by [Karlheinz Schwarz](#) at [3:01 AM](#) [No comments:](#) 

Labels: [IEC](#), [IEC 61850](#), [tissues](#)

Monday, October 8, 2018

IEC 61850-7-1 CDV Amendment 1 available for comments

The Amendment 1 of IEC 61850-7-1 is now available for comments and voting:

Communication networks and systems for power utility automation –
Part 7-1: Basic communication structure – Principles and models

IEC TC 57 just published the document 57/2035/CDV.

Ballot closes 2018-12-28.

The CDV is publicly available for comments for everybody:

Click [HERE](#) for Public CDV Commenting - you just need to register.

Please note the following:


The distributed CDV reflects the **amendment 1** (corrections and extensions) to IEC 61850-7-1 Ed2.

A second document (called consolidated edition 2.1) incorporates the amendment 1 (120 pages) and the existing Ed2. The consolidated edition (195 pages) is circulated as 57/2036/INF (unfortunately not publicly available). After the CDV/FDIS approval process the consolidated version will be published together with the amendment 1 under reference IEC 61850-7-1 Ed2.1.

The version 2.1 will introduce the latest modelling extensions.

The new version of IEC 61850-7-1 will be one of the most crucial documents of the standard series IEC 61850. As the editor of edition 1 I see that most of the content of the version 1 is still the basic information presented in this part 7-1

This document shows also that the standard series is growing and getting quite complex ... for simple applications you need to understand what is mandatory and what is optional!

Posted by [Karlheinz Schwarz](#) at [2:37 AM](#) [No comments:](#) 

Labels: [Edition 2.1](#), [IEC 61850](#), [IEC 61850-7-1](#), [model extensions](#), [modeling method](#), [services](#)

Monday, September 17, 2018

Technical Report Considering Protection IEDs with Digital Inputs and Output under way

The IEC TC 95 Ad Hoc Working Group 3 (AHG3 meeting in Nanjing this week)



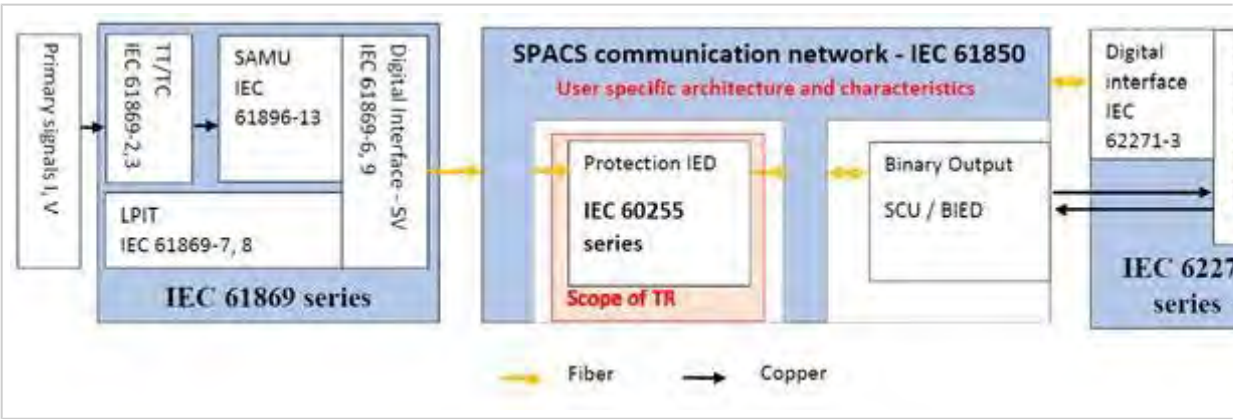
is discussing the scope of a new document with the following Scope;

This Technical Report aims at considering protection IEDs with digital inputs and output complying with IEC 61850 and IEC 61869 standards, in particular

- 1. subscribing streams of digital Sampled Values (SV) representing energizing inputs of the protection function.
- 2. subscribing GOOSE and/or reports by the protection function (eg. cb position, cb failure).
- 3. publishing GOOSE messages (e.g. trip orders).
- 4. subscribing time synchronization information.

On this base, this document will give recommendations and guidelines concerning requirements and testing of protection IED with digital inputs and outputs within TC95.

Requirements regarding characteristics of the communication network are not within the scope of this Technical Report. Delays and jitter due to the network have to be taken into account by network engineering. Figure 1 below shows the functional chain of a protection function. This Technical Report only considers the data received and publish by the protection IED as shown in figure below.



More to come ...

Posted by [Karlheinz Schwarz](#) at 2:09 AM [No comments:](#)

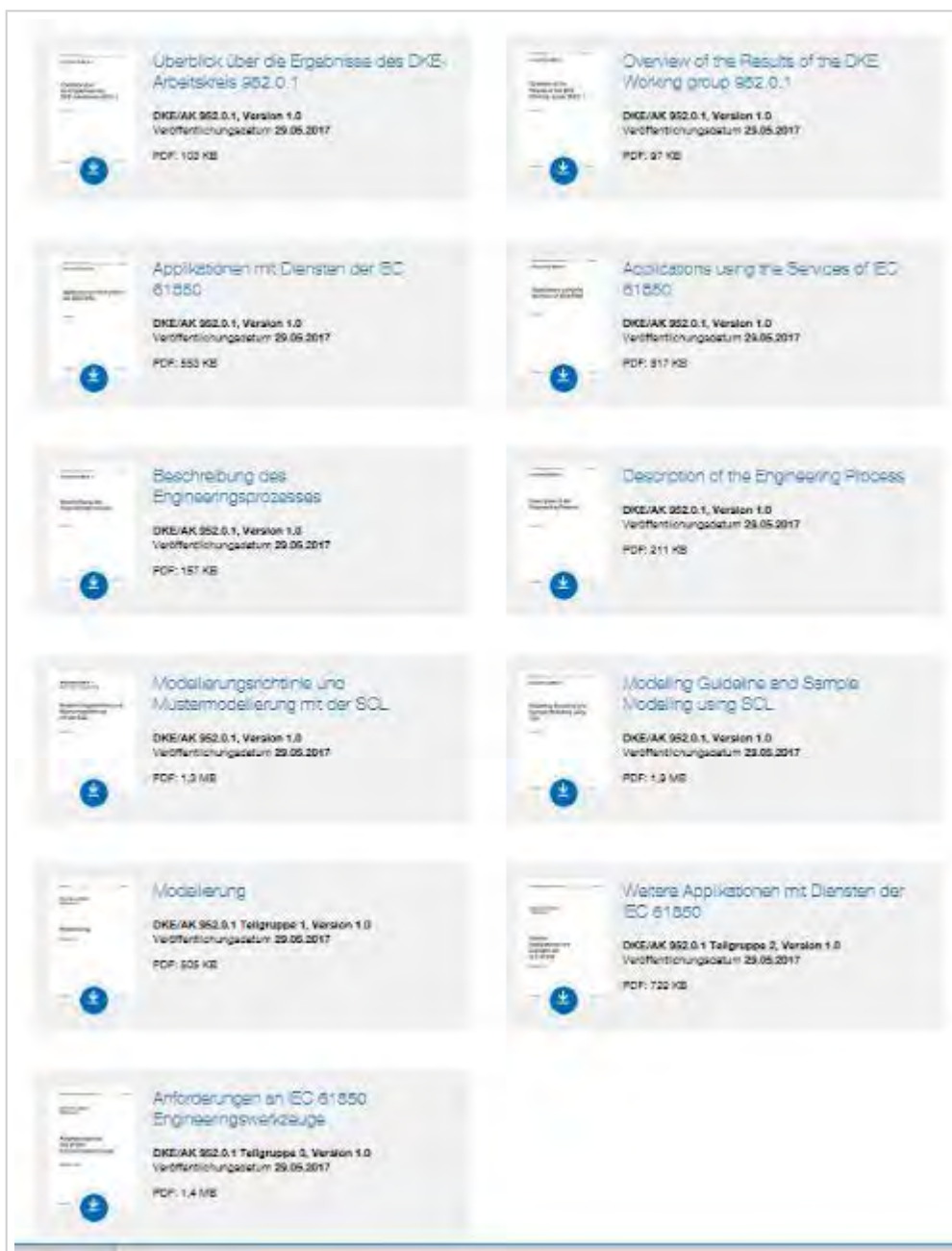
Labels: [GOOSE](#), [IEC 61850](#), [IEC TC 95](#), [protection](#), [sampled value](#)

Monday, September 10, 2018

IEC 61850 Applications in Germany - DKE Documents Online for Free Download


The German National Committee of IEC TC 57 (DKE K 952) has many members of various Working Groups (in the national as well as in the international groups) that discussed the IEC 61850 standard series in general and particularly how the standards could be applied to substation automation and protection. One of the key issues is the modelling and configuration using SCL.

Several documents in German and in English are available:



Click [HERE](#) for the link to the above page.

Enjoy the documents.

Posted by [Karlheinz Schwarz](#) at [5:04 AM](#) [No comments:](#) 

Labels: [configuration language](#), [DKE](#), [engineering](#), [IEC 61850](#), [IEC TC 57](#), [protection](#), [SCL](#), [Substation Automation](#)

Tuesday, July 24, 2018

Cyber Security for Industrial Control Systems (ICS) is Going Where?

Cyber Security for Industrial Control Systems (ICS) has been discussed over many years - and it will be discussed forever. There seems to be no end of discussions and solutions ... the end may come when electric power will be switched off - caused by insecure systems.

As long as we have ICS in operation - which is very crucial! - we will see products being developed and offered that are marketed to save the world of ICS.

Dale Peterson wrote a very nice and interesting article about "[The Future of the ICS Cyber Security Detection Market](#)" (23 July 2018).

Dale seems to expect that the ICS Cyber Security Detection Market will completely change in a few years. He may be right. My expectations is that the change will happen for ever - and ever faster.

So, you may decide to wait! This would be the worst decision you can make.

Whatever is available for your system today - use it! The wait for getting started with, e.g., encrypted ICS protocols is over - use TLS wrapper as much as possible - as soon as possible.

Click [HERE](#) for the complete article - worth to read.


Our power system highly depend on ICS - ICS highly depend on power systems. The two can live together only. Non of the two will survive without the other!!

I hope we have enough people to understand that we need more smart people to keep power flowing: means electrical engineers and IT experts ... and ...

My recommendation is that we need to get a better holistic understanding how power systems and ICS are interdependent ... we should not isolate one from the other ... already understood some hundred years ago:

"Hence we must believe that all the sciences are so interconnected, that it is much easier to study them all together than to isolate one from all others. If, therefore, anyone wishes to search out the truth of things in serious earnest, he ought not to select one special science, for all the sciences are cojoined with each other and interdependent."
Rene Descartes (1596-1650)

Finally we will have to accept that reliable electric power will be more expensive soon - moderate increased price in case we care about ICS Cyber Security - extremely expensive if we fail to protect the power system.

Posted by [Karlheinz Schwarz](#) at [12:11 PM](#) [No comments:](#) 

Labels: [holistic](#), [ICS cyber security](#)

New Smart Grid Controller with IEC 61850, IEC 61850-5-104, and DNP3

System Corp (Perth/Australia) offers a new very powerful Smart Grid Controller for applications in:

1. Secondary Substation Control
2. Transformer and Asset Management
3. Micro Grid Control and Automation
4. Data Gateway Application
5. IoT and Cloud Service Interfacing

Smart Grid CUBE Controller SGC-30

Smart data gateway and grid automation

The **SMART** Grid **CUBE** Controller **SGC-30** is a scalable communication and automation platform for demanding SMART Grid applications, which is ideally suited for micro grids, smart grid applications and distribution automation.

Based on a multi-tasking real-time operating system, a number of communication protocols the device can be used in conjunction with an integrated programmable logic controller.



Communication protocols such as IEC 61850, IEC 60870-5-101/104, DNP3 and Modbus are part of a standard communication library available on the **SGC-30**. Cloud interface options are based on standard JSON data format and exchange.

Infoteam's OPEN PCS programmable logic controller application is fully compliant with the IEC 61131 standard.

Standard Communication Features


Two configurable Ethernet ports provide a powerful network connectivity platform. Configuration options are:

- 2 x Independent Ethernet ports with own MAC addressing
- HSR (High Available Seamless Redundancy) Ethernet Ring
- PRP (Parallel Redundant Protocol) Ethernet configuration



Modular Input and Output Cube Cells
Depending on backplane configuration up to 4 cube cells are

Click [HERE](#) for more details.

Posted by [Karlheinz Schwarz](#) at [5:49 AM](#) [No comments:](#) 

Labels: [Cloud Computing](#), [DNP3](#), [HSR](#), [IEC 60870-5-104](#), [IEC 61131-3](#), [IEC 61850](#), [PRP](#), [Smart Grid](#), [SystemCorp](#)

Thursday, July 19, 2018

HMS Networks AB takes over Beck IPC

HMS has taken over the German based company Beck IPC. Beck IPC has a range of products providing IEC 61850, IEC 60870-5, and DNP3 connectivity - I have reported about their products from time to time ... just search for Beck on the blog.

Click [HERE](#) for the HMS press release.

HMS (IXXAT) sells some of the Beck com.tom (as Gateways):

Click [HERE](#) for Beck com.tom products with above standards implemented.

Click [HERE](#) for HMS Gateway products with above standards implemented.

Posted by [Karlheinz Schwarz](#) at [7:46 AM](#) [No comments:](#) 

Labels: [Beck IPC](#), [Gateway](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#)

Saturday, July 14, 2018

IEC TC 57 just published FDIS IEC 61850-8-2 (Mapping to XMPP)

IEC TC 57 just published FDIS IEC 61850-8-2 (Mapping to XMPP) - 253 pages !

(57/2020/FDIS)

Voting ends: 2018-08-24

Part 8-2: Specific communication service mapping (SCSM)

- Mapping to Extensible Messaging Presence Protocol (XMPP)

The long wait for a second SCSM is over!

The new mapping of IEC 61850 describes a specific communication service mapping (SCSM) over the Extensible Messaging and Presence Protocol (XMPP), providing detailed information on how to create and exchange concrete communication messages that implement abstract services and models specified in IEC 61850-7-4, IEC 61850-7-3, and IEC 61850-7-2.

Note that the MMS messages (defined using ASN.1) are used in IEC 61850-8-1 AND -8-2 ! The only crucial difference between the two message and model mappings (in 8-1 and 8-2) is this:


8-1 uses BER (Basic Encoding Rule) for the messages on the wire, while 8-2 uses (XER (XML Encoding Rule). **The complexity of the MMS messages is the same in both mappings - because the structure and how to build messages and how to carry the 7-2 services and 7-x models are the same!**

The challenges to implement 8-2 message mapping are more or less the same as with 8-1. Note that the messages in XER are far longer than with BER.

There is - of course - a difference between the two: The transport of messages in 8-2 uses XMPP.

Some may argue, that there are more tools available for XER than for BER. Ok.

IEC 61850-8-2 is far away from something simple and easy to implement and use - especially when you need only a few simple services and models.

Posted by [Karlheinz Schwarz](#) at [5:25 AM](#) [No comments:](#) 

Labels: [ASN.1](#), [BER](#), [IEC 61850](#), [iec 61850-8-2](#), [message encoding](#), [MMS](#), [SCSM](#), [XML](#), [XMPP](#)

WOW -- IEC 61850 Models Publically Available for Download

After long time, IEC has accepted to provide free online access to the IEC 61850 Models!!

Congratulation!

Excerpt from 57/2023/INF (2018-07-13):

"With IEC 61850-7-7, a machine processable format for the distribution of IEC 61850 data models has been defined. Based on that, in the future, **all IEC 61850 models** will be as well available in this format as namespace files (NSD files).

The namespace files are code components, that are intended to be directly processed by a computer. The purchase of the associated IEC standard carries a copyright license for the purchaser to sell software containing Code Components from this standard to end users either directly or via distributors, subject to IEC software licensing conditions, which can be found at: <http://www.iec.ch/CCv1>. ..."

Screenshot from the TC 57 Supporting Documents page:

TC 57

Power systems management and associated information exchange

Scope

Structure

Projects / Publications

Documents

Votes

Meetings

Collaboration Tools

Working Documents:

Other Documents

Supporting Documents

Documents available in this area are supporting documents uploaded by the committee. The IEC is not liable for the content of these documents.

TC 57 Supporting Documents

Table search:

Title, description	Downloads	Created	Publication reference
IEC_61850-6.2018.SCL.2007B4.full.zip IEC 61850-6 SCL schema V2007B4, see the IEC 61850-6:2009/AMD1:2018 for full legal notices	1874 kB	2018-06-08	IEC 61850-6:2009+AMD1:2 CSV
IEC_61850-7-3.NSD.2007A2.light.zip IEC 61850-7-3 2007A2 NSD light, see the IEC 61850-7-3:2010 for full legal notices	22 kB	2018-07-13	IEC 61850-7-3:2010
IEC_61850-7-4.NSD.2007A2.light.zip IEC 61850-7-4 2007A2 NSD light, see the IEC 61850-7-4:2010 for full legal notices	32 kB	2018-07-13	IEC 61850-7-4:2010
IEC_61850-7-2.NSD.2007A2.light.zip IEC 61850-7-2 2007A2 NSD light, see the IEC 61850-7-2:2010 for full legal notices	15 kB	2018-07-13	IEC 61850-7-2:2010
IEC_61850-8-1.NSD.2003.light.zip IEC 61850-8-1 2003 NSD light, see the IEC 61850-8-1:2011 for full legal notices	14 kB	2018-07-13	IEC 61850-8-1:2011
IEC_61850-7-7.2017.NSD.2017A.full.zip IEC TS 61850-7-7 SCL schema V2017A, see the IEC TS 61850-7-7:2018 for full legal notices	972 kB	2018-03-16	IEC TS 61850-7-7:2018
IEC_61850-6.2003.SCL.1.7.full.zip IEC 61850-6 SCL schema V1.7 (a.k.a. 2003), see the IEC 61850-6:2003 for full legal notices	1121 kB	2017-09-05	IEC 61850-6:2003
IEC_61850-6.2009.SCL.2007B.full.zip IEC 61850-6 SCL schema V2007B, see the IEC 61850-6:2009 for full legal notices	1725 kB	2017-09-05	IEC 61850-6:2009
IEC_62351-7.2017_ed1.0.MIBS.1.0.light.zip MIBS Code component, see the IEC_62351-7:2017 for full legal notices	32 kB	2017-07-24	IEC 62351-7:2017

Showing 1 to 9 of 9 entries

Click [HERE](#) to get to the above page.

Posted by [Karlheinz Schwarz](#) at 5:04 AM [No comments:](#) 

Labels: [Code Components](#), [free download](#), [IEC 61850](#), [models](#), [name space documents](#), [NSD](#)

Sunday, July 8, 2018

First Draft IEC 61850-90-16 Requirements for System Management for IEC 61850

The first Draft on IEC 61850-90-16 (97 pages) has been published (57/2014/DC):

Requirements for System Management for IEC 61850

"The distribution grid is facing a massive roll out and refurbishment of automation equipment to implement deeper monitoring and new smart grid applications. The new equipment to be deployed in order to solve today's issues (MV voltage and reactive power regulation for example) will necessarily have to be **adjustable and upgradeable in order to face challenges of tomorrow** (for example massive electric vehicles fleets, low voltage automation, ...) which will arrive long before the end of its 20 years' service life. Furthermore, there is a necessity for the equipment to adapt to the evolving and growing cybersecurity threats.

The equipment will therefore need to be patched, updated and reconfigured, and this has to be done remotely due to the great number of equipment. This is a cornerstone of the System Management (SM), which refers to functionalities that are not directly linked to the operational role of the equipment but allow it to perform its operational functions in the best conditions possible. Smart Grid Devices Management also includes other functions such as asset management or supervision. These functionalities need to be managed by the grid operator and address multiple devices from different vendors through independent Information Systems and thus the requirements and exchanges need to be standardized. As these are to be applied to IEC 61850 compliant equipment, these mechanisms need to be integrated in the standard. ..."

Comments are due by 2018-09-28

Posted by [Karlheinz Schwarz](#) at 5:46 AM [No comments:](#) 

Labels: [asset management](#), [distribution automation](#), [IEC 61850-90-16](#), [security](#), [Smart Grid](#)

Role-based Access Control - On its way to become Standard

IEC 62351-8 is on its way to become an IEC Standard (57/2017/CD):

Power systems management and associated information exchange – Data and communications security –

Part 8: Role-based access control

The part 8 is currently a Technical Specification. This will change in the next step.


The 62 page CD has been published for commenting until 2018-09-28

"This document provides standard for access control in power systems. The power system

environment supported by this standard is enterprise-wide and extends beyond traditional borders to include external providers, suppliers, and other energy partners. ...

The following interactions are in scope:

- local (direct wired) access to the object by a human user;
- local (direct wired) access to the object by a local and automated computer agent, e.g. another object at the field site;
- direct access by a user to the object using the objects' built-in HMI or panel;
- remote (via dial-up or wireless media) access to the object by a human user;
- remote (via dial-up or wireless media) access to the object by a remote automated computer agent, e.g. another object at another substation, a distributed energy resource at an end-user's facility, or a control centre application."

Posted by [Karlheinz Schwarz](#) at 5:38 AM [No comments:](#) 

Labels: [IEC 62351-8](#), [RBA](#), [Role Based Access](#), [security](#)

Wednesday, July 4, 2018

IEEE Spectrum July 2018: 6 WAYS IoT IS VULNERABLE

IEEE Spectrum 2018-07 publishes an opinion by Stacey Higginbotham about the vulnerability of IoT devices and systems:

6 WAYS IoT IS VULNERABLE

Here is an excerpt of the six reasons why security for the Internet of Things (IoT) is different from—and more difficult to tackle than—traditional IT security:

1. We've raised the stakes by connecting **more physical systems and facilities** to wireless networks -> Consequences of failure are more dire.
2. IoT security is a **special challenge**:The **adversaries** are **unlike any we've seen before**.
3. For traditional IT system, one can count on the software company's **support** for a **set amount of time**. What we see: it could be 10 years, 7, 3, 2, or even 0 ...
4. A connected product that generates a **small profit** may **require years of** updates, patches, and security evaluations.
5. Many connected devices are built with **software, hardware, and firmware that are created by different companies and pieced together** at the end. It takes only one weak link to create a vulnerability ...
6. Many connected devices live in **environments unlike any IT system**. In a home, there's **no IT manager to push patches** to a connected fridge. And in an industrial setting, patching one machine **might cause it to stop working** with other equipment on the line.

I would summarize the challenge as follows:

IoT devices and systems require in principle the same attention, efforts and resources like traditional IT systems. The sheer unlimited number of interconnected IoT devices will work securely only if we except to **spend much more money** than what the market expects!

Or: Today's solutions will be the problems of tomorrow.

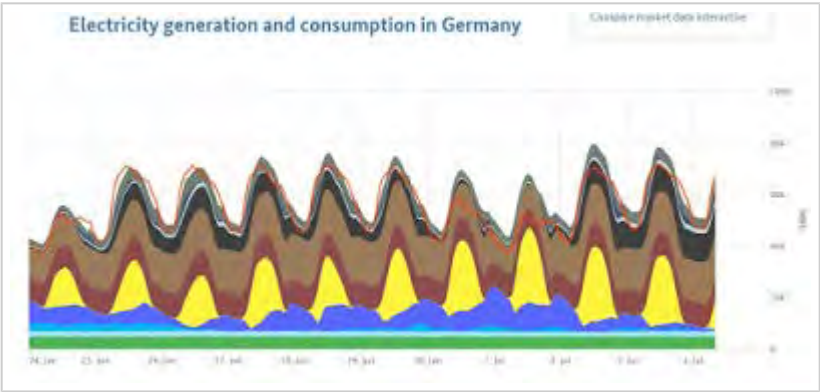
Click [HERE](#) for the complete document (1 page).

Posted by [Karlheinz Schwarz](#) at 4:57 AM [No comments:](#) 

Labels: [IOT](#), [security](#)

Real-time Access to German Generation and Consumption of Electricity

You have real-time access to the German generation and consumption of electricity:



Click [HERE](#) for the real-time data access.

Posted by [Karlheinz Schwarz](#) at [1:19 AM](#) [No comments:](#)

Labels: [consumtion](#), [Germany](#), [power generation](#), [real-time](#)

Monday, July 2, 2018
Version 2 des OE/BDEW-Whitepaper Anforderungen an sichere Steuerungs - und Telekommunikationssysteme

Version 2 des OE/BDEW-**Whitepaper** (komplett überarbeitete Version!; 80 Seiten):

**Anforderungen an sichere Steuerungs - und Telekommunikationssysteme
(Requirements for Secure Control and Telecommunication Systems)**

verfügbar

Click [HIER](#) für den Zugriff auf das gesamte Dokument.

"Das vorliegende Dokument definiert grundsätzliche Sicherheitsanforderungen für Steuerungs- und Telekommunikationssysteme für die Prozesssteuerung in der Energieversorgung und gibt Ausführungshinweise zu deren Umsetzung. Hierzu werden von Fachexperten zusammengestellte, aktuelle und branchenspezifische Empfehlungen zur Sicherstellung der Informationssicherheit aufgeführt. Das Whitepaper definiert Anforderungen an Einzelkomponenten und für aus diesen Komponenten zusammengesetzte Systeme und Anwendungen. Ergänzend werden auch Sicherheitsanforderungen an Wartungsprozesse, Projektorganisation und Entwicklungsprozesse behandelt. Fokus dieses Dokuments sind die im Rahmen der Beschaffung zu berücksichtigenden Anforderungen an technische Komponenten und Systeme und für die Projektabwicklung relevanten Prozesse. Ebenso wichtig sind organisatorische Sicherheitsmaßnahmen im Unternehmen, wie der Aufbau einer Sicherheitsorganisation, ein angemessenes Risikomanagement oder die Schaffung eines umfassenden Sicherheitsbewusstseins bei den Mitarbeitern (Security Awareness). Diese organisatorischen Anforderungen stehen nicht im Fokus des Whitepapers, hierzu sei insbesondere auf die Normen ISO/IEC 27001 und ISO/IEC 27019 verwiesen. Das vorliegende Dokument ist eine vollständig überarbeitete Neuauflage des BDEW Whitepapers und der zugehörigen Ausführungshinweise von Oesterreichs Energie und BDEW. Beide Dokumente wurden zusammengeführt und die Inhalte gemäß aktuellen Technologienentwicklungen umfassend aktualisiert und ergänzt."

Die englische Version wird in Kürze erscheinen.

Die hier beschriebenen Anforderungen haben erheblichen Einfluss auf Unternehmen im Kontext der Energieversorgung: mehr Mitarbeiter und mehr technische Hilfsmittel, mit denen die Anforderungen erfüllt werden könnten - **und damit höhere Kosten!**

Posted by [Karlheinz Schwarz](#) at [1:54 AM](#) [No comments:](#)

Labels: [BDEW Whitepaper](#), [Cyber Security](#), [IT Sicherheitsgesetz](#), [Sicherheit](#)

Wednesday, June 27, 2018
New Title of IEC TC 57 WG 17

The new title of IEC TC 57 WG 17 is:

“Power system intelligent electronic device communication and associated data models

for microgrids,
distributed energy resources and
distribution automation”

Posted by [Karlheinz Schwarz](#) at 4:05 AM [No comments:](#) 

Labels: [DER](#), [distribution automation](#), [IEC TC 57 WG 17](#), [microgrid](#)

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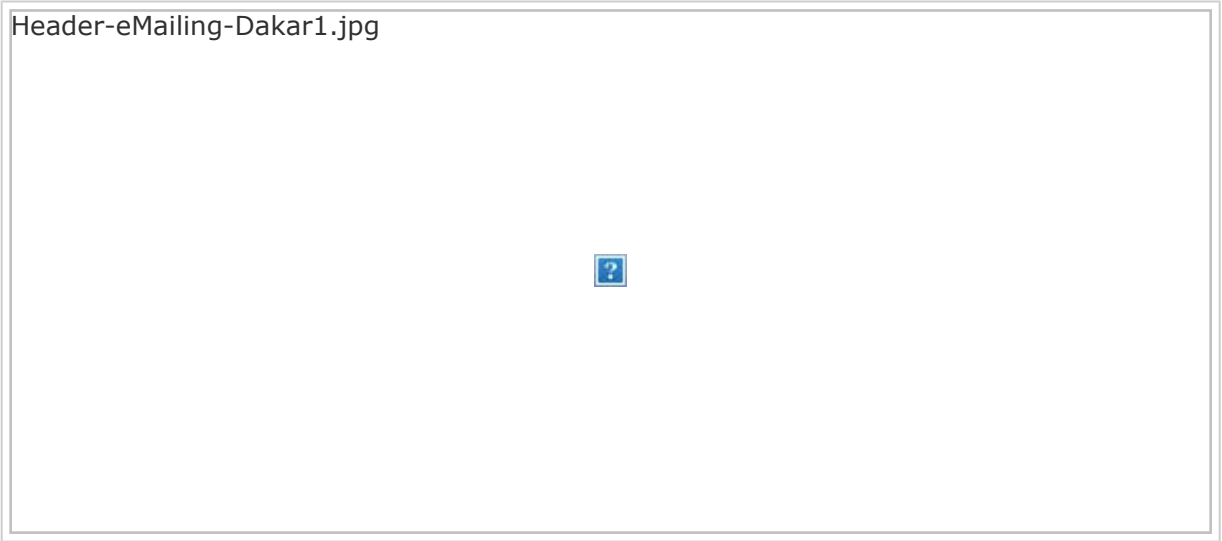
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WEITERE INFORMATIONEN OK

Monday, June 18, 2018

Séminaire PowerOn Dakar Sénégal 18 et 19 Juin 2018

Cet évènement vous permettra de partager des connaissances et de rencontrer des experts et spécialistes de différents horizons afin d’échanger sur les solutions aux problèmes que vous rencontrez, les outils de mesures-test-diagnostic des équipements électriques, et d’obtenir de l’aide ou des conseils, ou simplement découvrir les nouvelles techniques innovantes disponibles pour tester les transformateurs et autres équipements des postes HT.



- Protection des réseaux :
- **CEI 61850 et Réseaux électriques intelligents : impact sur les spécifications, essais et maintenance des postes électriques. Présenté par Andrea Bonetti.**
- **Protection Différentielle des transformateurs : influence physique des relais sur les transformateurs. Présenté par Andrea Bonetti.**
- Plan de protection : mesure de l’impédance de ligne. Présenté par Andrea Bonetti.
- Charge filerie : mesure d’impédance avec le SVERKER. Présenté par Andrea Bonetti.
- Vérification des TC/TP. Présenté par Mamadou Keita.
- Efficacité de la Maintenance :
- Informatisation du Suivi de Parc et de la Gestion des données de test
- Réseaux Souterrains :
- Localisation de défauts de câbles. Présenté par Adeola Adebomi.
- Diagnostic des câbles souterrains. Présenté par Adeola Adebomi.
- Transformateurs de puissance :
- Test et Diagnostic. Présenté par Mamadou Keita.
- Et bien d’autres thèmes qui seront abordés basées sur le retour d’expériences terrain

Nous serions honorés de votre présence et nous vous remercions de cliquer ci-dessous pour vous enregistrer.
Pour toute autre question, n’hésitez pas à nous contacter.

<http://fr.megger.com/seminaire-poweron-dakar-senegal>

Pour toute demande d’informations, envoyez un e-mail à infos@megger.com

Hôtel King Fahd Palace
Route des Almadies
Dakar 8181
Senegal

Posted by [Karlheinz Schwarz](#) at [10:36 AM](#) [No comments:](#)

Labels: [Andrea Bonetti](#), [Automation](#), [IEC 61850](#), [Megger](#), [protection](#)

Monday, June 4, 2018

Megger Offers a Wide Range of IEC 61850 GOOSE Test Tools and Experiences

Megger (Sweden) offers a wide range of test tools and experiences for testing and commissioning of systems based on IEC 61850 GOOSE.

They just published a brochure that shares some light on IEC 61850 interoperability problems and solutions for the horizontal communication (GOOSE):

For your Convenience

[An All NEW Evaluation, Demo, and Hands-On Package for IEC 61850 \(IEC 61400-25\) available \(2017-07-03\)](#)

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[Old Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[NEW! Blog as single PDF until 23 April 2017 \[17 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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[Fundamentals of IEC 61850 training programme](#)
- 2019 (51)
- 2018 (32)
- 2017 (87)
- 2016 (110)
- 2015 (94)
- 2014 (129)

IEC 61850 - GOOSE Interoperability

Click [HERE](#) for the brochure.

This document (written by **one of the most experienced senior protection engineers**) is really worth to download and to read! Andrea Bonetti will give you a deep inside look into the use of GOOSE messaging and how to reach interoperability.

"Interoperability is one of the most misunderstood of all business terms. It is, however, one of the most important of all predictors of success or failure. In short, interoperability is the ability of diverse systems to work together effectively and efficiently. Interoperability is a property of a product or system, whose interfaces are completely understood, to work with other products or systems, present or future, without any restricted access or implementation.

There is absolutely no doubt that Interoperability facilitates valuable business connections—across processes, between people and information and among companies. Interoperability yields improved collaboration and ultimately increased productivity. Providing interoperability helps customers decrease complexity and better manage heterogeneous environments—while enhancing choice and innovation in the market. Importantly, the interoperability requirement of the IEC 61850 standard has beneficially increased the “interoperability among different engineers” working for companies that are formally in competition. This increased communication among different vendors has contributed to the fact that GOOSE messaging can today be considered a working technology, even if problems still arise, like in any other technology.

With more than six years of field experience with IEC 61850 GOOSE communication in protection and control applications, it is possible today to list the main reasons for interoperability problems for multi- and single-vendor systems; however, the list of causes of interoperability failures would be longer than what indicated in this document, especially if considering the cases found during the beginning of the use of GOOSE messages.

In order to commission substations with the new IEC 61850 technology, there is need to use some new tools and methods. The key for these tools and methods is, paradoxically, implicitly available in the IEC 61850 standard itself."

Enjoy!

Posted by [Karlheinz Schwarz](#) at 2:46 AM [No comments:](#) 

Labels: [GOOSE](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Megger](#)

IEC 61850-90-11 - Modelling of Logics for IEC 61850 Based Applications

IEC TC 57 just published a 50+ page proposal for a very interesting topic:

57/2001/DC

Proposed IEC TR 61850-90-11, Communication networks and systems for power utility automation – **Part 90-11: Methodologies for modelling of logics for IEC 61850 based applications**

Comments to this draft are expected by 2018-07-27 at the latest.

This is likely the first time where application modelling (using a single configuration language!) integrates basic logic functions like AND, OR, Timer, ... including a Mapping of IEC 61850 data types and IEC 61131-3 / PLC Open XML data types.

The document introduces a couple of use cases describing mainly the control and monitoring of switchgears and electrical measurements.

- Use case 1 – Busbar disconnecter coupled in a double busbar arrangement
- Use case 2 – Delayed breaker trip and blocking after 1st low gas pressure alarm
- Use case 3 – Bay connected to busbar A
- Use case 4 – Definite trip
- Use case 5 – "Direct transfer open operation"
- Use case 6 – Line outage detection in a breaker and a half scheme
- Use case 7 – Unit trip logic
- Use case 8 – Data quality management
- Use case 9 – Switchgear control on the example of a busbar change-over

The modelling of logics could be of interest for many other applications.

Posted by [Karlheinz Schwarz](#) at 2:25 AM [No comments:](#) 

Labels: [Automation](#), [IEC 61850](#), [IEC 61850-90-11](#), [Logics](#)

Saturday, May 26, 2018
IEC TS 62351-5 ED2 - Security for IEC 60870-5 and derivatives

- ▶ [2013](#) (130)
- ▶ [2012](#) (188)
- ▶ [2011](#) (159)
- ▶ [2010](#) (153)
- ▶ [2009](#) (162)
- ▶ [2008](#) (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

IEC TC 57 just published a new proposal to revise TR IEC 62351-5 and convert it into a standard:

57/2000/DC

Proposed revision of IEC TS 62351-5 ED2 and transformation of the TS into an IS (Power systems management and associated information exchange - Data and communications security - **Part 5: Security for IEC 60870-5 and derivatives**)

Excerpt from the background:

"... Since IEC TS 62351-5 was first published, IEC 60870-5-7 has been published defining specific security requirements for IEC 60870-5 protocols based on IEC TS 62351-5, while similar specific security requirements have been defined for IEEE Std. 1815 (DNP3). In addition, implementations have been undertaken by vendors. As a result, some issues with IEC TS 62351-5 were identified. At the same time, the security requirements for IEC 60870-5 have matured since these specifications were released as a Technical Specification. At this time, it is important to update these security requirements and convert them into an International Standard in order to ensure that implementations of IEC 60870-5 can include the appropriate security measures. ..."

Comments are expected by 2018-07-20 at the latest.

Posted by [Karlheinz Schwarz](#) at [5:37 AM](#) [No comments:](#) 

Labels: [DNP3](#), [iec 60870-5](#), [IEC 62351](#), [IEC 62351-5](#), [security](#)

IEC 61850 - Model Extensions To Support Microgrids

IEC TC 57 just published a proposal for a new work:


57/1888/DC

Model extensions to IEC 61850 to support microgrids

From the preamble:

"An important market trend is to enable the operation of DER in **islandable mode supplying a local process such as campus, buildings, industries, ...**. Thus it is important to complement the existing and/or coming IEC 61850 series of standards to support such an operation mode, including the protection of considered assets, the **management of their transitioning between grid-tied and islanded mode, but also to the support the management of frequency, voltage, and quality of supply to the process**. ..."

Comments to the proposal are welcome by 2018-07-20 at the latest.

Posted by [Karlheinz Schwarz](#) at [5:18 AM](#) [No comments:](#) 

Labels: [grid tied](#), [IEC 61850](#), [islanding](#), [microgrid](#)

IEC 61850-90-9 - Use of IEC 61850 for Electrical Energy Storage Systems

IEC TC 57 has just published a 114 page new draft technical report:

57/1998/DC

Draft IEC TR 61850-90-9, Communication networks and systems for power utility automation – Part 90-9: **Use of IEC 61850 for electrical energy storage systems**

Comments are welcome until 2018-08-17

"This technical report provides necessary information within 61850 based object model in order to model functions of a battery based electrical energy storage system as a DER unit. For intelligently operated and/or automated grids, storing energy for optimising the grid operation is a core function. Therefore shorter periods of storing energy with charging and discharging capability is also an indispensable function. Charging and discharging operations need to be modelled thoroughly and are in the focus of this technical report. ...
An Electrical Energy Storage system (EESS) is a system which is used for the purpose of intermediate storage of electrical energy. The type of storage, the amount of energy, charging and discharging rates as well as self-discharge rate and many other characteristics are technology dependent and therefore can be very different. However, the general meaning of the characteristics and parameters are identical.
The objective of this document is to define a standardized and general approach to information modelling for operating an EESS regardless of any specific technique, which supports an efficient way of integrating an EESS into grid operation and other businesses.
Various types of EESS, such as **battery, pumped hydro, superconducting magnetic energy storage, flywheels, etc.**, are defined in "IEC White Paper on Electrical Energy Storage." According to the the white paper, EESS systems are classified by energy form, advantages/disadvantages to the specific usages or the purpose of the implementation. ... "

Posted by [Karlheinz Schwarz](#) at [5:11 AM](#) [No comments:](#) 

Labels: [batteries](#), [energy storage](#), [IEC 61850](#), [IEC 61850-90-9](#)

Part 7-420 - Distributed energy resources and distribution automation logical nodes

After tremendous work on the revision and extension of the IEC 61850-7-420 Edition 1, IEC TC 57 just published the 366 page committee draft IEC 61850-7-420 ED2:

57/1997/CD

Communication networks and systems for power utility automation – Part 7-420: Basic communication structure – **Distributed energy resources and distribution automation logical nodes**

Commenting period closes 2018-08-17


Excerpt from the introduction:

"Increasing numbers of DER (distributed energy resources) systems are being interconnected to electric power systems throughout the world. As DER technology evolves and as the impact of dispersed generation on distribution power systems becomes a growing challenge – and opportunity – nations worldwide are recognizing the economic, social, and environmental benefits of integrating DER technology within their electric infrastructure. The manufacturers of DER devices are facing the age-old issues of what communication standards and protocols to provide to their customers for monitoring and controlling DER devices, in particular when they are interconnected with the electric power system. In the past, DER manufacturers developed their own proprietary ...

This document addresses the IEC 61850 information modelling for DER, although some types and aspects of DER information models have been developed or are being developed separately through technical reports before they are added to this international standard DER model. These consist of the following:

- IEC 61850-90-6: Use of IEC 61850 for Distribution Automation Systems
- IEC 61850-90-8: Object model for electric mobility
- IEC 61850-90-9: Use of IEC 61850 for Electrical Storage Systems
- IEC 61850-90-15: DER Grid Integration using IEC 61850 "

This document is one of the crucial parts for the application of IEC 61850 in distributed power systems.

Posted by [Karlheinz Schwarz](#) at [5:03 AM](#) [No comments:](#) 

Labels: [CHP](#), [DER](#), [distribution automation](#), [IEC 61850](#), [IEC 61850-7-420 Edition 2](#), [photo voltaic](#)

Friday, May 18, 2018
Great Article on Internet Insecurity - a New Approach!?

Yes - the title is about "Internet Insecurity" ...

The paper suggests a radical new approach in dealing with security or insecurity.

The papers closes:
"Every organization that depends on digital technologies and the internet is vulnerable to a devastating cyberattack. Not even the best cyber hygiene will stop Russia, North Korea, and highly skilled, well-resourced criminal and terrorist groups. The only way to protect your business is to take, where you can, what may look like a technological step backward but in reality is a smart engineering step forward. **The goal is to reduce, if not eliminate, the dependency of critical functions on digital technologies and their connections to the internet.** The sometimes higher cost will be a bargain when compared with the potentially devastating price of business as usual."

Click [HERE](#) for the article.

Posted by [Karlheinz Schwarz](#) at [7:22 AM](#) [No comments:](#) 


Labels: [critical infrastructure](#), [Cyber Security](#), [internet](#)

Thursday, May 17, 2018
FNN-Lastenheft "Steuerbox" veröffentlicht

Der FNN-Hinweis "**Lastenheft Steuerbox** - Funktionale und konstruktive Merkmale" ist jetzt verfügbar und kann zum Preis von 39 € erworben werden.

Das Lastenheft "Steuerbox" liefert die erste Grundlage für ein standardisiertes Steuerungssystem, das in der Architektur des intelligenten Messsystems betrieben werden kann.

[Hier](#) für die Leseprobe klicken.
[Hier](#) finden Sie den Shop.

Posted by [Karlheinz Schwarz](#) at 4:40 AM [No comments:](#) 

Labels: [FNN-Steuerbox](#), [IEC 61850](#), [IEC 61850-7-420](#), [Schedule](#)

Wednesday, May 2, 2018

Die FNN-Steuerbox kommuniziert mit IEC 61850

Die FNN-Steuerbox basiert auf standardisierten Lösungen für den Informationsaustausch. Für die Fernkommunikation mit den Steuerboxen wurde eine Untermenge an Modellen und Diensten aus der Normenreihe IEC 61850 ausgewählt und näher spezifiziert.

Es kommen Services wie DataSet, Report Control, Log und Log Control, Control ... zur Anwendung. Als wesentliche Modell kommt das Scheduling (Fahrplansteuerung) zum Einsatz.

"In der Niederspannung sind basierend auf den FNN-Anwendungsfällen folgende Teilaspekte relevant.

Fahrplansteuerung

Die Realisierung einer netzdienlichen Fahrplansteuerung dient in erster Linie dem Ersatz der heutigen Heizungssteuerung (Nachtspeicher, Wärmepumpen, Warmwasser) durch das intelligente Messsystem und unterliegt u. a. den Anforderungen einer autarken und zuverlässigen Schaltfahrplansteuerung sowie einer zeitsynchronen Tarifierung.

Steuern einer Einzelanlage Last/Erzeuger in kurzer Zeit

Die Steuerung von einzelnen Lasten und Erzeugern in der Niederspannung kann durch externe Marktteilnehmer erfolgen und ist i.d.R. als unkritisch zu bewerten.

Steuerung von Anlagengruppen in kurzer Zeit

Die Steuerung von Lasten und Erzeugern in der Niederspannung kann durch Gruppierung der Anlagen zu erhöhten Anforderungen führen. Dies kann bei kritischen Netzsituationen erforderlich werden. Entsprechend sind dabei erweiterte Maßnahmen in der Steuerungsarchitektur zu treffen.

Die dabei betroffenen Stückzahlen sind im Anwendungsfall der Heizungssteuerung mit deutschlandweit ca. 2 Mio. Anlagen sowie einer Leistung von ca. 15 GW erheblich. Im Bereich der erneuerbaren Energien sind derzeit ca. 1,5 Mio. PV-Anlagen installiert, von denen perspektivisch ein großer Teil steuerbar sein soll - Tendenz steigend."

Click [HIER](#) für mehr Informationen.

Posted by [Karlheinz Schwarz](#) at 2:48 AM [No comments:](#) 

Labels: [Fahrplan](#), [FNN-Steuerbox](#), [IEC 61850](#), [IEC 61850-90-10](#), [Schedule](#)

Wednesday, April 18, 2018

Draft TR IEC 61850-7-6 published: Guideline for definition of Basic Application Profiles (BAPs) using IEC 61850

IEC TC 57 just published the 68 page draft Technical Report IEC 61850-7-6:

57/1986/DTR

Communication networks and systems for power utility automation –
Part 7-6: Guideline for definition of **Basic Application Profiles** (BAPs) using IEC 61850

Voting closes 2018-06-08.

"The IEC 61850 standard series offers a broad basis for communication networks and systems in power utility automation. Due to its broad coverage of power utility automation applications, it is up to the standard's user (utility, vendor, system integrator...) to pick and choose specific options from the standard in order to meet the requirements of the intended objective. As a consequence, implementations of IEC 61850 represent specific subsets of the standard.

In the context of standards the term "profile" is commonly used to describe a subset of an entity (e.g. standard, model, rules).

Accordingly an IEC 61850 standard profile contains a selection of data models (mandatory elements), communication services applicable and relevant engineering conventions (based on the Substation Configuration Language SCL defined in IEC 61850-6) for an application function of a specific use case in the domain of power utility automation.

Depending on the scope and objective different profile types can be distinguished:

- **User profile** – defined subset that is valid for a specific user / organization (e.g. utility)
- **Product / Device profile** – implemented subset in a specific vendor product /device
- **Domain profile** – defined subset for a specific domain and relevant use cases (e.g. monitoring of substation)
- **Application / function profile** - subset covering a specific application or function (e.g. substation interlocking)

These profile types target on **reducing complexity** and facilitate **interoperability** for their specific scope and during engineering and device / substation lifetime. In order to achieve both these goals - a properly defined profile and appropriate implementations (processes, tools, products) that support the profile are required."

Note that IEC 61850 is **not that complex** - but it is **very comprehensive**!!
Comprehensiveness with regard to:

- 1. Number of parts: some 50 including drafts
- 2. Number of Logical Nodes
- 3. Number of Data Objects
- 4. Configuration language
- 5. Number of task forces working on new stuff
- 6. Number of applications that can be covered
- 7. ...

The most crucial challenge is this: How can I find what may be of interest for my application? I hope somebody will do a good job in preparing an overview of models published and under preparation.
Let me know if you are aware of some good document or website ...

Posted by [Karlheinz Schwarz](#) at [4:47 AM](#) [No comments:](#) 

Labels: [Basic Application Profile](#), [configuration language](#), [IEC 61850](#), [models](#), [SCL](#), [subsets](#)

Tuesday, April 17, 2018

IEC TC 57 Proposes New Work on SCD Based Substation Network Auto-Routing

IEC TC 57 Proposes New Work on SCD Based Substation Network Auto-Routing:

57/1987/DC

Proposal to develop IEC TR 61850-90-22 –
Communication networks and systems for power utility automation –
Part 90-22: SCD based substation network auto-routing with visualization and supervision support

"The scope of the proposed TR is to provide a comprehensive analysis of increased challenges encountered in the field where substation network is adopted, and to propose a novel resolution which is **SCD based substation network auto-routing with visualization and supervision.**"

The following issues are key: Network topology auto-discovery, IED auto-detection, GOOSE/SV auto-routing, QoS and traffic engineering, Redundant path and fast recovery, Traffic validation, policing and shaping, Network resource virtualization, ...

I am happy to see that this draft proposal as been published - it will implement what I have been said for years in my seminars: SCD documents are containing a lot more than just Logical Nodes ... more to come. Stay tuned.

Click [HERE](#) for the list of National Committees involved in IEC TC 57.

Posted by [Karlheinz Schwarz](#) at [3:13 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-90-22](#), [routing](#), [SCD](#), [SCL](#)

Friday, April 13, 2018

CEWE Instruments Exhibits a new Meter with IEC 61850 Interface

CEWE Instruments exhibits at the Hanover Fair the **Prometer 100 family of high-precision four-quadrant energy meters** with advanced measuring, logging, power quality monitoring and data storage capabilities.

Prometer 100 supports flexible and modular communications options enabling integration with existing AMR/AMI/SCADA systems, and provides an upgrade path to future substation automation systems (SAS).

Logical Nodes supported: LLNO, LPHD, MMXU, MMTR, MHAI, MABT

Please note that the meter has been certified by the UCAIUG for IEC 61850 compliance.

Visit CEWE at Booth (B09, Hall 12) at the Hannover Messe (23.-27. April 2018)

Click [HERE](#) for more information.
Cliock [HERE](#) if you need a ticket for the fair in Hanover.

Posted by [Karlheinz Schwarz](#) at [4:51 AM](#) [No comments:](#) 

Labels: [CEWE](#), [IEC 61850](#), [SCADA](#), [smart metering](#)

Configuration Description Language for Extensions for Human Machine Interfaces

IEC TC 57 just published a very interesting committee draft for machine support of automatic mapping the SCL models to HMIs:

IEC 61850 (57/1984/CD):

Communication networks and systems for power utility automation –

Part 6-2: Configuration description language for extensions for human machine interfaces

Closing date for comments: **2018-06-01**

"This International Standard describes how the graphical components and their interactions found within HMI applications are to be described using the Graphical Configuration Language (GCL) and the HMI Configuration Language (HCL). It will describe how the graphical elements – described in GCL – are to be bounded to the IEC 61850 elements defined by IEC 61850's System Configuration Language (SCL). ..."

The following excerpt from the CD gives an impression on how the HMI configuration is intended to be automatically derived (supported) by a new graphical configuration namespace:

The diagram below summarizes the IEC 61850-6-2 based configuration, that is further defined in Chapter 9. The graphical configurations shall be managed in a dedicated namespace, and governed by its own graphical configuration languages (GCL). Likewise, the HMI configurations shall be managed by its own namespace, and governed by its own HMI configuration languages (HCL), which is responsible for binding the IEC 61850 sign defined in the SCD file to the graphical objects defined within the GCD file, with the output of this process creating the HCD file. See Chapter 8 for more information on the configuration languages (GCL/HCL). See Chapter 11 for more information on the various configuration files.

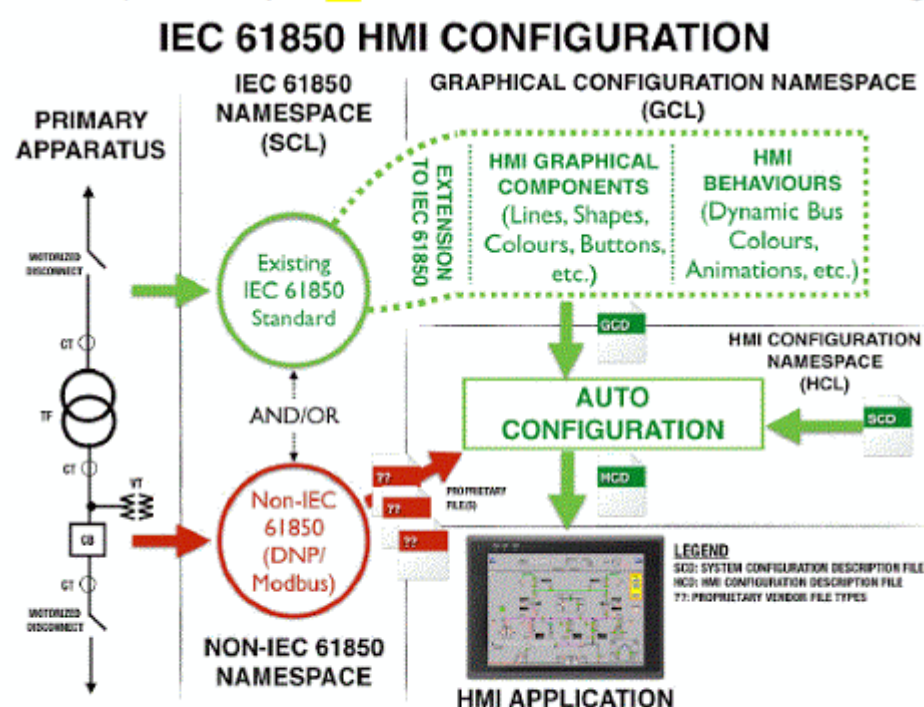


Figure 3: IEC 61850 HMI Engineering Principles

Wow, this is really a major step forward!

Posted by [Karlheinz Schwarz](#) at 4:40 AM No comments:

Labels: [configuration](#), [graphical interface](#), [HMI](#), [IEC 61850](#), [IEC 61850-6-2](#), [SCL](#), [Topology](#)

Monday, February 5, 2018

FMTF, NettedAutomation and other Experts Offer New Training Courses for Power System Automation, Protection, Smart Grid, and Security

FMTF Power AB (Uppsala, Sweden), KTH (Royal Institute of Technology Stockholm), Håvard Storås (Security expert), and NettedAutomation GmbH (Karlsruhe, Germany) have each long-term experience in the application of standards for protection and control as well in secure communication and SCADA applications.

FMTF and NettedAutomation in cooperation with other senior experts **offer the most comprehensive and vendor-independent education and practical training courses** – they combine their knowledge and practical experience in the following areas:

1. **Substation control and protection, system design, engineering, and testing** (Mr Andrea Bonetti who worked for ABB, Megger, and STRI),
2. **Smart Grid** (Mr Lars Nordström, Director and Professor at KTH – Royal Institute of Technology Stockholm),
3. **IT, OT & Cyber Security** (Expert Mr Håvard Storås) and
4. **Communication technology and SCADA ... market penetration and solutions**(Mr Karlheinz Schwarz who worked for Siemens in the 80s and 90s):

We offer the following comprehensive training options:

[Stockholm/Sweden](#)
(English: [Andrea Bonetti](#), [Prof. Lars Nordström](#), [Håvard Storås](#), and [Karlheinz Schwarz](#)):

12-16 March 2018 (book 3, 4 or 5 days)

Click [HERE](#) for details

[Karlsruhe/Germany](#)
(English: [Andrea Bonetti](#), [Håvard Storås](#), and [Karlheinz Schwarz](#)):

23-27 April 2018 (book 3, 4 or 5 days)

Click [HERE](#) for details

[Karlsruhe](#)
(Deutsch: [Karlheinz Schwarz](#)):

14-17 Mai 2018
04-07 Dezember 2018

[HIER](#) für Details in Deutsch klicken.

Posted by [Karlheinz Schwarz](#) at 7:18 AM [No comments:](#) 

Labels: [Cyber Security](#), [education](#), [engineering](#), [Helinks](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [KTH](#), [SCADA](#), [testing](#), [Training](#)

Friday, December 29, 2017

New Merging Unit Development Kit

A new **Merging Unit Development Kit** based on the NovTech IoT Smart Grid Platform with Intel Cyclone V SoC Core is available for your next project. Utility companies are adapting their infrastructures to support bidirectional energy flow to handle the emergence of DER (Distributed Energy Resources) via microgrids, photovoltaic panels, and local energy storage. As distributed energy generation increases, new intelligence of sensors, measurement and protection equipment will be required to process data at the edge. Also with the increase in variable DER, it is more challenging for substations to deliver sinusoidal and predictable steady-state voltage and current. Utility companies rely on substation metering of secondary voltage (VT) and current transformer (CT) circuits to detect performance issues and to provide vital information in real time to distributed digital protection nodes.

To satisfy this need, SystemCORP and Intel developed an **IEC 61850-9-2LE compliant merging unit** solution in form of a demonstrator/development platform.

This development kit consists of 6 parts:

1. NovTech IoT Octopus Smart Grid IoT Platform
2. SystemCORP VT/CT Interface board
3. SystemCORP **IEC 61850-9-2LE Sample Value software stack (PIS-11)** on ARM Cortex A9 core 1
4. SystemCORP **IEC standard 61850 server/client software stack (PIS-10)** on ARM Cortex A9 core 2 (optional)
5. Flexibilis embedded FPGA analogue front-end IP core
6. Flexibilis Ethernet PRP/HSR FPGA IP core (optional)

Click [HERE](#) for more information.

Posted by [Karlheinz Schwarz](#) at 2:14 AM [No comments:](#) 

Labels: [9-2LE](#), [client](#), [IEC 61850](#), [IEC 61850-9-2](#), [Intel](#), [merging unit](#), [sampled value](#), [server](#), [sv](#)

Saturday, December 9, 2017

IEC TC 57 Publishes Draft for Basic Application Profiles (BAPs)

IEC TC 57 just published Draft for Basic Application Profiles (BAPs):

Development of IEC TR 61850-7-6 (57/1946/DC):
Communication networks and systems for power utility automation

Part 7-6: Guideline for definition of Basic Application Profiles (BAPs) using IEC 61850

Different types are possible:

1. **User profile** –defined subset that is valid for a specific user / community of users (e.g. utility)
2. **Domain profile** - defined subset for a specific domain and relevant use cases (e.g. asset management)
3. **Basic Application Profile (BAP)** – standardized subset defining an atomic application

function (e.g. reverse blocking)

- 4. **Application profile** - profile covering a specific application mostly based by aggregating BAPs e.g. busbar protection)
- 5. **Device profile** – profile covering a typical IED functionality e.g. Merging Unit, IEC 61869-9)
- 6. **Product profile** – implemented subset in a specific vendor product

Comments on this draft are due by 2018-01-19.

Posted by [Karlheinz Schwarz](#) at [4:31 AM](#) [No comments:](#) 

Labels: [BAP](#), [Basic Application Profile](#), [IEC 61850](#), [profile](#)

How many employees will drive an electric vehicle?

A German manager recently said that 500 employees of his company drive by car to the company every workday. He expects that in the future 250 will use electric cars and will charge their cars within the first hour after they arrived. The company would need 10 times more power than today!

Ok! Hm!?

What do you think about these assumptions? 250 EVs charging in the first hour!?

As an engineer I am wondering that experts come up with such examples. First of all, I do not expect that 50 per cent of the car owners will buy an electric car in the next years. Even if they would do, why do 250 car drivers want to charge at the companies car park in the morning when they arrive?

He concludes that "we engineers have not yet thought through to the end".

I guess a lot of engineers have thought through to the end - but not many engineers or politicians are listening!

Click [HERE](#) for the report "Netzstabilität braucht Digitalisierung und Automatisierung" in the vdi nachrichten (German).

These discussions remind me of the situation in the early 80s when we had the discussion on CSMA/CD (Ethernet, IEEE 802.3) versus Token Passing (IEEE 802.4). Under the assumption that we have a shower of messages to be sent by all attached devices at the same time, we found that Ethernet could not efficiently manage the communication due to many collisions. Token Passing was understood to manage such a situation very well. Ok.

Another assumption, high load from one device only, could easily be managed by CSMA/CD - but Token Passing would end up in very low throughput ... many other assumptions could be made.

So, what is the realistic assumption for communication? Nobody knows - it all depends.

Finally [Switched Ethernet \(a major new development\)](#) solved the collision problem ... and Token Passing more or less became obsolete in the automation world.

In the energy domain we need first to find the [future new mix of power generation](#) and how to [store, transmit, distribute, and use the power - then we can think about automation and communication](#). The most crucial issue may be: Who is paying for all the changes?

By the way: We (many engineers) know how to communicate: IEC 61850 is one of the most crucial solution ... and how (not yet what) to automate.

Posted by [Karlheinz Schwarz](#) at [4:08 AM](#) [No comments:](#) 

Labels: [Ethernet](#), [Ethernet switches](#), [IEC 60870-6](#), [IEC 61850](#), [IEC 62351](#), [Power Automation](#), [TASE.2 ICCP](#)

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WEITERE INFORMATIONEN OK

Tuesday, November 21, 2017

Cigré -- Free of Charge Download of Publications related to IEC 61850

Non Cigré Members can download free of charge publications that are over three years old. Cigé is the international association and body of knowledge for the power sector:

Click [HERE](#) for a list of IEC 61850 related publications - many are older than three years.

Enjoy.

Posted by [Karlheinz Schwarz](#) at 9:37 PM No comments: 

Labels: [Cigré](#), [free download](#), [IEC 61850](#), [publications](#)

Monday, November 13, 2017

IEC 61850 Training in Deutsch mit Jubiläumsrabatt

An alle an IEC 61850 Interessierten, NettedAutomation bietet das viertägige IEC 61850 Intensiv-Training vom 05 bis 08. Dezember 2017 in Karlsruhe zu einem ***unschlagbaren Jubiläums-Sonderpreis*** von 750 Euro (netto) an!

[Hier für das Anmeldeformular klicken.](#)

Bei der Anmeldung bitte den Sonderpreis vermerken!

Weitere Termine:
14.-17. Mai 2018
04.-07. Dezember 2018

Wir haben mehr als 4.300 Experten in mehr als 240 Kursen geschult - überall auf der Welt!

Wir bieten Ihnen auch gerne ein Inhouse-Seminar an.

Wir würden uns freuen, Sie am 05.12. in Karlsruhe - direkt neben dem Weihnachtsmarkt - begrüßen zu können!

Posted by [Karlheinz Schwarz](#) at 11:44 AM No comments: 

Labels: [BDEW Whitepaper](#), [Cyber Security](#), [deutsch](#), [hands-on Training](#), [IEC 61850](#), [IEC 62351](#), [IT Sicherheitsgesetz](#), [seminar](#), [Training](#)

Saturday, November 11, 2017

First Amendment of IEC 61850-4: System and Project Management

IEC TC 57 just published the IEC 61850-4 Amendment 1 (57/1922/CDV)
– Communication networks and systems for power utility automation
– **Part 4: System and project management**

The main extensions of the edition 2 are:

1. New sub-chapter 5.3.6 describes the **engineering tool workflow and its chronology (which SCL files are exchanged in between configuration tools)** through 3 use cases: the classical use case, the change of system tool and the interaction between 2 projects.
2. New sub-chapter 6.4 talks about **backward compatibility and deals with replacement or extension** whatever the component is provided by the same or different manufacturer. To do so, it scrutinizes through 4 use cases, what kind of impacts could be acceptable for IED or tools.

The ballot closes 2018-02-02.
The CDV (committee draft for vote) is [accessible for PUBLIC comments](#) by every interested person.

Note that the amendment has already been blended into the edition 2 document for easier reading: 57/1923/INF

These extensions answer a couple of questions that come up during every seminar and in many discussions. They are extending the explanations of SCL (part 6).
The document is worth to study.

For your Convenience

[An All NEW Evaluation, Demo, and Hands-On Package for IEC 61850 \(IEC 61400-25\) available \(2017-07-03\)](#)

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[Old Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[NEW! Blog as single PDF until 23 April 2017 \[17 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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Posted by [Karlheinz Schwarz](#) at 4:55 AM [No comments:](#) 

Labels: [configuration](#), [configuration language](#), [IEC 61850-4](#), [SCL](#), [system configuration](#), [system management](#)

Friday, November 3, 2017

What happens during a blackout - Comprehensive Report of the German Parliament's study

The OFFICE OF TECHNOLOGY ASSESSMENT AT THE GERMAN BUNDESTAG published in 2011 a very comprehensive report:

What happens during a blackout - Consequences of a prolonged and wide-ranging power outage

"THE COMMITTEE’ S PREFACE

Infrastructures such as a reliable energy supply, functioning water-supply and wastewater-disposal systems, efficient modes of transport and transport routes and also information technology and telecommunications technology that can be accessed at all times represent the lifeblood of high-technology industrialised nations. The Committee on Education, Research and Technology Assessment therefore commissioned the Office of Technology Assessment at the German Bundestag (TAB) to investigate the possible effects of a prolonged and widespread power blackout on highly critical infrastructures such as drinking water, wastewater, information and communications systems, financial services and health services, especially against a backdrop where the blackout has a cascading effect spanning state and national boundaries. In Germany, several recent natural disasters and technical malfunctions (Elbe and Oder floods in 2002/2005, power blackout in the Münsterland in 2005, the Kyrill storm in 2007) have highlighted the population’s dependence on such (critical) infrastructures. Supply bottlenecks, public safety problems and disruptions to road and rail transport have revealed the vulnerability of modern societies and made extreme demands on health, emergency and rescue services...."

Click [HERE](#) for the 250 page report [English].
Click [HERE](#) for the German version.

The report is one of the best descriptions I have seen. It is really worth to **read**, to **understand** and to **follow**.

If you want to understand what power outages could mean to a society (in a warm region - not in c(o)ld Germany), study the following reports:
Click [HERE](#) for the report "Puerto Rico 'heartbreaking' five weeks post-storm"
Click [HERE](#) for the report "Puerto Rico Struggles With Power Recovery ..."
Click [HERE](#) for further information

I hope something like that will not happen during winter time in Germany.
Note that we have more than natural disasters: Man-made aging infrastructures and aging workforce.

Posted by [Karlheinz Schwarz](#) at 10:29 PM [No comments:](#) 

Labels: [blackout](#), [Germany](#), [power outage](#)

Thursday, November 2, 2017

Port Scanning in a Substation - May be a No-Go

Security is more than a buzzword these days. You should be very serious about the security of your substation protection and automation system.
Joe Weiss asked yesterday:

Are the Good Guys as Dangerous as the Bad Guys – an Almost Catastrophic Failure of the Transmission Grid

What happened? A port scanning tool in an IEC 61850 GOOSE based substation protection system had a very negative impact on the GOOSE publisher and subscriber: The Relays stopped to operate!! They had to be manually rebooted.
Port scanning may provide a lot (too much) of stress to the devices and communication system. Such a crucial load has to be taken into account during the design of the devices and of the whole system. Theoretically this payload should be taken into account as part of the system engineering ... part of the System Configuration Description (SCD). Any unexpected traffic avalanche may have a serious impact on the stability of the system!
Click [HERE](#) for Joe's report.

I guess that the [GridEx network monitor](#) would have raised the red flag seeing the message avalanche in the transmission substation.

Lesson to be learned:



Any non-operational load on a critical network should be treated very careful. IT and OT people have to work together and make sure that such test tools do not put too much stress onto the devices connected in a substation or any other system:
Teamwork makes the dream work - and keeps the power flowing!

Click [HERE](#) for a discussion of port scanning ... written long time ago (2001 !!)
Click [HERE](#) for a worth to read report on how to apply IEC 62443.

My friend Andrea Bonetti (FMTP) responded as follows:

- [2013](#) (130)
- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

-  [Karlheinz Schwarz](#)
-  [Michael Schwarz](#)

Dear Karlheinz!

What you have described is unfortunately a known problem.

It is really not at all the first time that it happens in the last 10 years, but it is maybe the first time that it is presented to the public.

I would like to stress-out that this problem is NOT related to IEC 61850 but it is related to the correct usage of digital technology.

Similar situations happened also “before” when proprietary digital technology was used. Maybe they were just more difficult to disclose because also the tools were proprietary. Regarding GridEx, it would have detected the loss of communication among the devices, as it performs the supervision of the GOOSE messages. This would have been written in its report. GridEx performs also network load calculations, but in the case you have described this would not have helped probably. Anyway that information would also have been written in the report.

Let me point out that GridEx is an “IEC 61850 passive tool”.

GridEx does not talk to any device, does not send any IEC 61850 message.... it can only listen to what happens, without interacting with the system.

Also the time synchronization of GridEx can be performed completely independently from the system, with its own independent GPS receiver accessory.

Also GridEx works without a PC, so you do not connect the PC to the substation network system.

As GridEx doesn’t interact to the system where it is connected to, it cannot cause any damage and it can be connected to the network while the system is in service.

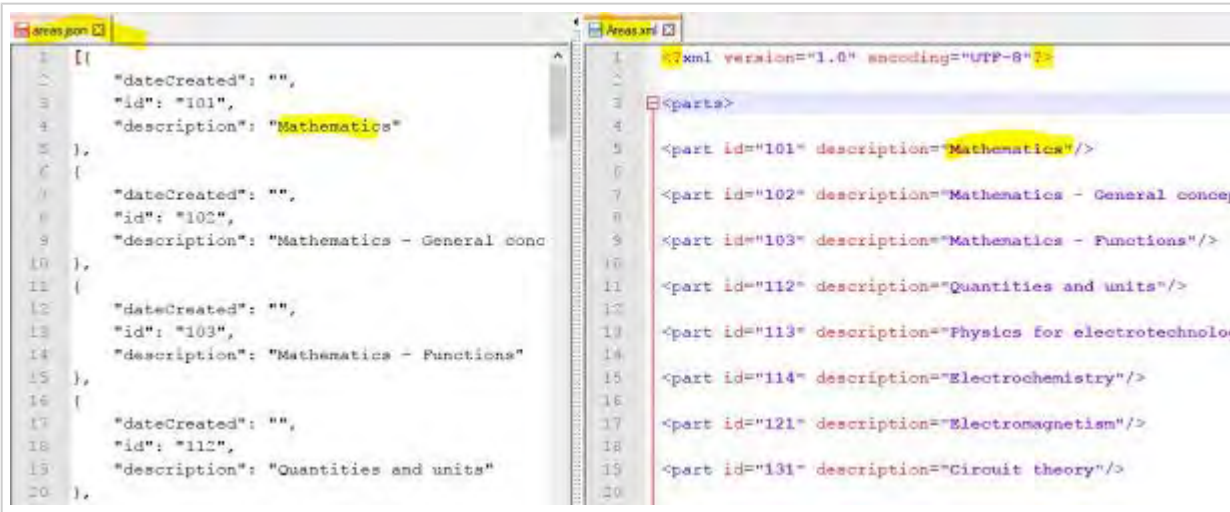
Posted by [Karlheinz Schwarz](#) at [10:25 PM](#) [No comments:](#) 

Labels: [Cyber Security](#), [GOOSE](#), [GridEx](#), [IEC 61850](#), [IEC 62351](#), [IEC 62443](#)

Saturday, October 28, 2017

Wow: IEC Goes XML and PSON

IEC provides access to crucial standardized information by modern web technologies: The content of the [Electropedia](#) (The World's Online Electrotechnical Vocabulary) is now made accessible by [XML documents](#) and PSON (REST) through the [opendata gateway](#). “A json version of all subject areas (or IEV parts) in the Electropedia is available by calling the REST endpoint: “ <https://opendata-api.iec.ch/v1/opendata/areas/>



I expect that the PSON option will be made available for the complete vocabulary soon. Enjoy!

More to come!

Posted by [Karlheinz Schwarz](#) at [1:49 AM](#) [No comments:](#) 

Labels: [Electropedia](#), [Opendata](#), [PSON](#), [XML](#)

Draft TR IEC 62351-90-2: Deep Packet Inspection (DPI) of Encrypted Communication

IEC TC 57 just published the document 57/1939/DTR:

Power systems management and associated information exchange –
Data and communications security –
IEC TR 62351-90-2: Deep Packet Inspection (DPI) of encrypted communications

This technical report analyses the impact of encrypted communication channels in power systems introduced with IEC 62351. As defined in IEC 62351 an encrypted channel can be employed when communicating with IEDs and encryption can be adopted at message level as well. For example, the use of encrypting TLS setups according to IEC 62351-3 introduces some issues when Deep Packet Inspection (DPI) is needed to inspect the communication channel for monitoring, auditing and validation needs. In this report we analyze different techniques that can be employed to circumvent this issues when DPI of communications is required.

The voting closes 2017-12-22

Posted by [Karlheinz Schwarz](#) at [1:40 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [deep package inspection](#), [IEC 62351](#), [iec 62351-90-2](#), [TLS](#)

Sunday, October 8, 2017

ABB Presents the Benefits of Substation Digitalization with IEC 61850

A nice video by ABB (Steven Kunsman) explains "all the benefits of substation digitalization ... it's little wonder there's so much interest in the shift to this technology. Supported by the open communication capabilities derived from **IEC 61850's**, substation assets are providing a growing volume of health and operational data that's enabling higher levels of both reliability and performance. This excerpt from an ABB Automation & Customer World Workshop provides key highlights of how the digital substation is also safer, smaller, and simpler to commission and operate than traditional substations."

Click [HERE](#) for the video.

Posted by [Karlheinz Schwarz](#) at 9:18 PM [No comments:](#) 

Labels: [ABB](#), [IEC 61850](#), [Substation Automation](#)

Saturday, October 7, 2017

IEC TC 57 published Two Documents Related to Security Measures (IEC 62351)

IEC TC 57 just published the following two documents:

57/1928/NP

IEC 62351-100-3: Conformance test cases for the IEC 62351-3, the secure communication extension for profiles including TCP/IP

The scope is to specify common available procedures and definitions for conformance and/or interoperability testing of the requirements of IEC 62351-3, the security extension for profiles including TCP/IP.

57/1931/DC

Proposed revision of IEC TS 62351-6 ED1 and conversion into an International Standard (Power systems management and associated information exchange - Data and communications security - Part 6: Security for IEC 61850)

Both documents indicate that the security measures defined by the series IEC 62351 are becoming more important! Hope that more experts in the power delivery domain will understand the impact!

Posted by [Karlheinz Schwarz](#) at 8:20 AM [No comments:](#) 

Labels: [conformance test](#), [Cyber Security](#), [IEC 61850](#), [IEC 62351](#), [IEC 62351-6](#), [security](#), [TCP/IP](#)

Draft TR IEC 61850-90-6 for Distribution Automation Published

IEC TC 57 WG 17 just published the **277 page (!)** draft TR 57/1929/DTR:

IEC 61850-90-6: Use of IEC 61850 for Distribution Automation Systems

Commenting period and ballot closes 2017-12-01.

This technical report provides basic aspects that need to be considered when using IEC 61850 for information exchange between systems and components within MV network automation. In particular, the report:

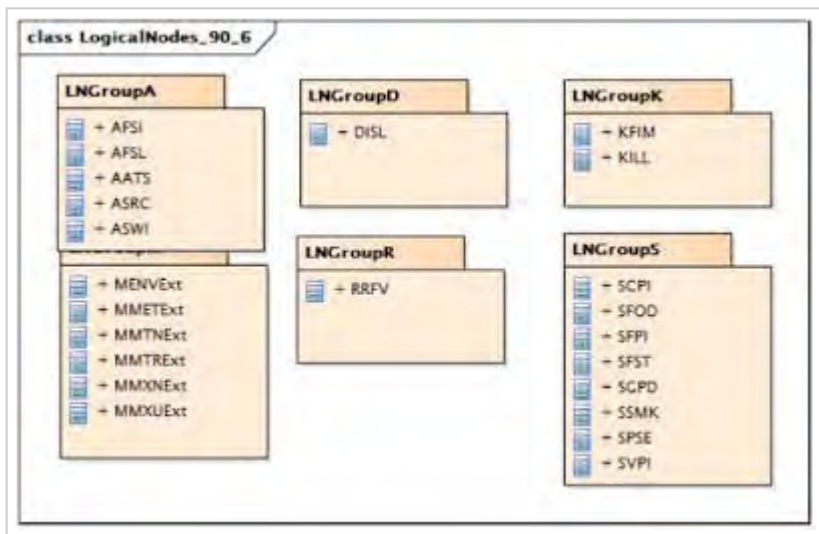
- Defines **use cases for typical DA applications** that require information exchange between two or more components/systems
- Provides **modelling of components** commonly used in DA applications
- Proposes **new logical nodes and the extensions to the existing logical nodes** that can be used in typical DA applications.
- Provides **guidelines for the communication architecture and services** to be used in DA applications
- Provides **configuration methods** for IEDs to be used in DA systems.

Basic function for which models will be selected or defined cover:

- Fault Passage Indication and report
- FLISR (Fault Location, Isolation and Service Restoration)
- VVC (Voltage and Var Control)
- Anti-Islanding Protection Based on Communications
- Automatic Switch Transfer
- Monitoring Energy Flow
- Environment Situation Awareness

A Distribution Automation System (DAS) can have up to tens of thousands of IEDs spreading over a wide area distribution network.

Multiple new Logical Node Classes and extensions for existing LNs are proposed:



This draft is very detailed and easy to read.

Posted by [Karlheinz Schwarz](#) at 7:56 AM No comments:

Labels: [distribution automation](#), [Fault Location](#), [fault passage indication \(FPI\)](#), [IEC 61850-90-6](#), [logical node](#), [model extensions](#)

Conflicting Use of TCP Port 102 for IEC 61850 and Simatic S7

IEC 61850-8-1 defines how the abstract IEC 61850 services (ACSI) are mapped to MMS (ISO 9506). The MMS protocol runs on ISO/OSI Transport Layer, ISO/OSI Session Layer, ... For IEC 61850 it has been decided to use TCP/IP as transport protocol.

TCP has to be "extended" by some definitions to get the same services and protocol features as provided by ISO/OSI Transport Layer class 0: The [IETF RFC 1006](#) defines how to use TCP for MMS. RFC 1006 defines among other issues to use [TCP Port number 102 for the MMS Server](#) role. Any IEC 61850 Server role has to run on port 102 - independent of the platform it is running on: protection device, control device or a Windows PC.

Siemens SIMATIC S7 PLCs use RFC 1006 entitled "ISO Transport Service on top of the TCP" (ISO-on-TCP) as a protocol extension for the TCP protocol for connection between two systems.

RFC 1006 (and thus [Port 102](#)) is used for standard connections in the SIMATIC environment.

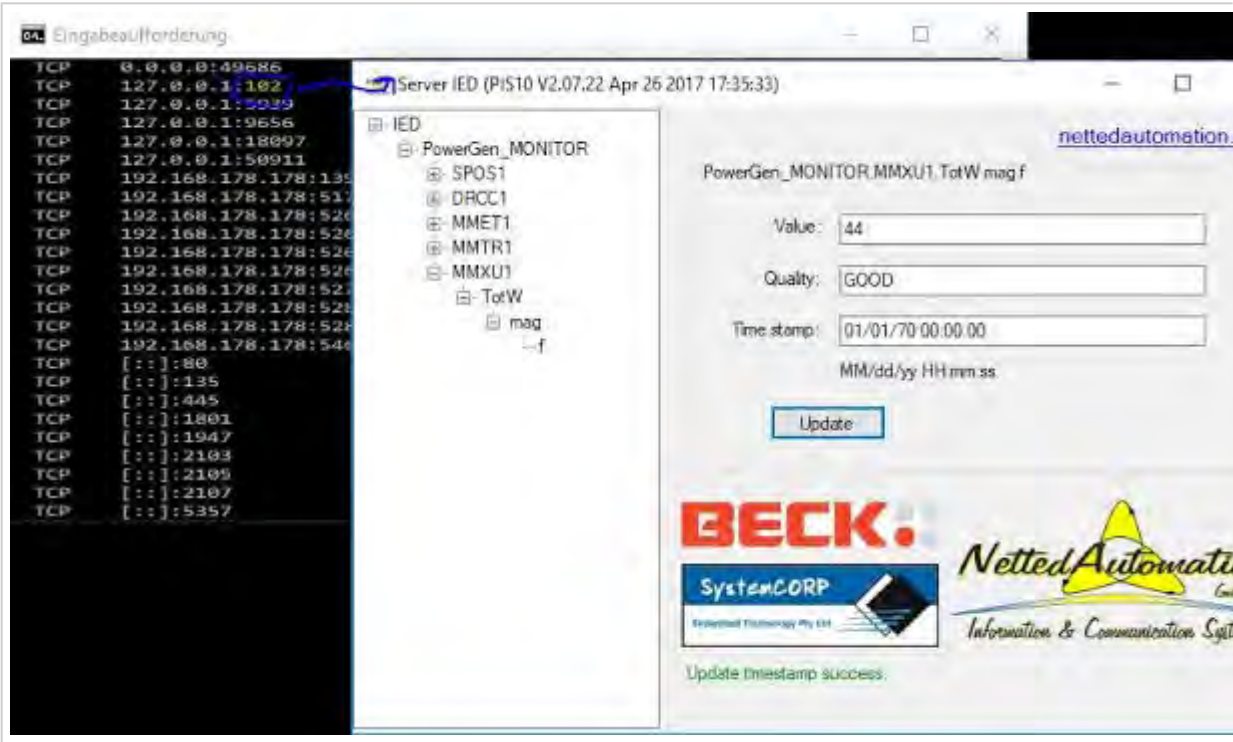
- [STEP 7 remote programming via LAN](#)
- [ISO-on-TCP connections](#)
- [S7 connections via Industrial Ethernet](#)

I have come across situations where PCs are running SIMATIC S7 tools that are using Port 102! In that case you cannot run an IEC 61850 Server role on the same PC (with the same IP address) - because Port 102 is already in use!!

If you have trouble running an IEC 61850 Server role on your computer - check also if Port 102 is already in use. In one case we figured out this situation with a server model (SCL) that we tried to simulate with the Omicron IED Scout! IED Scout reported an error: TCP Port 102 already in use. We stopped the SIMATIC S7 application to free the Port 102.

This is another use case where the [IEDScout](#) reports very useful error information!

Here is an example of the command ["netstat -a"](#) (may use as well "netstat -a -b") to figure out, if the port 102 is used or not: Waiting for port "102":



Click [HERE](#) for the Server demo (shown on the right).

Click [HERE](#) for a list of ports used by Siemens SIMATIC S7.

Posted by [Karlheinz Schwarz](#) at 1:31 AM No comments:

Labels: [demonstrations](#), [Evaluation](#), [IEC 61850](#), [IEDScout](#), [iso 9506](#), [MMS](#), [Omicron](#), [port 102](#), [rfc 1006](#), [Simatic S7](#), [TCP/IP](#)

Tuesday, October 3, 2017

Are Devices Using IEC 61850 Vulnerable?

Devices that implement IEC 61850 may be vulnerable - depending on the measures (not) implemented to protect your SYSTEM! There are many layers of security that can be build into the system to make is less vulnerable. IEC 61850 needs special security measures to hide the semantics of the information being exchanged in a system.

IEC 61850 has well defined models for controlling switch gears: Logical Node CSWI.Pos for operating any kind of switchgears liek circuit breaker, dis-connector or earthing switches. If a client (SCADA, RTU, Proxy, ...) has "open" access to an IED, it could use the self-description and figure out which CSWI instances are available ... and could try to use MMS Write to open or close a switch gear. In a bad system design, this may work.

A high level of security would not (easily) allow other clients (except those that are designed to operate) to operate a switch gear.

Security measures have to be implemented to prevent misuse of the self-description. Even without the self-description, it may be possible that somebody gets access to the SCL file of the system to "read" the models from an XML file. As a consequence: XML files need to be secured as well ...!

You will find solutions for many of the known security problems in the [standard series IEC 62351](#)!

The definitions have to be implemented - the paper standards do not protect your systems!

A very new, comprehensive and up-to-date report on security has been published the other day:

**THREAT INTELLIGENCE REPORT
CYBERATTACKS AGAINST
UKRAINIAN ICS**

Click [HERE](#) for the report [pdf, 20 pages].

By the way, the report mentions IEC 60870-5-101/104, IEC 61850 and OPC UA.
Worth to read.

Posted by [Karlheinz Schwarz](#) at 6:50 AM No comments:

Labels: [ICS cyber security](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 62351](#), [vulnerability](#)

Monday, October 2, 2017

LIMA/Peru: PROTECCION, CONTROL Y AUTOMATIZACION CON LA NORMA IEC-61850

Orientado a la proteccion, control y automatizacion de subestaciones electricas, haciendo uso de: GOOSE Sampled Values, SCADA y el lenguaje de configuracion SCL.

EI estandar IEC 61850 es aplicado desde hace varios anos en el diseno de nuevas subestaciones alrededor del mundo. Durante el seminario, los mäs experimentados y reconocidos ingenieros especialistas a nivel global le enseñarán como utilizar y aplicar la norma IEC 61850 en el diseno, supervision y control de subestaciones digitales para el sector electrico. Se harán aplicaciones prácticas utilizando herramientas de prueba, software e IEDs de diferentes fabricantes.

Lima/Peru
NM Lima Hotel
Av. Pardo y Aliaga N° 330
San Isidro 15073
Dei 27 al 30 de Noviembre del 2017.
Horarlo: De 09:00 a 17:30 horas.

Organized by: Nakama Solutions, FMTP, and NettedAutomation

Click [HERE](#) for the brochure.
Click [HERE](#) for the program.

Posted by [Karlheinz Schwarz](#) at 8:52 AM [No comments:](#) 

Labels: [control](#), [IEC 61850](#), [protection](#), [SCADA](#), [SCL](#), [seminar](#), [Substation Automation](#)

Friday, September 22, 2017
IEC 61850: Usage of XML Schemata for Model Name Space Definitions

One of the crucial challenges in dealing with IEC 61850 is the **sheer unlimited amount of Models** (Logical Nodes, Data Objects, Data Attributes, Data Attribute Types, ... and related Services). How to manage these? How to figure out which model was valid last year, which model details are currently valid, ... questions, questions ...
What are the answers to these questions? Simply: **good documentation of content, modifications, extensions, and changes.**
The IEC TC 57 WG 10 has published a document that defines the rules for model content of IEC 61850 based core data model in IEC 61850-7-2, IEC 61850-7-3 and IEC 61850-7-4. Other domains (like DER, Hydro, Wind, etc.) could define their own data model based on IEC 61850 core data model to be able to use IEC 61850 core parts as a common layer.

The published 70 page document 57/1925/DTS contains the new draft rules:

Communication networks and systems for power utility automation –
Part 7-7: Basic communication structure –
Machine-processable format of IEC 61850-related data models for tools

The voting and commenting period closes 2017-12-15

*"Year after year the IEC 61850 data models are extended both in depth with hundreds of new data items, and in width with tens of new parts.
In order to foster an active tool market with good quality, and at the end to improve IEC 61850 interoperability, we need a machine-processable file describing data model related parts of the standard as input. This is the purpose the new language Name Space Definition (NSD) defined by this part of IEC 61850.
This will avoid the need for any engineering tool related to the IEC 61850 data models to get the content of the standard manually entered, with the highest risk of mistakes. This will also help spreading easily any corrections to the data model, as requested to reach interoperability. Tool vendors will be able to integrate NSD in their tools to distribute the standard data models directly to end users."*

This new document seems to be crucial for all experts that deal with models and their implementation in Tools and IEDs.

Posted by [Karlheinz Schwarz](#) at 9:55 PM [No comments:](#) 

Labels: [common data classes](#), [data object](#), [IEC 61850](#), [logical node](#), [models](#), [namespace](#), [SCL](#), [SCL Schema](#), [tools](#)

Sunday, September 17, 2017
IEC 61850 Logical Node Group Designation

IEC 61850 uses a well defined designation of Logical Node Groups like MMXU for 3phase electrical measurements. The following groups are defined:

- A Automatic control
- C Supervisory control
- D DER (Distributed Energy Resources)
- F Functional blocks
- G Generic function references
- H Hydro power
- I Interfacing and archiving
- K Mechanical and non-electrical primary equipment
- L System logical nodes
- M Metering and measurement
- P Protection functions

- Q Power quality events detection related
- R Protection related functions
- S Supervision and monitoring
- T Instrument transformer and sensors
- W Wind power
- X Switchgear
- Y Power transformer and related functions
- Z Further (power system) equipment

A total of several hundred of Logical Nodes are already defined and published.

Posted by [Karlheinz Schwarz](#) at [10:54 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [logical node](#)


Machine Processable SCL/XML Schema Available for Download

Please note that the SCL Schema Edition 1 and 2 are available for download from the IEC Website.

Click [HERE](#) for more details.

There will be more machine processable documents of the series IEC 61850 available in the near future.

I highly recommend to stay tuned to this IEC 61850 Blog ... just Subscribe to it
(details can be found on the top right of the site).

Posted by [Karlheinz Schwarz](#) at [7:05 AM](#) [No comments:](#) 

Labels: [free download](#), [IEC 61850-6](#), [SCL Schema](#)

First Document of Series IEC 61850 Published as Edition 2.1 FDIS

IEC TC 57 has just published the FDIS of IEC 61850-6/AMD1 ED2:

Amendment 1 – Communication networks and systems for power utility automation –
Part 6: Configuration description language for communication in power utility automation systems related to IEDs

The voting ends: 2017-10-27

Amendment 1 means finally Part 6 Edition 2.1:

The present FDIS reflects amendment 1 to IEC 61850-6 Ed. 2. TC 57 WG 10 has also developed a so-called consolidated edition 2.1 based on the present amendment and the existing Edition 2. The consolidated edition is circulated in parallel under reference 57/1919/INF, so that national committees can see the implementation of the amendment in the existing edition.
Once the present FDIS is approved, the consolidated edition will be published together with the amendment under reference **IEC 61850-6 Ed. 2.1**.

Machine processable Schema available!!

Note that the [Schemata for Edition 1 and 2 of part 6 could be downloaded from the IEC Website](#):

TC 57 Power systems management and associated information exchange

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Documents available in this area are support documents uploaded by the TC/SC. The IEC shall not be liable for the contents of these files.

TC 57 Support Documents

Table search:

Title, description	Downloads	Created	Publication reference
IEC_61850-6-2003.SCL-1.7.full.zip IEC 61850-6 SCL schema V1.7 (a.k.a. 2003), see the IEC 61850-6:2003 for full legal notices	 1121 kB	2017-09-05	IEC 61850-6:2003
IEC_61850-6-2009.SCL-2007B.full.zip IEC 61850-6 SCL schema V2007B, see the IEC 61850-6:2009 for full legal notices	 1725 kB	2017-09-05	IEC 61850-6:2009
IEC_62351-7-2017_ed1.0.MIB5.1.0.light.zip MIB5 Code component ; see the IEC_62351-7:2017 for full legal notices.	 32 kB	2017-07-24	IEC 62351-7:2017

The availability of the machine readable schemata is a very great progress in getting IEC 61850 applied in more and new application domains. More to come.

Congratulation!

Posted by [Karlheinz Schwarz](#) at [6:58 AM](#) [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [IEC 61850](#), [IEC 61850-6](#), [SCL](#), [SCL Schema](#), [XML](#)

Saturday, September 16, 2017

IEC 61850: Training for Protection, Control, and SCADA experts

FMTP and NettedAutomation offer one of the most wanted

Training for Protection, Control, and SCADA based on systems according to IEC 61850:

10.-13. October 2017

Karlsruhe/Germany (just one hour south of Frankfurt International Airport)

We have a few seats available - one for you and maybe one for your colleague.

Click [HERE](#) for details and registration information.

Click [HERE](#) for further training opportunities.

Posted by [Karlheinz Schwarz](#) at [1:57 AM](#) [No comments:](#) 

Labels: [control](#), [FMTP](#), [IEC 61850](#), [NettedAutomation](#), [protection](#), [SCADA](#), [seminar](#), [Training](#)

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WEITERE INFORMATIONEN OK

Saturday, September 9, 2017

TÜV SÜD Offers Interoperability Tests - What comes next?

The [UCAIUG](#) (UCA International Users Group) has issued [800 Certificates for IEC 61850 devices and tools](#). Congratulation for the success.

The global market has accepted the new technology standardized since 1995! No question!

In multi vendor projects quite often devices from different manufacturers or from different device firmware versions show interoperability issues. Device A and B may conform to the standard series - but device A may support options that are not supported by device B. This ends up in interoperability problems ... discussions and frustrations.

It is highly recommended that devices used in a multi vendor project are tested for interoperability! Interoperability tests are usually organized by users, e.g., big utilities. The UCAIUG organizes interoperability tests every second yer - far away from being sufficient! The next one is planned for being conducted in New Orleans (USA) in November. It requires a lot of resources to go there ... I guess European utilities may send very few experts only ... and small vendors are likely not travelling across the Atlantic.

So, what to do? I have recommended early to TÜV SÜD to offer interoperability test services.

[TÜV SÜD \(Munich, Germany\) is offering interoperability test](#)... contact them to figure out how your device can interoperate with other devices.



Interoperable components save time and money during integration into complex systems - and help to reduce frustrations when struggling with implemented or not implemented options, with different interpretations by vendors, ...

And note this: Traveling to Munich (Germany) is easier and cheaper than flying around the globe!

Partners in the industrial automation domain have learned that interoperability (for easier integration) is a crucial means to save a lot of resources ... they are partnering:

Open Integration Partner program for practical testing of multi-vendor automation topologies

Endress + Hauser is proposing the following: "[Open Integration validates the interplay of all products in a reference topology by mutual integration tests.](#)" in a permanent lab environment.

I hope that some companies and organizations in the Power Industry will also implement such permanently available **"LAT" (Lab Acceptance Tests)** that would offer 24x7 support services to the power industry.

Maybe you are interested to discuss this with TÜV SÜD or ... or myself. Please feel free to contact me.

Thanks to TÜV SÜD to offer the interoperability test services. I look forward to see more in the near future - the whole energy market would appreciate it.

Posted by [Karlheinz Schwarz](#) at 4:30 AM [No comments:](#)

For your Convenience

[An All NEW Evaluation, Demo, and Hands-On Package for IEC 61850 \(IEC 61400-25\) available \(2017-07-03\)](#)

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[Old Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[NEW! Blog as single PDF until 23 April 2017 \[17 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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► 2018 (32)

► 2017 (87)

► 2016 (110)

► 2015 (94)

► 2014 (129)

Labels: [conformance test](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [TÜV SÜD](#), [UCAIUG](#)

Tuesday, September 5, 2017

IEC 61850 Tissue Database is Crucial for Improving the Quality of IEC 61850

The [Tissue \(technical issues\) Database](#) is one of the most important means to improve the quality of the standard series IEC 61850. When IEC published the first parts of the series in 2004 the editors used a Word document to keep track of technical issues reported to the key experts and the results of their discussions. NettedAutomation developed the Tissue Database to offer a public tool to support the standardization and quality assurance process.

The following parts have an entry in the Database:

IEC 61850 Tissue Database		
Home	News	Technical Issues
Search Sign In		
General		
Part 1 (2001)	15 Sep 16	32
Part 2 (2003)		
Part 3 (2003)	19 Feb 08	11
Part 4 (2004)		
Part 4 (2011; Edition 2)		
Part 5 (2003)	02 Jul 12	4
Part 5 (2013-01; Edition 2)	04 May 16	5
Part 6 (2004)	29 Mar 16	103
Part 6 (2009-12; Edition 2)	27 Jun 17	129
Part 7-1 (2003)	19 Nov 10	7
Part 7-1 (2011; Edition 2)	26 May 16	21
Part 7-2 (2003)	07 Nov 14	184
Part 7-2 (2010; Edition 2)	27 Jun 17	104
Part 7-3 (2003)	05 Jan 14	61
Part 7-3 (2010; Edition 2)	04 Sep 17	74
Part 7-4 (2003)	03 Sep 14	121
Part 7-4 (2010; Edition 2)	10 Jun 17	203
Part 7-410 (2007; Hydro Power)	27 Aug 10	33
Part 7-410 (2012; Edition 2, Hyvdro Power)		
Part 7-420 (2008; DER)	16 Jul 15	168
Part 7-510 (2012; Edition 1, Hydroelectric power)	13 May 14	2
Part 8-1 (2004)	07 Apr 15	105
Part 8-1 (2011; Edition 2)	18 Apr 17	82
Part 9-1 (2003)		
Part 9-2 (2004)	11 Jan 12	11
Part 9-2 (2011; Edition 2)	04 Feb 16	7
Part 9-2 LE	15 Apr 10	1
Part 9-3 (Precision Time Protocol Profile)	26 Jul 17	5
Part 10 (2005)	04 Nov 14	18
Part 10 (2012; Edition 2)	17 Mar 16	6
Part 80-1 (2008; Edition 1, CDC's to 101/104)	20 Feb 14	5
Part 90-1		
Part 90-1 (2010; Ed1, Comm. between substations)		
Part 90-2 (2016; Ed1, Comm. between SS and CC)		
Part 90-4 (2013; Edition 1, Network Engineering)	26 Aug 16	7
Part 90-5 (2013; Edition 1, Synchrophasor)	19 Apr 17	9
Part 90-7 (2013; Edition 1, DER power converters)	15 Jun 15	5
Part 90-17 (2017; Ed1, Power Quality Data)	14 Jul 17	5

We just added an entry to part 90-2 (Substation to Control Center communication). Please note that the almost 1,500 entries play a crucial role in the latest parts published and in the [UCAIUG](#) testing specification. Excerpt of IEC 61850-6 Amendment 1 to Edition 2:

The Tissues which have been considered in this Amendment 1 are:				
N°	Subject	Cat	Clause	Paragraph
658	Tracking related features	IntOp2	Annex A	
660	XML encoding header repeat	Ed2	Annex A.4	
663	FCDA element cannot be a "functionally constrained logical node"	IntOp2	9.3.7	Table 22
668	Modeling of autotransformer	IntOp2	9.2.4	

This list has 50+ entries referring to the Tissue Database.

Products that claim conformance with IEC 61850 have to be accompanied by the so-called "TICS" Technical Issues Conformance Statement. This is a list that describes which Technical Issues have been implemented in a specific product. It is quite important to understand, that a specific Technical Issue that has an impact on client and server (publisher and subscriber) has to be implemented on both sides!!

The test labs for IEC 61850 have to test Technical Issues - when required by the testcase. The UCAIUG maintains a list of all "green" Tissues that are integral part of UCAIUG Testing requirements.

If you have an issue with IEC 61850 I recommend to check the Database and search for the topic you are looking for. Maybe your concern has already been solved ... you find a lot of

- [2013](#) (130)
- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

good discussions in many tissues.

NetteAutomation will continue to offer the Tissue Database for the next parts to be published, e.g., Edition 2.1 of the core documents.

Enjoy the Database.

Posted by [Karlheinz Schwarz](#) at [2:00 AM](#) [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [interoperability tests](#), [technical issue](#), [tissues](#), [UCAIUG](#)

Monday, September 4, 2017

LIMA/PERU: PROTECCIÓN, CONTROL Y AUTOMATIZACIÓN CON LA NORMA IEC-61850

NAKAMA SOLUCIONES S.A.C., FMTP, and NettedAutomation conduct a 5 days course on

PROTECCIÓN, CONTROL Y AUTOMATIZACIÓN CON LA NORMA IEC-61850

in Lima (Peru), NM Lima Hotel, Av. Pardo y Aliaga N° 330, San Isidro 15073

Del 13 al 17 de Noviembre del 2017

Horario: De 09:00 a 17:00 horas

Click [HERE](#) for general information.

Click [HERE](#) for the full program.

Posted by [Karlheinz Schwarz](#) at [11:59 AM](#) [No comments:](#) 

Labels: [ABB](#), [Automation](#), [FMTP](#), [IEC 61850](#), [protection](#), [Siemens](#), [SIPROTEC 5](#), [Training](#)

Saturday, August 26, 2017

The Cassandra Coefficient and ICS Cyper - Some Thoughts

Do you have a idea what "The Cassandra Coefficient" is all about and how it relates to ICS cyber security? Joe Weiss discusses the issues in a recent publication:

Cassandra coefficient and ICS cyber – is this why the system is broken

Brief extract from the publication:

Joe Weiss writes: " ... *What I have found is that each time another IT cyber event occurs more attention goes to the IT at the expense of ICS cyber security. The other common theme is "wait until something big happens or something happens to me, then we can take action". Because there are minimal ICS cyber forensics and appropriate training at the control system layer (not just the network), there are very few publicly documented ICS cyber cases. However, I have been able to document more than 950 actual cases resulting in more than 1,000 deaths and more than \$50 Billion in direct damages. I was recently at a major end-user where I was to give a seminar. The evening before I had dinner with their OT cyber security expert who mentioned he had been involved in an actual malicious ICS cyber security event that affected their facilities. For various reasons the event was not documented. Consequently, everyone from the end-user, other that the OT cyber expert involved, were unaware of a major ICS cyber event that occurred in their own company. So much for information sharing.*"

My personal experience in this and in many other areas is: People tend to **hide information** instead of **sharing information**. I found many times that SCADA experts do not really talk to RTU people, substation automation or protection engineers ... and not at all to the people that are responsible for the communication infrastructure. Most engineers likely tend to focus on their (restricted) tasks and not looking at the SYSTEM and its lifetime. Am I contributing to solve the challenges to build a quite secure system - or am I part of the problem?

I repeat what I have said many times: **Teamwork makes the dream work! Become a team player!**

Click [HERE](#) for the publication.

This publication is worth to read ... some definition of what Cassandra Coefficient is could be found [HERE](#).

Posted by [Karlheinz Schwarz](#) at [5:56 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [ICS cyber security](#), [IEC 61850](#), [IT](#), [OT](#), [SCADA](#), [security](#)

Wednesday, August 23, 2017

ICS-Security Für Kleine Unternehmen Machbar Machen

Industrielle Automatisierungssysteme (Industrial Automation and Control Systeme, IACS) durchdringen viele Bereiche der **kritischen Infrastrukturen wie Versorgungssysteme für Strom, Gas, Wasser, Abwasser, ...).**

Mittlerweile wächst so langsam das Bewußtsein, dass **viele dieser Systeme aus vielerlei**

Gründen nur unzureichend (im Sinne von Informationssicherheit) geschützt sind.

Gründe können sein, dass Verantwortliche noch nicht die Notwendigkeit für mehr Schutzanforderungen sehen oder dass die installierten Systeme "altersschwach" sind und nur durch Austausch geschützt werden können, und und ...

Wasserversorgungsunternehmen zusammen mit dem BSI und der RWTH Aachen haben eine Masterarbeit begleitet, die besonders kleinen Versorgungsunternehmen den Blick für mehr Sicherheit in der Informations- und Automatisierungstechnik öffnen könnte:

Sarah Fluchs hat die folgende Masterarbeit geschrieben:

Erstellung eines IT-Grundschutz-Profiles für ein Referenzunternehmen (kleines/mittelständisches Unternehmen, KMU) mit automatisierter Prozesssteuerung (Industrial Control System, ICS)

Oder:

ICS-Security für kleine Unternehmen machbar machen

Die Arbeit und ein Anhang sind öffentlich zugänglich:

[HIER](#) für den Hauptteil der Arbeit klicken.

[HIER](#) für den Anhang "IT-Grundschutz-Pilotprofil bzw. IT-Grundschutz-Profil für die Wasserwirtschaft

Diese Masterarbeit ist absolut lesens- und beachtenswert!

Die Einleitung beginnt mit einer Aussage von Ralph Langer:

*„For many complex IACS networks, there is **no longer any single person who fully understands the system**, [...] and neither is there accurate documentation.“*

Dieser Aussage stelle ich eine viel ältere von Rene Descartes (1596-1650) voran:

*"Hence we must believe that **all the sciences** [all the aspects of a distributed Automation System; vom Verfasser des Blogposts eingefügt] **are so interconnected**, that it is much easier to study them all together than to isolate one from all others. If, therefore, anyone wishes to search out the truth of things in serious earnest, he **ought not to select one special science (aspect), for all the sciences (aspects) are cojoined with each other and interdependent.**"*

Die Herausforderungen der heutigen und zukünftigen Generationen bestehen darin, ganzheitlich zu denken und zu handeln sowie die vielen überlieferten und damit auch vielfältigen Erfahrungen von unseren Vorfahren, besonders aber von solchen Menschen zu berücksichtigen, die unmittelbar in der Praxis tätig waren und gegenwärtig sind! [Aussage wurde von einem guten Freund ergänzt].

Teamwork makes the dream work.

In diesem Sinne geht mein Dank an Frau Fluchs, die mit ihrer Masterarbeit einen Grundstein gelegt hat. Symptomatisch ist, dass oft grundlegende Arbeiten "nur" von Studenten durchgeführt werden. Schade! Die angesprochenen Themen betreffen uns ALLE!

Eine Aussage in ihrem Fazit und Ausblick würde ich gerne korrigieren:

*"Die übergeordnete Thematik der vorliegenden Arbeit ist die ICS-Security. Das Thema besetzt im Vergleich zu der „gewöhnlichen“ IT-Security bislang eine Nische. Vor allen produzierende Unternehmen und Betreiber kritischer Infrastrukturen müssen sich damit befassen – **Otto Nor-malverbraucher** bekäme zwar die Auswirkungen eines Security Incidents potenziell zu spüren, **hat aber keinen direkten Einfluss auf die ICS-Netze und deren Sicherheit.**"*

Wir als Otto-Normalverbraucher haben einen sehr großen direkten Einfluss auf die Sicherheit unserer Infrastrukturen: **Indem wir bereit sind, mehr für unsere Grund-Versorgung zu bezahlen!!**

Posted by [Karlheinz Schwarz](#) at 3:19 AM [No comments:](#) 

Labels: [aging infrastructure](#), [alternde Infrastruktur](#), [Automation](#), [critical infrastructure](#), [ICS cyber security](#), [industrial automation](#), [Sicherheit](#)

Tuesday, August 22, 2017

No Gas No Electric Power - Yes, it Happend

Taiwan was hit recently by a massive blackout caused by simply closing two gas valves that powered six power generators with a total capacity of some 4,000 MW or 4 GW!

How could that happen? The peak generation did not have reserve power. So the 4 GW tripped could not be compensated by other generations. It happens so fast!

The general stress was one aspect - another was an error made by humans, "**almost 9 per cent of the island's generation capacity, stopped after workers accidentally shut off its natural gas supply**".

I am not aware of any details of the human error. One thing is clear: Our infrastructure is really under stress! It will take some efforts to get it fixed.


Click [HERE](#) for a news report.

We have really problems with **existing and new infrastructures**:

[Check the pictures from the problems](#) of the new train tunnel project in Rastatt (close to my home town Karlsruhe/Germany) ... you may read German as well ...

What happened? Who knows? Maybe the cheapest offer was awarded a contract ... There is almost no redundancy in the Rhine river valley rail system ... redundancy costs money ...

It is a pity that new build infrastructure collapses and destroys old (still working) infrastructures.

Posted by [Karlheinz Schwarz](#) at 7:08 AM [No comments:](#) 

Labels: [aging infrastructure](#), [blackout](#), [gas power plants](#), [power outage](#), [Power Plants](#), [Taiwan](#)

Monday, August 21, 2017

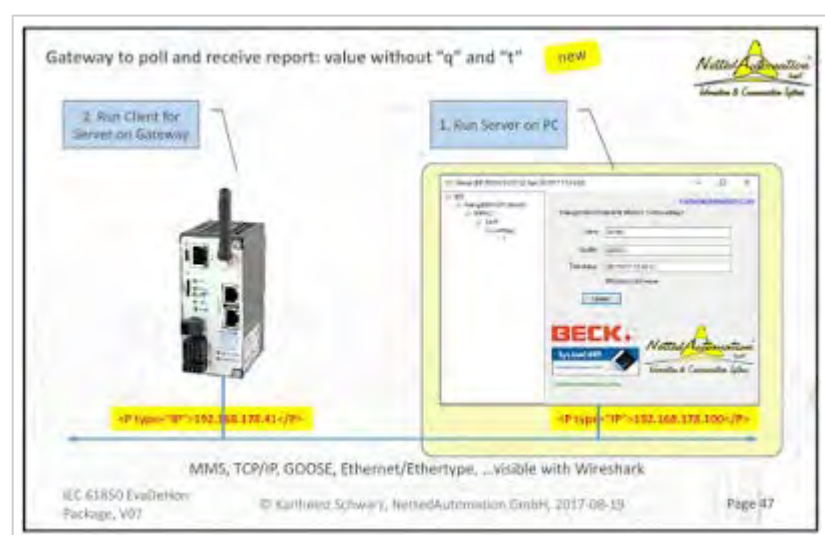
New Application Example for EvaDeHon Package

We have posted a new example extending the use of the Evaluation, Demonstration and Hands-On ([EvaDeHon](#)) Package.

We will publish from time to time additional models and documentation for interesting applications. The objective is to help you to understand the various topologies and possibilities to use the IEC 61850 technology for the process information exchange.

One focus is on the application of the IXXAT (HMS) Smart Grid Gateways.

The example offers polling and reporting (Server on PC, Client on IXXAT WEB-PLC Gateway). The download contains the client CID for the gateway, the server CID and the JSON file for the PC. The gateway polls every 2 seconds and receives reports every 5 seconds - these intervals can be configured. Additionally it includes some specific documentation.



Click [HERE](#) for more information.

Posted by [Karlheinz Schwarz](#) at 1:35 AM [No comments:](#) 

Labels: [Beck](#), [client](#), [Demo Kit](#), [EvaDeHon](#), [hands-on Training](#), [HMS](#), [IEC 61850](#), [IXXAT](#), [polling](#), [Reporting](#), [seminar](#), [server](#)

Saturday, August 19, 2017

Smart Cars Under Attack- What Does it Mean for Power Systems?

We are quite often looking for smart things: cars, phones, power grids, ... expecting they make life easier or more comfortable. May be ... or may not be.

We have to understand and take into account that most of these smart things are under enormous pressure to become hacked.

Researchers have reported that "Smart car makers are faced with a **potentially lethal hack that cannot be fixed with a conventional software security update**. The hack is believed to affect all smart cars and could enable an attacker to **turn off safety features**, such as airbags, ABS brakes and power-steering or any of a vehicle's computerised **components connected to its controller area network (Can) bus. ...** The hack is "currently indefensible by modern car security technology, and to completely resolve it would require **broad, sweeping changes in standards and the ways in-vehicle networks and devices are made,**"

Click [HERE](#) for the full report on computerweekly.

Click [HERE](#) for another detailed report also worth to read and FOLLOW.

Hm, that is no good news!

I hope that the power industry is using appropriate (security) standards to dramatically reduce the risk to hack devices used in power automation systems. One of them is IEC 62351. There are many other measures discussed on this block, e.g., the [German BDEW](#)

[Whitebook](#).

How many more wake-up calls do we need to change our ways how to secure energy delivery services? The more devices are brought into operation the more we need to care about security.

A lethal position of the management would be: "It could not happen to our systems - they are all safe. Really?

In the first years of open systems interconnection (OSI) ... early 1980s, I was quite unhappy with the Ethernet CSMA/CD method and the token bus solution. As a young engineer at Siemens here in Karlsruhe, I spent many hours and days of my free time (at home) to figure out how to improve the CSMA/CD to make the access deterministic - yes I found a solution! My colleagues and the management was supporting Tokenbus only ;-)

So, my patent was not used by Siemens ... but later I figured out that the CAN bus used the same algorithm I developed for my patent.

At that time almost nobody was expecting that years later people would intentionally hack media access protocols!! I remember one person complaining about OSI in the early 80s. He said (in German): "Wer offene Systeme haben will, der ist nicht ganz dicht!" This is not easily to be translated in English - I will try. "Offene Systeme" is "Open Systems". "Dicht" means "close" - and if someone is "nicht dicht" means: you are crazy. So: "If you want to have Open Systems - you must be crazy."

Click [HERE](#) to have a look at my patent (EP0110015).

I am really wondering that the old and for long time used protocols like CAN make that lethal trouble 30 years later! What will be next?

By the way, any Ethernet multicast shower in a subnetwork has the potential to crash a "smart" device. If the Ethernet controller has to filter out too many multicast messages it may stop to work.

Resume: Any system needs to be carefully designed, engineered and configured. Do you want to have a problem? No Problem!

The industry has to learn that a lot of changes in the way we automate today has to come!! That requires SMART People - and a lot more resources ... the costs of our living will definitely increase.

I question, if we have really made a lot of progress since the early 80s. Open Sytsems are too "open" ... we have to find ways to close the points where hacker could tap and "re-use" the messages in order to stop talking.

Posted by [Karlheinz Schwarz](#) at 2:23 AM [No comments:](#) 

Labels: [BDEW](#), [CAN](#), [Cyber Security](#), [hacking](#), [IEC 62351](#)

Friday, August 18, 2017

Draft of First Amendment to IEC 62351-3 (power system security) Published

Draft IEC 62351-3/AMD1 ED1 (57/1894/CDV)

Amendment 1 – Power systems management and associated information exchange – Data and communications security – **Part 3: Communication network and system security – Profiles including TCP/IP**

The crucial amendment has been prepared by IEC TC57 Working Group 15 in order to address the following:

1. Definition of additional security warnings for TLS versions 1.1 and 1.0
2. Alignment of handling of revoked or expired certificates for TLS session resumption and TLS session renegotiation
3. Clarification regarding session resumption and session renegotiation invocation based on session time.
4. Enhancement of session resumption approach with the option of session tickets to better align with the upcoming new version of TLS
5. Enhancement of the utilized public key methods for signing and key management with ECDSA based algorithms
6. Update of the requirements for referencing standards
7. Update of bibliography

The CDV ballot ends 2017-11-03

Posted by [Karlheinz Schwarz](#) at 8:52 AM [No comments:](#) 

Labels: [Cyber Security](#), [IEC 62351](#), [iec 62351-3](#), [TLS](#)

Drei IEC-61850-Hands-On-Trainingskurse in Deutsch in Karlsruhe (2017 und 2018)

Die NettedAutomation GmbH (Karlsruhe) bietet drei Termine für das aktuelle IEC61850-Hands-On-Training in Karlsruhe an:

05.-08. Dezember 2017

14.-17. Mai 2018
04.-07. Dezember 2018

Diese **unschlagbar günstigen** Trainingskurse vermitteln über 30 Jahre Erfahrungen mit Informationsaustausch-Systemen basierend auf internationalen Normenreihen wir **IEC 61850** (allgemeine Anwendungen in der Energietechnik, Schaltanlagen, Transport- und Verteilnetze, Wasserkraft, Kraft-Wärmekopplung, Speicher, ...), **IEC 61400-25** (Wind), **IEC 60870-5-10x** (traditionelle Fernwirktechnik), **IEC 61158** (Feldbus), **IEC 62351** (Sicherheit in der Informationstechnik) und vielen anderen.

Planen Sie schon heute das entsprechende Budget für das Jahr 2018!

Clicken Sie [HIER](#) für Inhalte, Preise und Anmeldeinformationen.

Posted by [Karlheinz Schwarz](#) at [8:40 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [de](#), [deutsch](#), [Feldbus](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61158](#), [IEC 61400-25](#), [IEC 62351](#), [seminar](#), [Training](#)

Thursday, August 17, 2017

SMA Inverter and Cyber Security Issues

Recently a study on cyber security threads regarding PV inverters was published, in which SMA was mentioned. The topic has also since been seized upon by other media outlets. Unfortunately, the claim has caused serious concern for SMA customers. SMA does not agree with this article, as some of the statements are not correct or greatly exaggerated.

Click [HERE](#) for the complete response by SMA.
[HIER](#) geht es zur deutschen Seite.

I hope that all vendors of network connected devices are as serious as SMA when it comes to security.

Posted by [Karlheinz Schwarz](#) at [12:27 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [inverter](#), [PV](#), [SMA](#)

Thursday, August 10, 2017

Fuzzing Communication Protocols - Some Thoughts About a New Report

Have you heard about **FUZZING**?

Wikipedia explains: "***Fuzzing or fuzz testing** is an **automated software testing technique** that involves providing invalid, unexpected, or random data as inputs to a computer program. The program is then monitored for exceptions such as crashes, or failing built-in code assertions or for finding potential memory leaks. ...*" Wow!

Is there any link to IEC 60870-5-104, OPC UA or IEC 61850? Yes there are people that have used the technique to test these and many other protocols.

The "**State of Fuzzing 2017**" report just published by SYNOPSIS (San Francisco) wants to make us belief that, e.g., the above mentioned **protocols are weak and may crash easily**. What?

The best is to **read the report and my comments below**. Other experts have commented similarly.

Click [HERE](#) to download the report.

Any kind of testing to improve IMPLEMENTATIONS of protocols is helpful. You can test implementations only – not the protocols or stacks per se.

One of the crucial questions I have with the fuzz testing report is: Which IMPLEMENTATION(s) did they test? Did they test 10 different or 100? Open source implementations only? New implementations or old? Or what?

Testing is always a good idea ... more testing even a better approach. At the end of the day, customers have to pay for it (e.g., higher rates per kWh).

I would like to see more vendor-independent tests of any kind ... but the user community must accept the higher costs. Are you ready to pay more? How much more would you accept to pay? 50%?

As long as vendors have the possibility to self-certify their products we will see more problems in the future.

Anyway: The best approach would be to use a different protocol for each IED ... ;-)

What about testing the wide spectrum of application software? Not easy to automate ... to fuzz.

You may have a protocol implementation without any error within one year ... but an application that easily crashes ... a holistic testing approach would be more helpful. IEC TC 57

WG 10 has discussed many times to define measures for functional tests ... without any useful result so far. Utility experts from all over the world should contribute to that project – go and ask you manager to get approval for the next trips to New Orleans, Seoul, New York, Frankfurt, Brisbane, Tokyo, ... to contribute to functional testing. In case you do not attend – don't complain in the future when IEDs crash ...

The **more complex an application is**, the more likely it is that there will be serious and hard to find problems.

Crashing the protocol handler and application is one thing - what if they don't crash but bad data gets through?

Conclusion

The report is a nice promotion for the fuzzing tools offered by Synopsis.
The last page states: **"Synopsis offers the most comprehensive solution for building integrity—security and quality—into your SDLC and supply chain. We've united leading testing technologies, automated analysis, and experts to create a robust portfolio of products and services. ... our platform will help ensure the integrity of the applications that power your business."**

Testing is very crucial and very complex. I hope that users of devices applying well known protocols in power system automation will soon better understand HOW important testing is - require various tests for devices they purchase and are willing to pay for it!
Start with an education phase as soon as possible - before it is too late.

Posted by [Karlheinz Schwarz](#) at 10:46 AM No comments: 

Labels: [education](#), [Fuzzing](#), [IEC 60870-5-104](#), [IEC 61850](#), [OPC UA](#), [security](#), [seminar](#), [Training](#)

Wednesday, August 9, 2017
Analysis Of The Malware Reportedly Used in the December 2016 Ukrainian Power System Attack

Senior experts of SANS ICS and E-ISAC have released a very good report:

**ICS Defense Use Case No. 6:
Modular ICS Malware**

August 2, 2017

*This document contains a summary of information compiled from multiple publicly available sources, as well as analysis performed by the SANS Industrial Control Systems (ICS) team in relation to this event. Elements of the event provide an **important learning opportunity for ICS defenders.***

The sharing of this report is very much appreciated. It is very rare to get such a professional publicly available analysis about a significant and terrifying event in the control system world.

The report closes with this very important statement:

*Defenders must take this opportunity to conduct operational and engineering discussions as suggested in this DUC and enhance their capabilities to gain visibility in to their ICS networks and hosts. **The community must learn as much as it can from real world incidents and not delay;** we expect adversaries to mature their tools and enhance them with additional capabilities.*

I recommend you to study this document and get trained by the real experts - for the good of your country! Don't accept the decision of your HR ... not providing you the budget for training. Quite often HR managers believe that our systems are secure - no need for training on security, communication standards, etc.

Click [HERE](#) for the full report.

By the way, the [SCADASEC blog](#) (as a crucial platform for ICS defenders and other people) is a nice place to visit, discuss and learn issues related to the topics discussed in the paper.

Posted by [Karlheinz Schwarz](#) at 8:38 AM No comments: 

Labels: [BDEW](#), [Cyber Security](#), [ICS](#), [IEC 61850](#), [IEC 62351](#), [malware](#), [SCADA](#)

Tuesday, August 8, 2017
Draft for Role Based Access Control (RBAC) Published (IEC 62351-90-1)

IEC TC 57 published the IEC TR 62351-90-1 Draft for Role Based Access Control (RBAC) [57/1905/DTR]:

IEC 62351 Data and communications security –
Part 90-1: Guidelines for handling role-based access control in power systems

The voting period closes on 2017-09-29.

"The power system sector is adopting security measures to ensure the reliable delivery of energy. One of these measures comprises Role-based Access Control (RBAC), allowing utility operators, energy brokers and end-users to utilize roles to restrict the access to equipment

and energy automation functionalities on a need-to-handle basis. The specific measures to realize this functionality have been defined in the context of IEC 62351-8. It defines 3 profiles for the transmission of RBAC related information. This information is, but not limited to, being contained in public key certificates, attribute certificates, or software tokens.

Moreover, especially for IEC 61850, it defines a set of mandatory roles and associated rights. The standard itself also allows the definition of custom roles and associated rights, but this is not specified in a way to ensure interoperability."

Data and communication security is a crucial issue in the communication between multiple IEC 61850 clients and an IED with a single IEC 61850 Server. The administration of the roles and further behavior requires a highly complex (centralized!?) administration and a complex functionality in each IED implementing RBAC.

The following aspects have a big impact on implementations:

1. TCP/IP Networking,
2. General security measures like TLS,
3. RBAC,
4. MMS,
5. IEC 61850 Services, Models and Configuration, and
6. Power system functionalities (key for the power delivery system) on top

The bulk of resources needed are mainly independent of the MMS protocol and services. People that want to use other protocols cannot really expect that the cost for getting secure communication and data will be lowered - the most efforts are related to non-protocol issues. The second, third, fifth, and sixth bullet are most crucial.

In addition to the cost of implementing RBAC (including the other required parts of the series IEC 62351) one has to understand that the operation, management, engineering, and configuration of RBAC consumes a relatively huge amount of resources of the embedded controllers or other platforms.

That is one of the crucial reasons why many IEDs installed today cannot (and likely will not) be upgraded for measures defined in the IEC 62351 series.

Recommendation: As soon as possible get started to understand the impact of the measures defined in IEC 62351 and how to implement some or many of these measures.

Related documents of the series IEC 62351 IEC/TS 62351, Power systems management and associated information exchange – Data and communications security – are:


Part 1: Communication network and system security – Introduction to security issues

Part 3: Communication network and system security – Profiles including TCP/IP

Part 4: Profiles including MMS

Part 5: Security for IEC 60870-5 and derivatives

Part 8: Role-based Access Control

Posted by [Karlheinz Schwarz](#) at 8:15 AM [No comments:](#) 

Labels: [IEC 61850](#), [IEC 62351-90-1](#), [MMS](#), [RBAC](#), [security](#), [TCP/IP](#), [TLS](#)

Monday, August 7, 2017

IEC 61850, Sensors, and Cyber Threats

Sensors all over will be more important in the future: First to automate processes and second to monitor the automation systems.

The other day I found a very serious report on compromising automation systems under the title:

ICS cyber threats are morphing into compromise of plant functionality – do we have the right tools?

The report by Joe Weiss is worth to read.

Click [HERE](#) for reading the complete report.

The discussion is about compromising an actuator (Valve, ...) and let the physics do the damage!

Joe resumes: **"Without sensor monitoring, it is NOT possible to see the precursor** to these kinds of conditions until it is too late."

I have discussed the reported issues with an expert of valves in industrial process control applications. He confirmed that the cavitation (bubble or Wasserblasen) effect is known for long. But there are only a relatively few applications of (vibration) sensors installed to measure the noise produced by cavitation ([see video at Youtube](#)) to figure out that something is going wrong.

IEC 61850 has a bunch of models and services to support sensors:

Application modeling

Modeling Sensors and Supervision (1)

■ Crucial real world applications modeled with IEC 61850 Logical Nodes and Data are: **Sensor applications**

Sensors (T-LN = Transducer):

Angle
Axial Displacement
Distance
Flow
Frequency
Generic sensor
Humidity
Media level
Magnetic field
Movement/speed
Position
Pressure (absolute)
Rotational speed
Sound pressure
Temperature
Mechanical tension
Vibration
Water PH level
Current transformer
Voltage transformer

Supervision (S-LN =Supervision):

Arcs monitoring
Tap changer
Operating mechanism
Partial discharge
Power transformer
Pressure
Temperature
Vibration
Circuit breaker
Switches
Insulation gas
Insulation liquid

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and event reporting:

Application modeling

Modeling Sensors and Supervision (4)

■ Crucial real world applications modeled with IEC 61850 Logical Nodes and Data are: **Sensor applications**

■ **Example temperature sensor and supervision:**

Monitoring Applications

– Sensor data

Cyclic report

• STMP.Tmp.InstMag + .quality + .timestamp

– Sensor data supervision

Event report

• STMP.Alm.stVal + .quality + .timestamp

Event report

• STMP.Trip.stVal + .quality + .timestamp

Event report

• STMP.RteAlm.stVal + .quality + .timestamp

– Sensor sampled data

STMP SMV

• TTMP.TmpSAV.InstMag + .quality + .timestamp

– Sensor supervision

Asset Management Event report

• TTMP.EEHealth.stVal + .quality + .timestamp


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The quality attributes that come with all values could be used to flag that the value is valid or not. Additionally the sensor may have a health problem (figured out by a diagnosis routine) that can be reported using the TTMP.EEHealth.stVal attribute (EE - external equipment).

All models and services have to rely on good hardware and software! Or we get: Garbage in - Garbage out!

In our seminars and hands-on training courses we discuss these and many other topics in detail.

Posted by [Karlheinz Schwarz](#) at 8:15 AM [No comments:](#) 

Labels: [Cyber Security](#), [ICS cyber security](#), [IEC 61850](#), [Information Model](#), [protocol](#), [SCADA](#), [Sensors](#), [services](#)

IEC 61850 Europe 2017 Conference and Exhibition in September 2017

The largest conference and exhibition on IEC 61850 and related topics invites you:

Multi-Vendor Multi-Edition IEC 61850 Implementation & Operation
3-Day Conference, Exhibition & Networking Forum
26-28 September 2017
Novotel Amsterdam City
The Netherlands

Now firmly established as the European end-user forum for IEC 61850 experts and implementation leaders, this dedicated 3-day conference, exhibition and networking forum provides the information, inspiration, and connections you need to propel your IEC 61850 deployments further faster!

This year’s end-user driven programme explores the opportunities and challenges presented by sophisticated multi-vendor multi-edition IEC 61850 implementation, operation and maintenance. Utility experiences of advanced functionalities such as Process Bus, GOOSE Messaging, PRP & HSR, and Time Synchronisation are evaluated in the context of digital substations, as well as inter-substation, substation to SCADA systems, substation to metering infrastructure, and substation to DER.


Click [HERE](#) for the details of the event.

Attending this conference will give you a flavor of the market for IEC 61850 based systems.

<http://blog.nettedautomation.com/search?updated-max=2017-09-16T01:57:00-07:00&max-results=18&start=90&by-date=false>[01.03.2020 16:50:10]

After the conference you may have a lot of questions and my look for some senior experts that will guide you vendor-independently into the magic of the standard series.

Please have a look [what kind of training FMTP and NettedAutomation offer you](#) in October and December 2017 in Karlsruhe (Germany).

Posted by [Karlheinz Schwarz](#) at 7:45 AM [No comments:](#) 

Labels: [conference](#), [exhibition](#), [hands-on Training](#), [IEC 61850](#), [IEC 61850 Europe](#), [SCADA](#), [seminar](#), [Training](#)

ENTSO-E Just Published a New Update on Activities Related to IEC 61850

ENTSO-E is actively supporting the application of IEC 61850.

They believe that *"The IEC 61850 Standard for the design of electrical substation automation addresses many crucial aspects of TSO communications, data modeling and engineering in order to reach seamless interoperability of different vendors' subsystems within the TSO system management architecture."*

ENTSO-E published an Update on their activities related to IEC 61850 in July 2017.

ENTSO-E Ad Hoc Group IEC 61850 continued to intensively work on the improvement of the IEC 61850 standard interoperability on two main domains:

1. At information level ([data semantic](#)), the development of the ENTSO-E profile through the Interoperability Specification Tool (ISTool)
2. [At engineering level](#), by consolidating ENTSO-E requirements that have been formalized into a DC (Document for Comment), approved through the IEC National Committees (NC) voting process, and now encapsulated in the action plan of several task forces of the IEC TC 57 WG10

Click [HERE](#) for reading the complete the report.

Posted by [Karlheinz Schwarz](#) at 7:30 AM [No comments:](#) 

Labels: [ENTSO-E](#), [IEC 61850](#), [Object model](#), [profile](#), [TSO](#)

Comparison of IEC 60870-5-10x, DNP3, and IEC 60870-6-TASE.2 with IEC 61850

In 2008 I published the 3rd version of the document:

[Comparison of IEC 60870-5-101/-103/-104, DNP3, and IEC 60870-6-TASE.2 with IEC 61850](#)

This is really the most downloaded document since then - and still in 2017!

Click [HERE](#) for getting a copy.

It is interesting that so many people are still interested to see the difference between IEC 61850 and the other IEC TC 57 standard series.

Now, in 2017 we have learned that IEC 61850 goes far beyond the other standard series.

The RTU standards like 104 or DNP3 are still in widespread use. Utilities are expecting that many vendors of RTUs will start to discontinue to supporting these standards. That is one of many reasons why more utilities are starting to get involved in understanding IEC 61850.

Posted by [Karlheinz Schwarz](#) at 7:21 AM [No comments:](#) 

Labels: [DNP3](#), [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61400-25](#), [IEC 61850](#), [TASE.2 ICCP](#)

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WEITERE INFORMATIONEN OK

Monday, August 7, 2017

IEC PC 118 Has Published Two CDV Documents Dealing With Smart Grid Communication

IEC PC 118 "SMART GRID USER INTERFACE" has published two new CDV documents available for PUBLIC comments:

Systems interface between customer energy management system and the power management system – Part 10-1: Open Automated Demand Response [118/75/CDV] with 87 pages

Systems interface between customer energy management system and the power management system – Part 10-3: Adapting smart grid user interface to IEC CIM [118/76/CDV] with 27 pages

Both CDV (committee draft for vote) are accessible for PUBLIC comments (http://www.iec.ch/comment).

These documents of IEC PC 118 are likely to have an impact on the work done and under development of IEC TC 57 and IEC TC 65. With your comments a duplication of work may be prevented.

Please use the opportunity to provide your comments through the IEC channel.

Posted by Karlheinz Schwarz at 2:43 AM No comments: ➡

Labels: CIM, IEC 61850, IEC PC 118, Open ADR

IEC 61850-90-9 Models for Electrical Energy Storage Systems

IEC 61850 Part 90-9: Use of IEC 61850 for Electrical Energy Storage Systems is progressing these days. The latest draft describes the basic functions of Electric Energy Storage System (EESS) and the information model of the interface to integrate EESS in intelligent grids and establish the necessary communication with standardised data objects. The next official draft is expected to be published soon.

This draft is connected with IEC 61850-7-420, as well as IEC 61850-7-4:2010, explaining how the control system and other functions in a battery based electric energy storage unit utilizes logical nodes and information exchange services within the IEC 61850 framework to specify the information exchanged between functions as well as information that individual functions need and generate. The first Edition of IEC 61850-7-420 provides an information model for batteries which was derived from the proposed data objects of part 7-4. Those data objects follow the requirements of batteries that are supposed to be used in substations as an auxiliary power system and as backup power supplies. For this purpose it was sufficient to only model the discharge function. Therefore it is necessary to prepare new logical nodes to be applicable for grid connected electrical energy storage systems. This draft provides necessary information within 61850 based object model in order to model functions of a battery based electrical energy storage system as a DER unit. For intelligently operated and/or automated grids, storing energy for optimising the grid operation is a core function. Therefore shorter periods of storing energy with charging and discharging capability is also an indispensable function. Charging and discharging operations need to be modelled thoroughly and are in the focus of this technical report.

The draft lists several use-cases found in the real world:

- UC1 Retrieve current status and capabilities of EESS
- UC2 Set charging power to EESS
- UC3 Set discharging power to EESS
- UC4 Set Operating mode/ schedule to EESS
- UC5 EESS Alarm / Asset Monitoring

UC1 current capability /status information as an example:

- 1-2-1 EESS Generic Status Reporting
 - ES-DER on or off
 - Storage available or not available
 - Inverter/converter active power output
 - Inverter/converter reactive output
 - Storage remaining capacity (% and/or kW
 - Storage Free capacity (% and/or kW
- 1-2-2 EESS inverter /converter status
 - Current connect mode: connected or disconnected at its ECP
 - Inverter on, off, and/or in stand-by status: inverter is switched on (operating), off (not able to operate), or in stand-by

For your Convenience

An All NEW Evaluation, Demo, and Hands-On Package for IEC 61850 (IEC 61400-25) available (2017-07-03)

Personal experience and capabilities of Karlheinz Schwarz [PDF 3.5 MB]

Old Demo Kit (Windows DLL) for IEC 61850 with executable SW and with Application SW Source Code (C++/C#) - 2015-06-12

NEW! Blog as single PDF until 23 April 2017 [17 MB]

Some videos explaining basics ... Gateway applications

Training by NettedAutomation

Seminare in Deutsch in 2017

New Flyer for Training with crucial topics

Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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- 2015 (94)
- 2014 (129)

- mode, e.g. capable of operating but currently not operating
- DC current level available for operation: there is sufficient current to operate
- Value of the output power setpoint
- Value of the output reactive power setpoint
- Value of the power factor setpoint as angle (optional)
- Value of the frequency setpoint (optional)

1-2-3 EESS (battery) internal status

- Amp-hour capacity rating
- Nominal voltage of battery
- Maximum battery discharge current
- Maximum battery charge voltage
- High and Low battery voltage alarm level
- Rate of output battery voltage change
- Internal battery voltage
- Internal battery current
- State of charge (energy % of maximum charge level)
- Reserve (Minimum energy charge level allowed, % of maximum charge level)
- Available Energy (State of charge – Reserve)
- Type of battery

1-2-4 Power measurements

- Total Active Power (Total P): Value, High and Low Limits
- Total Reactive Power (Total Q): Value, High and Low Limits
- Average Power factor (Total PF): Value, High and Low Limits, and averaging time
- Phase to ground voltages (VL1ER, ...): Value, High and Low Limits

More to come ...

Posted by [Karlheinz Schwarz](#) at [2:08 AM](#) [No comments:](#) 

Labels: [batteries](#), [energy storage](#), [IEC 61850](#), [IEC 61850-90-9](#), [models](#), [SCADA](#)

Wednesday, July 26, 2017

IEC TC 88 Published Edition 2 Documents for the Series IEC 61400-25

IEC TC 88 has published the edition 2 of the following two parts of the series IEC 61400-25:

IEC 61400-25-4: Wind energy generation systems -
Part 25-4: Communications for monitoring and control of wind power plants -
[Mapping to communication profile](#)
The mappings specified in this part of IEC 61400-25 comprise:

- SOAP-based web services,
- OPC/XML-DA,
- IEC 61850-8-1 MMS,
- IEC 60870-5-104,
- DNP3.

Click [HERE](#) for the Preview.

IEC 61400-25-6: Wind power generation systems -
Part 25-6: Communications for monitoring and control of wind power plants -
[Logical node classes and data classes for condition monitoring](#)

Click [HERE](#) for the Preview

Note that the mapping to MMS according to IEC 61850-8-1 is the most used communication protocol for applications in the Wind Power Industry.
The modeling approach and the models are now in general compatible with those defined in IEC 61850-7-x. This is a major step forward.
[General gateway solutions](#) for IEC 61850 could be used for wind energy generation systems to bridge from Profibus, ProfiNet, Modbus, CAN bus, ... to IEC 60870-5-104 or IEC 61850-8-1.

Posted by [Karlheinz Schwarz](#) at [12:49 AM](#) [No comments:](#) 

Labels: [condition monitoring](#), [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [OPC](#), [Web Service](#), [wind power](#)

Friday, July 21, 2017

Data and Communications Security: IEC TC 57 Just Published IEC 62351-7

IEC TC 57 just published IEC 62351-7:2017:
Power systems management and associated information exchange - Data and communications security - [Part 7: Network and System Management \(NSM\) data object models](#)

IEC 62351-7:2017 defines network and system management (NSM) data object models that are specific to power system operations. These NSM data objects will be used to monitor the health of networks and systems, to detect possible security intrusions, and to manage the

- [2013](#) (130)
- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

performance and reliability of the information infrastructure. The goal is to define a set of abstract objects that will allow the remote monitoring of the health and condition of IEDs (Intelligent Electronic Devices), RTUs (Remote Terminal Units), DERs (Distributed Energy Resources) systems and other systems that are important to power system operations. This new edition constitutes a technical revision and includes the following significant technical changes with respect to IEC TS 62351-7 (2010): NSM object data model reviewed and enriched; UML model adopted for NSM objects description; SNMP protocol MIBs translation included as **Code Components**.

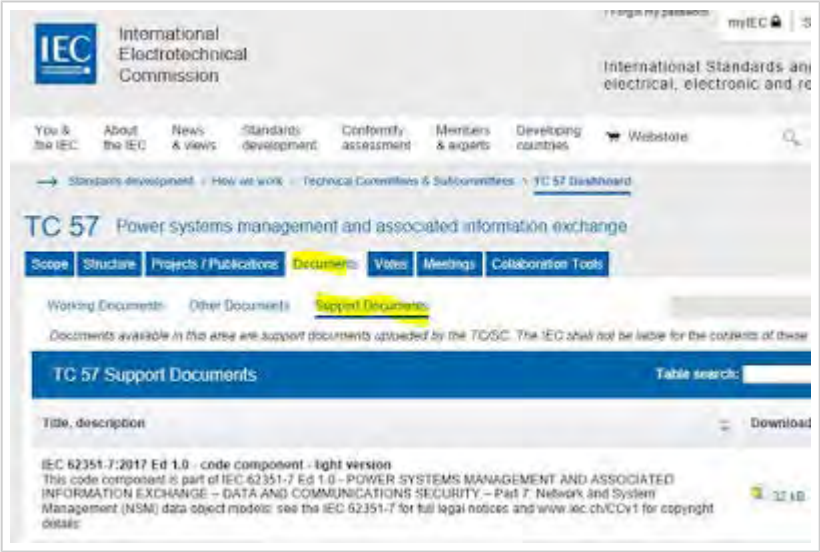
The Code Components included in this IEC standard are also available as electronic machine readable file.

Click [HERE](#) for the Preview.

Click [HERE](#) for the Code Components.

The standard series IEC 61850 will also come with Code Components when the various 7-x parts will be published as International Standard. This will ease the development and maintenance of engineering and configuration tools ... tremendously.

Check [HERE](#) for Code Components ... coming later in 2017 or 2018 ...



Posted by [Karlheinz Schwarz](#) at 6:41 AM [No comments:](#)

Labels: [Code Components](#), [IEC 62351](#), [Network Management](#), [objects](#), [security](#)

Again Security: How do you Protect your Industrial Control System from Electronic Threats?

Industrial Control System (ICS) need to be protected from **Electronic Threats** - one of the most crucial challenge yesterday, today, and in the future. Joseph Weiss (PE, CISM - one of the real senior experts in the field) uses the term "electronic threats" rather than cyber security because there are many electronic threats to Industrial Control Systems beyond traditional cyber threats (as he says).

Joe Weiss has written a book with more than 300 pages published in 2010 worth to study (and more important TO IMPLEMENT): "**Protecting Industrial Control Systems from Electronic Threats**"

List of contents:

1. Industrial Control System Descriptions
2. Convergence of Industrial Control Systems and Information Technology
3. Differences between Industrial Control Systems and Information Technology
4. Electronic Threats to Industrial Control Systems
5. Myths
6. Current Personnel Status and Needs
7. Information Sharing and Disclosure
8. Industrial Control System Cyber Risk Assessments
9. Selected Industry Activities
10. Industrial Control System Security Trends and Observations
11. Industrial Control System Cyber Security Demonstrations
12. Selected Case Histories: Malicious Attacks
13. Selected Case Histories: Unintentional Incidents
14. Industrial Control System Incident Categorization
15. Recommendations

As long as you can read this blog post you could assume that there is enough power for all computers involved in the chain from the server holding this bog to your computer.

When you will see the following message on your screen: "Sorry, we are out power!" don't worry that much - because the only message you CANNOT SEE ON YOUR SCREEN IS: "SORRY; WE ARE OUT OF POWER. No power no screen display. ;-)

Click [HERE](#) for more details on the book.

I guess Joe would have spent another 100 or so pages to talk about IoT vulnerability if he would have written the book now.

In a report published the other day by Wired you can read:

"On Tuesday, the internet-of-things-focused security firm Senrio revealed a hackable flaw it's calling "Devil's Ivy" **a vulnerability in a piece of code called gSOAP** widely used in physical security products, potentially allowing faraway attackers to fully disable or take over thousands of models of internet-connected devices from security cameras to sensors to

access-card readers.

Using the internet-scanning tool Shodan, Senrio found 14,700 of XXXX's cameras alone that were vulnerable to their attack-at least, before XXXX patched it. And given that's one of the dozens of ONVIF companies alone that use the gSOAP code, **Senrio's researchers estimate the total number of affected devices in the millions.**"

Unbelievable!!

Click [HERE](#) for the full Wired report.

How long will you wait to implement more measures to protect your industrial control system?

Start now - latest next Monday.

Posted by [Karlheinz Schwarz](#) at [6:16 AM](#) [No comments:](#) 

Labels: [control systems](#), [Critical Infrastructure Protection](#), [Cyber Security](#), [ICS](#), [security](#)

Tuesday, July 18, 2017

IXXAT (HMS) Offers New POWERFUL Smart Grid Gateways for IEC 61850, IEC 60870-5, Profibus and more

Under the IXXAT brand, HMS delivers connectivity solutions for embedded control, **energy**, safety and automotive testing.

The new and very powerful IIoT gateways from HMS allow industrial equipment to communicate with power grids based on IEC 60870-5-104 and IEC 61850. In addition they also include Modbus TCP Client/Server and Modbus RTU Master/Slave



IXXAT SG-gateways...

- enable easy remote control and management of electrical systems
- allow to log and display application data and energy consumption
- provide IEC 61850 client/server and IEC 60870-5-104 server support
- have in-built Modbus TCP Client/Server and Modbus RTU Master/Slave interfaces
- provide connectivity for CAN Bus, I/O, M-Bus, PROFIBUS, PROFINET and EtherNet/IP based devices

Click [HERE](#) for more details in English

[Hier](#) klicken für Details in Deutsch

Posted by [Karlheinz Schwarz](#) at [7:17 AM](#) [No comments:](#) 

Labels: [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Profinet](#), [RTU](#), [virtual power plant](#)

Friday, July 14, 2017

How Much Will The Implementation Of Security Measures Cost?

Almost everybody is **talking about security measures** in the context of automation and communication systems in factories, power plants, substations, hospitals, ... Talking about the topic is one thing - what's about **implementing and sustainable use of secure systems?** Hm, a good question.

A news report published on June 13, 2017, under the title

"The "Internet of Things" is way more vulnerable than you think—and not just to hackers

points out that many - maybe most - devices that communicate using internet technologies are not capable to carry the load needed for reasonable security measures. One paragraph referring to Joe Weiss (a well known expert) is eye-catching:

*"Weiss believes that the first step in securing the IoT is to **build entirely new devices** with*

faster processors and more memory. In essence, **hundreds of billions of dollars' worth of machines need to be replaced or upgraded significantly.**"

Click [HERE](#) to read the complete report.

I would like to see - at least - more powerful platforms when it comes to new installations. Be aware that the cost of a new platform with implemented state-of-the-art security measures is one thing. Another thing is to implement a more centralized security infrastructures to manage the security.

IEC 62351-9 specifies cryptographic key management, namely how to **generate, distribute, revoke, and handle X.509 digital certificates and cryptographic keys** to protect digital data and its communication.

Primary goals of the series IEC 62351 are considered for the use of cryptography:

- Verifying the claimed identity of a message sender (authentication);
- Verifying that the sender has the right to access the requested data (authorization);
- Ensuring no one has tampered with a message during transit (integrity);
- Obscuring the contents of a message from unintended recipients (confidentiality);
- Associating specific actions with the entity that performed them (non-repudiation).

It is recommended for vendors and users to pay more attention to IEC 62351 (and other standards) and to listen carefully to the experts involved in protecting our infrastructures. A reasonable white paper on the matter has been published by the BDEW (Germany): "Requirements for Secure Control and Telecommunication Systems".

Click [HERE](#) to access the BDEW white paper.

Click [HERE](#) for further information (some documents are in English).

Click [HERE](#) for a paper discussing the BDEW white paper.

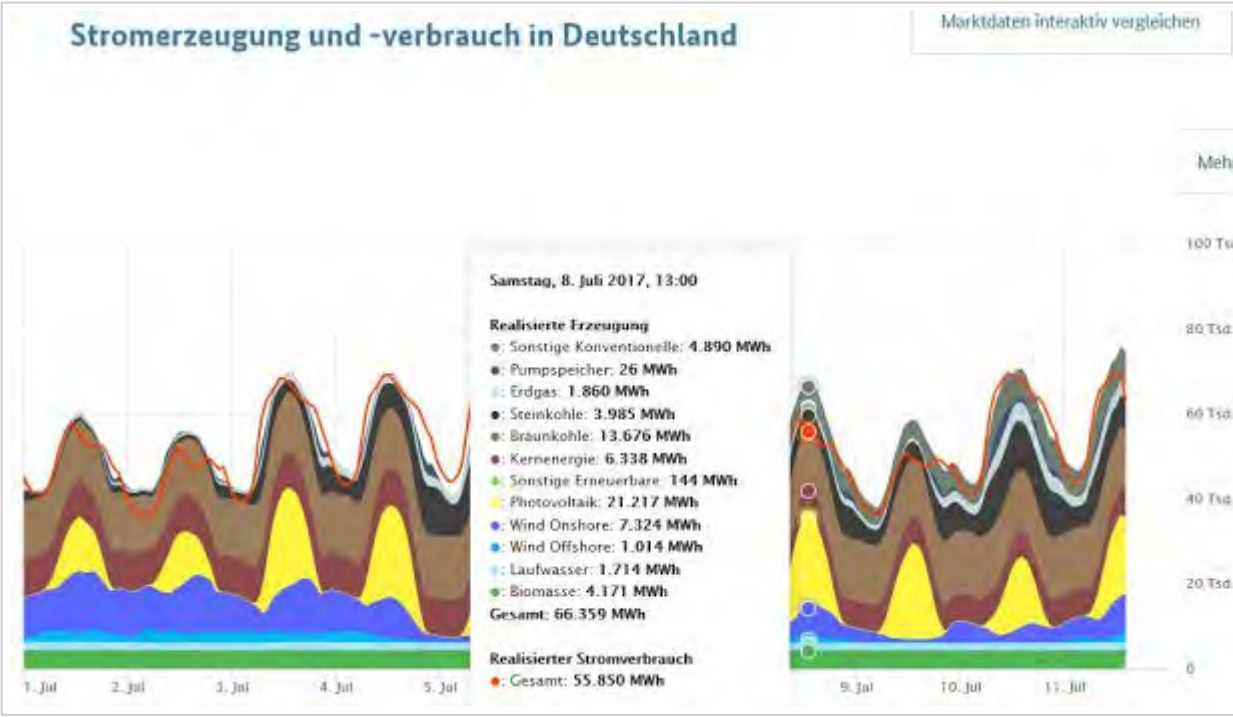
Posted by [Karlheinz Schwarz](#) at [12:34 AM](#) [No comments:](#) 

Labels: [BDEW](#), [Critical Infrastructure Protection](#), [Cyber Security](#), [IEC 62351](#), [IEC 62351-9](#)

Tuesday, July 11, 2017

Interactive Information about German Power Generation, Load and Export/Import

The German regulator of the electric power network has just opened a new website which gives you a deep inside view in power generation, load and export/import.



Graph from the new website.

Click [HERE](#) to access the new website.

Enjoy.

This is a very interesting service ... to see what's going on.

Posted by [Karlheinz Schwarz](#) at [7:24 AM](#) [No comments:](#) 

Labels: [electric power system](#), [Germany](#), [load](#), [power generation](#), [regulator](#)

When will Hackers Take Control Over Substations?

I guess most people belief that our power delivery infrastructure is very secure - yes, I agree that this is (still) the case. What's next? There are some publicly visible efforts to change this - obviously.

One of the attempts to approach the power delivery control systems has been made public the other day with the headline:

Attack on Critical Infrastructure Leverages Template Injection

"Attackers are continually trying to find new ways to target users with **malware sent via email**. Talos has identified an email-based attack targeting the energy sector, including nuclear power, **that puts a new spin on the classic word document attachment phishing**.

Typically, malicious Word documents that are sent as attachments to phishing emails will themselves contain a script or macro that executes malicious code. In this case, there is no

malicious code in the attachment itself. The attachment instead tries to download a template file over an SMB connection so that the **user's credentials can be silently harvested**. In addition, this template file could also potentially be used to download other malicious payloads to the victim's computer."

Click [HERE](#) to read the full report.

Click [HERE](#) for NYTimes report.

Posted by [Karlheinz Schwarz](#) at 12:46 AM [No comments:](#) 

Labels: [critical infrastructure](#), [Critical Infrastructure Protection](#), [Cyber Security](#)

Saturday, July 8, 2017

IEC-61850-Hands-On-Training in Deutsch in Karlsruhe (Dezember 2017 und Mai 2018)

NettedAutomation GmbH bietet zwei IEC-61850 Hands-On-Trainingskurse **zu unschlagbar günstigen Preisen** in Deutsch in Karlsruhe an:

05.-08. Dezember 2017

14.-17. Mai 2018

04.-07. Dezember 2018

NEU: Zusätzlicher Schwerpunkt wird das Thema "Sicherheitsanforderungen" (BDEW White Paper, ...) für die Energieversorgung sein.

Die drei (3) Blöcke (1 Tag + 2 Tage + 1 Tag) können einzeln oder in Kombination gebucht werden. Sie entscheiden selbst, ob Sie nur einen Tag von Ihrem Arbeitsplatz fern bleiben möchten oder zwei, drei oder vier. Je nachdem, wieviel Zeit Sie investieren wollen oder können und welchen Bedarf Sie haben.

Lernen Sie, wie über 4.300 Teilnehmer vor Ihnen, was IEC 61850 und andere Normen wie IEC 60870-5-10x oder IEC 62351 (Security) bedeuten. Gewinnen Sie einen Einblick in relevante Realisierungen wie die FNN-Steuerbox oder VHPready, die auf IEC 61850 aufbauen. Verstehen Sie, wie Feldbusse (Profibus, Profinet, Modbus, ...) über lostengünstige Gateways in die Anlagen eingebunden werden können.

Im Hands-On-Training lernen Sie die wesentlichen Konzepte der Normenreihe praktisch kennen. Die [umfangreiche Trainings-Software](#) dürfen Sie behalten und weiterhin nutzen!




Copyright, 2017-07, Michael Hüter

Der Kurs ist für alle geeignet, die mehr über IEC 61850 erfahren wollen.

[HIER klicken](#), um zur Beschreibung und den Anmeldeunterlagen zu gelangen [pdf, 430 KB].

Beachten Sie auch, dass die meisten Seminare als Inhouse-Kurse stattfinden! Falls Sie Interesse an einem Inhouse-Kurs (in deutsch, englisch, italienisch oder schwedisch) haben sollten [kontaktieren Sie uns bitte!](#)

Posted by [Karlheinz Schwarz](#) at 4:10 AM [No comments:](#) 

Labels: [BDEW](#), [Edition 2](#), [Edition 2.1](#), [education](#), [Feldbus](#), [hands-on Training](#), [ICS cyber security](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Profinet](#), [security](#), [seminar](#), [Training](#)

Monday, July 3, 2017

An All NEW Evaluation, Demo, Hands-On Package for IEC 61850 and IEC 61400-25

NettedAutomation GmbH (Karlsruhe, Germany) has released an **All NEW Evaluation, Demo, Hands-On Package for IEC 61850 and IEC 61400-25 (EvaDeHon) for immediate download and use!**

The new EvaDeHon Package comprises the roles Client, Server, Publisher, and Subscriber running on a PC, HMS (IXXAT, Beck IPC) Gateways, SystemCorp IEDs, ...

The new solutions allow to run **multiple IED models (all roles) in parallel on one PC** (simulating IEDs of a complete system!) ... and more. The roles and applications are configured directly by SCL files (.cid). You can build your own models and run them with all

roles ... if configured.

This Package is based on our 30+ years of experience. We are really proud of offering these tools to the industry today! Sit down, enjoy and relax ...



Copyright, 2017, Michael Hütter

Click [HERE](#) to download the documentation only [pdf, 3.2 MB]

Click [HERE](#) for downloading the demo package including the documentation and license conditions.

Example: Server and Client on two PCs:

Topology of Demo (on two Windows machines)

2. Run Client for Server on 1st PC

1. Run Server on 2nd PC

Client ID (R510 v2.07.22 Apr 26 2017 17:55:33)

Server ID (R510 v2.07.22 Apr 26 2017 17:55:33)

PowerGen_MONITOR MMS/1 TarW mag!

Value: 2345

Quality: GOOD

Time stamp: 07/01/17 00:00:00

MMS/100 by 100 per sec

BECK SystemCORP

NettedAutomation

Information & Communication Systems

Connected to IP: 192.168.178.100

Update

Update successfully received

MMS, TCP/IP, GOOSE, Ethernet/Ethertype, ...visible with Wireshark

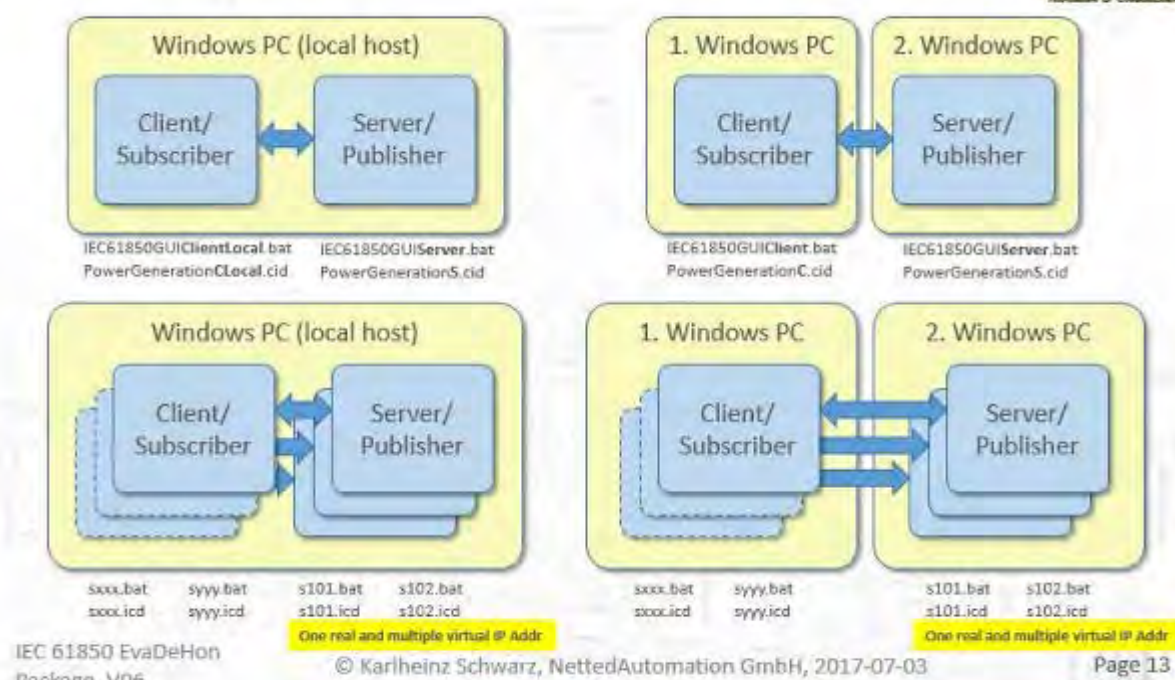
IEC 61850 EvaDeHon Package, V06

© Karlheinz Schwarz, NettedAutomation GmbH, 2017-07-03

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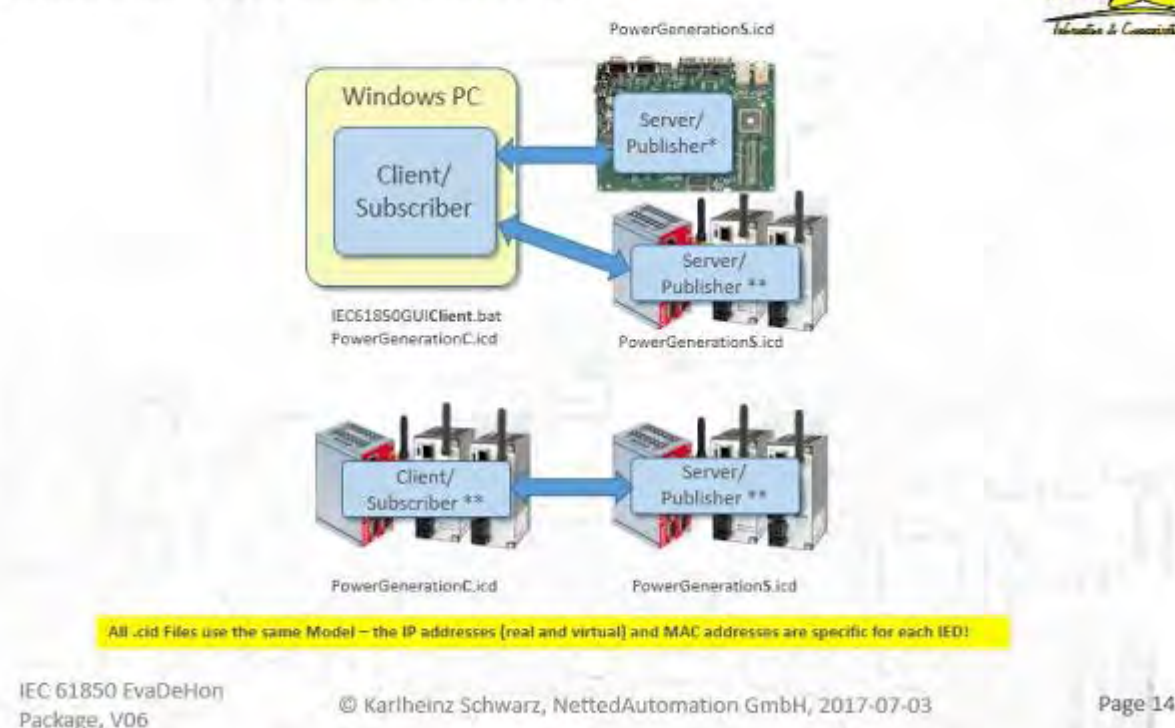
Many topologies on PCs:

Application use-cases of the EvaDeHon Package (1)



... and topologies with gateways:

Application use-cases of the EvaDeHon Package (2)



Click [HERE](#) to download the documentation only [pdf, 3.2 MB]

Click [HERE](#) for downloading the demo package including the documentation and license conditions.

Posted by [Karlheinz Schwarz](#) at 8:51 AM No comments:

Labels: [Beck IPC](#), [client](#), [Demo Kit](#), [education](#), [Evaluation](#), [free download](#), [hands-on Training](#), [HMS](#), [IEC 61400-25](#), [IEC 61850](#), [IEDScout](#), [IXXAT](#), [MMS](#), [publisher](#), [seminar](#), [server](#), [subscriber](#), [SystemCorp](#)

Monday, June 26, 2017

Update on OPC UA IEC 61850 Companion Specification

The OPC UA IEC 61850 Companion Specification of the OPC Foundation is focusing on gateways that are intended to be used to transfer information fully and accurately through gateways between devices that implement IEC 61850 or OPC UA respectively. While IEC 61850 is focusing on electricity generation, transmission, distribution, distributed energy resources (DER), and consumption, OPC UA is dealing with non-electrical industrial process activities. It is clear that users require integration of the electrical aspects of a plant with non-electrical aspects.

The information models defined in IEC 61850 were focused during the late 90s on protection and automation of electric power systems. **In the meantime the models provide a huge number logical nodes (e.g., STMP = Supervision of temperature with measurement, alarms and trips, or FPID = PID loop control) applicable in most non-electrical applications domains. The communication services (Reporting, Logging, GOOSE, Control, Setting Group Control, ...) are generic for any application domain.**

OPC UA's modelling capabilities is understood to make it possible to transfer data between

different systems without losing the semantics of data. Thus the drafted companion specification document describes how IEC 61850 data can exchanged using OPC UA data modelling and services.

Click [HERE](#) for more information.

IEC TC 88 PT 25 is currently working on a technical specification:

Wind turbines - IEC 61400-25-41: Communications for monitoring and control of wind power plants - Mapping to communication profile based on IEC 62541 (OPC UA)

Microsoft has provided an Open-Source OPC UA stack to OPC Foundation!

The new OPC Foundation .NET reference stack, based on the new .NET Standard Library technology, was developed and optimized by Microsoft to serve as the complete platform-independent infrastructure, from the embedded world to the cloud. This new version is enabled on the following supported platforms: Various Linux distributions, iOS, Android, Windows 7, Windows 8, Windows 8.1, Windows 10, Windows Phone, HoloLens and the Azure cloud.

Click [HERE](#) for the press news from the OPC Foundation.

Click [HERE](#) for accessing the open source reference stack at Gidhub.

Brief comparison of IEC 61850 and OPC UA:

Standard? Yes for both in IEC.

Available since? IEC 61850 for some 15 years; OPC UA for a few years.

SCADA support? Yes for both.

Real-time support? Yes in IEC 61850; OPC UA is intended to run on TSN (IEEE 802).

Security? Yes for both (IEC 61850 refers to IEC 62351).


Semantic? IEC 61850 has huge, still growing list of models; OPC UA has not yet semantics.

Configuration Language? IEC 61850 has SCL (System Configuration Language); OPC UA has no.

Conformance testing? Yes for both.

Support: By many big and small companies.

Open Source Stack? Yes for IEC 61850 (<http://libiec61850.com>); yes for OPC UA (from Microsoft, see above).

Posted by [Karlheinz Schwarz](#) at 7:27 AM [No comments:](#) 

Labels: [Cyber Security](#), [IEC 61850](#), [IEC 62351](#), [OPC UA](#), [open source](#), [real-time](#), [SCADA](#), [Semantic](#)

Wednesday, June 14, 2017

How to Model Thousands of Measurement Signals?

The standard series IEC 61850 was originally developed for high voltage substation automation and protection ... with well defined logical nodes and data objects representing the most crucial signals like status (CSWI.stVal), 3-phase electrical measurements (MMXU.V.phsA ...), temperature supervision (STMP.Tmp, STMP.Alm, ...) and many other signals.

Several applications require huge number of values, e.g.,

1. Logs (hundreds of status changes over a long period)
2. Power Quality measurements (hundreds of values of min, max, ...)
3. Temperature (hundreds or thousands of raw measured or processed values)

The corresponding logical nodes and communication service models would end-up in a lot of overhead in the modelling or in the communication.

I have discussed the first two bullets already inside the standardization groups ... more details may be discussed in a future blog post.

Today, I will discuss the third issue: huge amount of temperature values.

First of all, there are two models for temperature: TTMP (Transducer for a single sensor value) and STMP (Supervision of a single temperature value) with the following excerpt of details:

TTMP.TmpSv.instMag and **TTMP**.TmpSv.q are the two mandatory data attributes.

STMP.Tmp.mag.f, **STMP**.Tmp.mag.q, **STMP**.Tmp.mag.t (Tmp is optional)
STMP.Alm.stVal, STMP.Alm.q, STMP.Alm.t (Alm is optional)

STMP.Trip.stVal, STMP.Trip.q, STMP.Trip.t (Trip is optional)

Second, If you want to **communicate just hundreds of temperature values**, I would model this application as follows (SIUnits and sample rate ... may be modeled as well):

[Sure, I am aware that multiple instances of TmpSv are not yet standardized ... I would not care a lot at the moment ... it will come anyway. If not, define an extended Data Object TmpSamp with multiplicity 0..*]

TTMP1.

TmpSv1.instMag and TmpSv1.q
TmpSv2.instMag and TmpSv2.q
TmpSv3.instMag and TmpSv3.q
...
TmpSv100.instMag and TmpSv100.q

DataSet="DsTTMP1"

FCDA=TmpSv1.instMag
FCDA=TmpSv2.instMag
FCDA=TmpSv3.instMag
...
FCDA=TmpSv100.instMag

Unbuffered Report CB="UnbTTMP1

Data Set="DsTTMP1"
trigger option: integrity period
period: 1 h or ...

TTMP2.

TmpSv1.instMag and TmpSv1.q
TmpSv2.instMag and TmpSv2.q
TmpSv3.instMag and TmpSv3.q
...
TmpSv100.instMag and TmpSv100.q

DataSet="DsTTMP2"

FCDA=TmpSv1.instMag
FCDA=TmpSv2.instMag
FCDA=TmpSv3.instMag
...
FCDA=TmpSv100.instMag

Unbuffered Report CB="UnbTTMP2

Data Set="DsTTMP2"
trigger option: integrity period
period: 1 h or ...

TTMP3.

TmpSv1.instMag and TmpSv1.q
TmpSv2.instMag and TmpSv2.q
TmpSv3.instMag and TmpSv3.q
...
TmpSv100.instMag and TmpSv100.q

DataSet="DsTTMP3"

FCDA=TmpSv1.instMag
FCDA=TmpSv2.instMag
FCDA=TmpSv3.instMag
...
FCDA=TmpSv100.instMag

Unbuffered Report CB="UnbTTMP3

Data Set="DsTTMP3"
trigger option: integrity period
period: 1 h or ...

Third, If you want to use **hundreds of temperature values AND alarms AND trips** etc. then STMP would be the right choice. The above modeling approach would be the same. In addition to the data sets for the measured values, you may also configure data sets for the quality "q", and configure report control blocks with trigger option "data change". You may also add the quality into the other FCDAs ... depending on how crucial the quality is for the client application.

Posted by [Karlheinz Schwarz](#) at 3:24 AM [No comments:](#) 

Labels: [extended objects](#), [IEC 61850](#), [model extensions](#), [STMP](#), [TTMP](#)

Tuesday, June 13, 2017

Are Blackouts Knocking at the Doors of Substations?

Dear experts interested in secure power delivery systems,
You may have been informed yesterday about one of the latest developments in destroying the power delivery infrastructure: **Industroyer**.
What is Industroyer? It is "A new threat for industrial control systems" according to Anton Cherepanov (ESET):

*"Win32/Industroyer is a sophisticated piece of malware designed to disrupt the working processes of industrial control systems (ICS), specifically **industrial control systems used in electrical substations**. Those behind the Win32/Industroyer malware have a deep knowledge and understanding of industrial control systems and, specifically, the industrial protocols used in electric power systems. Moreover, it seems very unlikely anyone could write and test such malware without access to the specialized equipment used in the specific, targeted industrial environment. Support for four different industrial control protocols, specified in the standards listed below, has been implemented by the malware authors:*

- **IEC 60870-5-101 (aka IEC 101)**
- **IEC 60870-5-104 (aka IEC 104)**

- **IEC 61850**
- **OLE for Process Control Data Access (OPC DA)**

In addition to all that, the malware authors also wrote a tool that implements a denial-of-service (DoS) attack against a particular family of protection relays, ..."

Click [HERE](#) for a comprehensive report [pdf].

The Conclusion of the report closes with this statement:

*"The commonly-used industrial control **protocols** used in this malware were designed decades ago **without taking security into consideration**. Therefore, **any intrusion into an industrial network with systems using these protocols should be considered as "game over".**"*

The protocols used are not the crucial issue! The protocols like IEC 61850 could be protected by the accompanying standard series IEC 62351 (Power systems management and associated information exchange - Data and communications security).

One crucial show stopper is: "Stingy is cool" mentality!!

Securing the systems could be implemented - with far higher costs during development, engineering, configuration, OPERATION, and maintenance.

As long as we all do not accept that the electric power (and other) infrastructures will require a lot more resources to keep the level of today's availability, quality, and security, we will experience more disrupted infrastructures.

Building an infrastructure, operating, and maintaining it are different aspects. The maintenance of our infrastructures will consume definitely more resources than we believe today.

I was shocked to read, that some "friends" believe that the reports about the "Industroyer" are just fake news.

Whatever you believe, one thing is really true: **Many systems and devices in the automation domain (substations, ...) are not protected! Believe me!**

Posted by [Karlheinz Schwarz](#) at [1:13 AM](#) [No comments:](#) 

Labels: [blackout](#), [Cyber Security](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 62351](#), [OPC](#), [security](#)

Saturday, June 10, 2017

CIM-Workshop am 19. Oktober 2017 in Frankfurt

Die DKE lädt zum CIM (Common Information Model)-Workshop 2017 ein!

Ort: **Frankfurt/Main**

Datum: **19. Oktober 2017**

Mit vielen spannenden Themen, u.a.

- Eine Kurzeinführung in CIM
- Viele Anwendungsbeispiele
- Vorstellung des Themas CIM in Verteilnetze, Niederspannung
- „Life Hack“ – Wir bauen einen Kundenanschluss...
- Rolle von CIM in verschiedenen Projekten
- Referenzmodelle und CIM
- Podiumsdiskussion mit den Themen CIM Blick in die Zukunft, Blockchain, ...

[Hier für weitere Informationen klicken.](#)

[Introduction to CIM](#)

Posted by [Karlheinz Schwarz](#) at [2:40 AM](#) [No comments:](#) 

Labels: [CIM](#), [DKE](#), [IEC 61968](#), [IEC 61970](#), [workshop](#)

Thursday, June 8, 2017

What is your Annual Cybersecurity Incident Bill?

"Although the **majority of industrial organizations believe they are well-prepared for cybersecurity incidents**, this **confidence may be not well-founded**: every second ICS company experienced between one and five incidents last year, according to a survey conducted by Kaspersky Lab. On average, ineffective cybersecurity costs industrial organizations up to \$497K per year."

Click [HERE](#) to read more details.

Many ICS (Industrial Control Systems) are also used in power system applications. So, what is the situation there? Likely similar to the industrial domain.

Posted by [Karlheinz Schwarz](#) at [4:22 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [ICS](#)

Wednesday, May 31, 2017

Just published: IEC TR 61850-90-17

IEC TC 57 has published a new part of IEC 61850 in May 2017:


IEC TR 61850-90-17
COMMUNICATION NETWORKS AND SYSTEMS
FOR POWER UTILITY AUTOMATION –
Part 90-17: Using IEC 61850 to transmit power quality data

This part of IEC 61850 defines how to exchange power quality data between instruments whose functions include measuring, recording and possibly monitoring power quality phenomena in power supply systems, and clients using them in a way that is compliant to the concepts of IEC 61850.

Click [HERE](#) for a preview of the new document.

Note that the Tissue Database can be used for posting technical issues with IEC 61850-90-17. The first tissue has been registered:

Click [HERE](#) for the first tissue on part 90-17.

Posted by [Karlheinz Schwarz](#) at [7:20 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-90-17](#), [power quality](#), [tissues](#)

Thursday, May 25, 2017

WWW - Water, Wine, and Watt-hours

When it comes to get prepared for a blackout, what do you need to survive? The "World Wide Web" (WWW) will likely not work anymore.

What's about "Water, Wine, and Watt-hours"? The new WWW.

It is still a challenge to store Watt-hours - a battery of, let's say 20 kWh would dry out within short time. It would not help in winter to survive. I would like to harvest the sun in summer, convert the electric kWh into hydrogen kWh or methane gas kWh and store it locally or somewhere outside the city.

In wintertime we could use it for heating and generate electricity.

I look forward to purchasing a system that could generate hydrogen or methane gas and store it. It may be round the corner - who knows.

Posted by [Karlheinz Schwarz](#) at [10:13 PM](#) [No comments:](#) 

Labels: [blackout](#), [energy storage](#), [www](#)

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WEITERE INFORMATIONEN OK

Friday, May 19, 2017

Data And Communication Security for MMS is Speeding Up

IEC TC 57 is about to accelerate the publication of a new Standard on Security:
IEC 62351-4 ED1 (57/1860/CDV):
Power systems management and associated information exchange -
Data and communications security -
Part 4: Profiles including MMS
Closing date for voting: 2017-08-11

The current part 4 is just a TS (technical Specification). The need for a definitive solution for secure MMS communication is at hand.

"Scope
This second edition of this part of IEC 62351 substantially extents the scope of the first edition [KHS: TS only!]. While the first edition primarily provided some limited support for authentication during handshake for the Manufacturing Message Specification (MMS) based applications, this second edition provides support for **extended integrity and authentication** both for the handshake phase, and for the data transfer phase. **In addition, it provides for shared key management and data transfer encryption and it provides security end-to-end (E2E) with zero or more intermediate entities.** While the first edition only provides support for systems based on the MMS, i.e., systems using Open Systems Interworking (OSI) protocols, this second edition also provides support for application protocols using other protocol stacks, e.g., a TCP/IP protocol stack. This support is extended to protect application protocols using XML encoding [KHS: IEC 61850-8-2] and other protocols that have a handshake that can support the Diffie-Hellman key exchange. This extended security is referred to as E2E-security.
It is intended that this part of IEC 62351 be referenced as normative part of IEC TC 57 standards that have a need for using application protocols, e.g., MMS, in a secure manner. It is anticipated that there are implementation, in particular Inter-Control Centre Communications Protocol (ICCP) implementations that are dependent on the first edition of this part of IEC 52315. The first edition specification of the A-security-profile is therefore included as separate sections. Implementations supporting this A-security-profile will interwork with implementation supporting the first edition of this part of IEC 62351. Special diagnostic information is provided for exception conditions for E2E-security. This part of IEC 62351 represents a set of mandatory and optional security specifications to be implemented for protected application protocols."

By the way: The best security standard is useless if it is not implemented (and even worse when it is available but not used) in as many devices as possible! Talk to your management to get the resources (hardware, software, peopeware) to implement this new part - as soon as possible.

Posted by [Karlheinz Schwarz](#) at 10:08 PM No comments: 

Labels: [Cyber Security](#), [IEC 61850](#), [IEC 62351](#), [MMS](#), [TLS](#)

TSN: Fieldbus Standardization - Another Way to Go

Fieldbus standardization has a very long history - resulting in tens of solutions in ONE single standard series IEC 61158. This has been discussed several times on this blog.
The latest decisions in the industrial automation domain could change the direction to go: To get one or two or three ... solutions - based on TSN (Time-sensitive Networking).
It took more than 25 years to implement in principle what I have written in a paper on Fieldbus and Ethernet. When I worked for Siemens Industry in the early 90s, I recommended to use native Ethernet instead of fieldbusses ... now we write 2017 – 26 years later:
Click [HERE](#) for the paper "Bridging MAP to Ethernet" [PDF, 720 KB, 1991]
Click [HERE](#) for the paper "Fieldbus standardization: Another way to go" [PDF, 720 KB, 1991].

25 years of fieldbus wars are likely to end in the near future.
Even the Profibus International Users Group (PI) published the other day in the PI Profinews: "TSN (Time-sensitive Networking) is a promising new IEEE technology for Ethernet that combines ... PI will **expand PROFINET** with the mechanisms of TSN in layer 2, **retaining the application layer on the higher levels**. This makes it possible to migrate the applications to the new technology simply and incrementally and to take advantage of the benefits of an open, globally standardized IT technology."
Clicke [HERE](#) for the full announcement in the Profinews.

It's a pity that it took 25 years to understand that Ethernet is THE solution for the future.

TSN is just another link layer solution - what's about the upper layers? Huuch ... there is still the old fight of various groups that belief that their solution is the best!
PROFINET will keep their higher layers and add the option of OPC UA for higher automation levels to the cloud. So, they are recommending a compromise - which ends up in many

For your Convenience

[An All NEW Evaluation, Demo, and Hands-On Package for IEC 61850 \(IEC 61400-25\) available \(2017-07-03\)](#)

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[Old Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[NEW! Blog as single PDF until 23 April 2017 \[17 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Training by NettedAutomation


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[New Flyer for Training with crucial topics](#)
[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)



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- 2015 (94)
- 2014 (129)

higher layer solutions on TSN.

ABB, Bosch Rexroth, B&R, Cisco, GE, Kuka, NI, Schneider Electric, Belden/Hirschmann and Phoenix Contact are fighting for a SINGLE combination: [TSN and OPC UA](#).

In the meantime we have - for more than 20 years - a SINGLE combination for the electric power (and energy) market: IEC 61850 with Ethernet and MMS (for client/server communication) supported by hundreds of vendors and users worldwide. AND: IEC 61850 has a huge basket of object models and a configuration language! What is being communicated through OPC UA TSN?

A finished solution (Ethernet/MMS some 25 years ago) **is better than a perfect one that will never be accomplished** - even not with TSN plus XX, YY, ZZ, ...!

This lets IEC 61850 look very good!

If you need your Profibus or Profinet data being communicated by IEC 61850, check [HERE](#) for Gateways.

Posted by [Karlheinz Schwarz](#) at [10:23 AM](#) [No comments:](#) 

Labels: [Ethernet](#), [fieldbus](#), [IEC 61850](#), [MMS](#), [OPC UA](#), [Profibus](#), [Profinet](#), [real-time](#), [TSN](#)

Monday, May 15, 2017

IEC 61850-90-21 - New Project On Travelling Wave Fault Location System

IEC TC 57 just published a Proposal to develop an IEC Technical Report: IEC TR 61850-90-21: Communication networks and systems for power utility automation – **Part 90-21: Travelling wave fault location system**

Scope:

1. Describe the principles of fault location based on travelling waves aided by communications.
2. Specify use cases for this method under the following application scenarios:
 - a. Single-ended fault location
 - b. Double-ended fault location through peer-to-peer communications
 - c. Double-ended fault location with communications to a master station
 - d. Wide area fault location applications
 - e. Pulse radar-type echo (Japanese) method
 - f. Substation integration with other fault location and disturbance recording functions
 - g. Testing and calibration
3. Describe the information model for each use case.
4. Give guidance on its applications and its communication requirements.
5. Give guidance on how to achieve co-existence and interoperability with different fault location techniques.

More to come.

Posted by [Karlheinz Schwarz](#) at [2:21 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-90-21](#), [new work](#)

Updated IEC 61850 Roadmap - What is going on?

The following 40 (!!) documents are in the process of revision or definition:

- [2013](#) (130)
- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)


Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

1	IEC 61850-2	Glossary
2	IEC 61850-4	System and project management
3	IEC 61850-5	Communication requirements for functions and device models
4	IEC 61850-6	Configuration description language for communication in electrical substations related to IEDs
5	IEC 61850-6-2	Configuration description language extensions for human machine interfaces
6	IEC 61850-6-100	Guideline for function modeling in SCL for substation automation
7	IEC 61850-7-1	Basic communication structure – Principles and models
8	IEC 61850-7-2	Abstract communication service interface (ACSI)
9	IEC 61850-7-3	Common data classes
10	IEC 61850-7-4	Compatible logical node classes and data classes
11	IEC 61850-7-410	Hydroelectric power plants - Communication for monitoring and control
12	IEC 61850-7-420	Communications systems for distributed energy resources (DER) - Logical nodes
13	IEC 61850-7-5	IEC 61850 modelling concepts
14	IEC 61850-7-500	Use of logical nodes to model functions of a substation automation system
15	IEC 61850-7-510	Hydroelectric plants – Modelling concepts and guidelines
16	IEC 61850-7-520	DER - Modelling concepts and guidelines
17	IEC 61850-7-6	Guideline for Basic Application Profiles
18	IEC 61850-7-7	Specification of schema for namespace definition files
19	IEC 61850-8-1	Mappings to MMS (ISO/IEC 9506-1 and ISO/IEC 9506-2) and to ISO/IEC 8802-3
20	IEC 61850-8-2	Mapping to Webservices
21	IEC 61850-9-2	Sampled values over ISO/IEC 8802-3
22	IEC 61850-9-3	Precision time protocol profile for power utility automation
23	IEC 61850-10-3	Functional testing of IEC 61850 based systems
24	IEC 61850-80-5	Mapping between Modbus and IEC 61850
25	IEC 61850-90-4	Network engineering guidelines for substations
26	IEC 61850-90-6	Using IEC 61850 for Distribution Automation
27	IEC 61850-90-8	Object models for electrical vehicles
28	IEC 61850-90-9	Object models for electrical energy storage
29	IEC 61850-90-10	Object models for schedules
30	IEC 61850-90-11	Methodologies for modelling of logics for IEC 61850 based applications
31	IEC 61850-90-12	Wide area network engineering guidelines
32	IEC 61850-90-13	Deterministic network topologies
33	IEC 61850-90-14	Using IEC 61850 for FACTS and power conversion data modelling
34	IEC 61850-90-15	IEC 61850 based DER Grid Integration
35	IEC 61850-90-16	Requirements for System Management
36	IEC 61850-90-18	Modeling Alarmhandling for IEC 61850
37	IEC 61850-90-19	Applying role based access to IEC 61850
38	IEC 61850-90-20	Guideline for redundant IEDs with IEC 61850
39	IEC 61850-90-21	Use of IEC 61850 for traveling wave fault location system
40	IEC 61850-104-10	Guideline for technical committees and working groups for extending IEC 61850

What else are you looking for? Several other documents have already been officially published.

Posted by [Karlheinz Schwarz](#) at [2:14 AM](#) [2 comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [Edition 3](#), [IEC 61850](#)

IEC TC 57 Published IEC 61850 Roadmap and Schedule

IEC TC 57 just published a new IEC 61850 Roadmap and Schedule to give an update on the ongoing work (57/1882/INF).

The following 35 (!) parts are in the process of revision respectively under preparation:

- General Topics
- 5 / 7-1 / 7-2 7-3 / 7-4 8-1 / 9-2
- 62361-104-10
- Communication
- 8-2
- 80-5
- 90-4, 90-12, 90-13
- 90-20
- Modeling
- 7-410
- 7-420
- 7-5
- 7-510 7-520
- 90-6 / 90-9 / 90-14 90-15 / 90-21
- 90-10 / 90-18
- 90-19
- 7-6
- 7-7
- Engineering
- 4
- 6
- 6-100
- 6-2
- 90-11
- Testing
- 10-3

The years 2017/2018 will bring more stable documents than ever before! The major step forward is the use of a formal UML modelling tool (Enterprise Architect) to keep the consistency very high level.
Any question? Let us know.

Posted by [Karlheinz Schwarz](#) at [1:23 AM](#) [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [Edition 3](#), [IEC 61850](#)

IEC TC 88 Started Work on SCL for Wind Power Plants

WOW! IEC TC 88 has published a new work item proposal (88/621/NP) for the specification of extending the SCL (System Configuration Language):


Wind energy generation systems –
Part 25-7: Communications for monitoring and control of wind power plants –
Configuration description language for communication in wind automation systems related to IEDs

The objective of the NWIP is to describe the **adoption of the System Configuration description Language (SCL)** defined in IEC 61850-6 to the wind domain

"This part would extend the IEC 61400-25 series with a file format for describing communication-related IED (Intelligent Electronic Device) configurations of a wind turbine, wind power plant controller, metrological mast etc. The extension of SCL to wind domain would simplify integration of wind power plant equipment as well as their integration to the electrical system. The adoption of SCL allows formalised tool based exchange of IED parameters, communication system configurations, switch yard (function) structures, as well as description of the relations between them. The purpose of this format is to formally and efficiently exchange wind turbine and wind power plant IED capability descriptions, and system descriptions between IED engineering tools and the system engineering tool(s) of different manufacturers in a compatible way. The file format is also intended for providing report configuration and alarms as well as HMI interface information from a wind power plant. This information can be used to engineer overlying SCADA systems for the site, for connected DSO, TSO or fleet operators maintenance and surveillance systems. Finally, the SCL is intended as a documentation of the configuration and topology of the delivered system."

WOW! Why a WOW? During the fist years of standardization of the series IEC 61400-25 the proposal of applying and extending the SCL (IEC 61850-6) did not find enough support to start working on the issue! Time is passing and more and more experts understand the advantage of SCL!

Good luck.

Posted by [Karlheinz Schwarz](#) at [1:12 AM](#) [No comments:](#) 

Labels: [configuration](#), [engineering](#), [IEC 61400-25](#), [IEC 61850](#), [SCADA](#), [SCL](#), [system design](#), [wind power](#)

Friday, May 5, 2017

IEC TC 57 published Draft for Machine-Processable Models

IEC TC 57 has just published (57/1870/CD) the first draft improving the applicability of IEC 61850:

Communication networks and systems for power utility automation –
Part 7-7: Basic communication structure –
Machine-processable format of IEC 61850-related data models for tools

This Technical Specification of IEC 61850 specifies a way to model the **code components** of IEC 61850 data model (e.g., the tables describing logical nodes, common data classes, structured data attributes, and enumerations) in an **XML format that can be imported and interpreted by tools**. The following main use cases shall be supported:

- Generation of SCL data type templates for system specification or ICD files. One sub-use case is the generation of LNodeTypes for replacing GGIO.
- Validation of SCL data type templates.
- Definition of private extensions by following the rules of the standard.
- Adapting rapidly the whole engineering chain as soon as a new version of IEC 61850 data model (an addendum, a corrigenda or a Tissue) affects the content of the standard.
- Provide tool-neutral textual help to users of tools on the data model contents.
- Supporting multi-language publication, i.e., enabling the expression of the data model in different languages, through a machine processable format.

The purpose of this proposal is limited to the **publication of the XML format which should support the data model part of any IEC 61850 related standard**. The publication of code components themselves will be part of the related IEC 61850 part.

Comments are expected by 2017-07-28.

This a major step forward. Especially because the "cleaned-up" models of all parts to be published as Edition 2.1 of the corresponding parts could be understood as the **real Edition 2** of the parts that contain models!

Posted by [Karlheinz Schwarz](#) at [9:48 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [interoperability](#), [SCL](#), [XML](#)

Monday, May 1, 2017

Why Wikipedia Misleads People Looking for Help regarding IEC 61850

How do people understand and learn what the standard series IEC 61850 really offers to the protection, automation and supervision of energy systems and what this all means for their application (as vendor, user, consultant, ...)? Some up-to-date discussion you can find on this blog, e.g., by this posting:

[Who can tell you what IEC 61850 really is?](#)

Some people (managers and ...) just go to Wikipedia and believe that they get a reasonable overview about IEC 61850. After reading the German and English version, they have learned: **That IEC 61850 is mainly a PROTOCOL standard!**

[German Version](#) tells in the very first sentence:

"Die Norm IEC 61850 der International Electrotechnical Commission (IEC) beschreibt ein allgemeines **Übertragungsprotokoll** für die Schutz- und Leittechnik in elektrischen Schaltanlagen der Mittel- und Hochspannungstechnik (Stationsautomatisierung)."

[English Version](#) talks a lot about PROTOCOLS:

"IEC 61850 is a standard for vendor-agnostic engineering of the configuration of Intelligent Electronic Devices for electrical substation automation systems **to be able to communicate with each other**. ... The abstract data models defined in IEC 61850 can be **mapped to a number of protocols**. Current mappings in the standard are to MMS (Manufacturing Message Specification), GOOSE (Generic Object Oriented Substation Event), SMV (Sampled Measured Values),[clarification needed] and soon to Web Services. These **protocols can run over** TCP/IP networks or substation LANs using high speed switched Ethernet to obtain the necessary response times below four milliseconds for protective relaying."

After reading these two pages ... some managers believe that IEC 61850 is mainly dealing with protocols. Protocols are required to exchange information between devices. IEC 61850 deals mainly with the **description of signal flows** between any point of a (power or energy) system that **generates information** (status, measurements, alarms, settings, ...) and those points that need to **receive or consume this information**.(protection, automation, SADA, control center, ... asset management, ...). The signal flow could be completely described (and documented) as an SCL file of tens of Mega Bytes ... such files have almost nothing to do with protocols - but the tools that design and engineer systems like substations are key to the future systems. SCL is defined in one document (IEC 61850-6). This document has the biggest impact on how we manage power systems in the future. In my understanding SCL is likely 2/3 of the importance of IEC 61850. Then there are the many crucial models - and finally we have protocols. Protocols are crucial when it comes to devices that have to send and receive signals - no discussion.

Unfortunately the managers (and everybody) that uses Wikipedia for understanding the impact of IEC 61850 are completely mislead! And likely may not understand how IEC 61850 impacts the system design and engineering based on SCL - aspects that are today usually not linked to any protocol.

If the resources for a project to implementing and using IEC 61850 is determined by the assumption that IEC 61850 is another PROTOCOL - then it is likely that the project will fail to get what IEC 61850 could provide.

This post was triggered by a discussion during an IEC 61850 Seminar and hands-on training recently. It is really frustrating for engineers to discuss the needed resources with managers that believe IEC 61850 is mainly a PROTOCOL.

[Who can tell you what IEC 61850 really is?](#)

Posted by [Karlheinz Schwarz](#) at [10:26 AM](#) [2 comments:](#) 

Labels: [engineering system](#), [IEC 61850](#), [protocol](#), [SCL](#), [system configuration](#), [system design](#), [system documentation](#), [wikipedia](#)

Wednesday, April 26, 2017

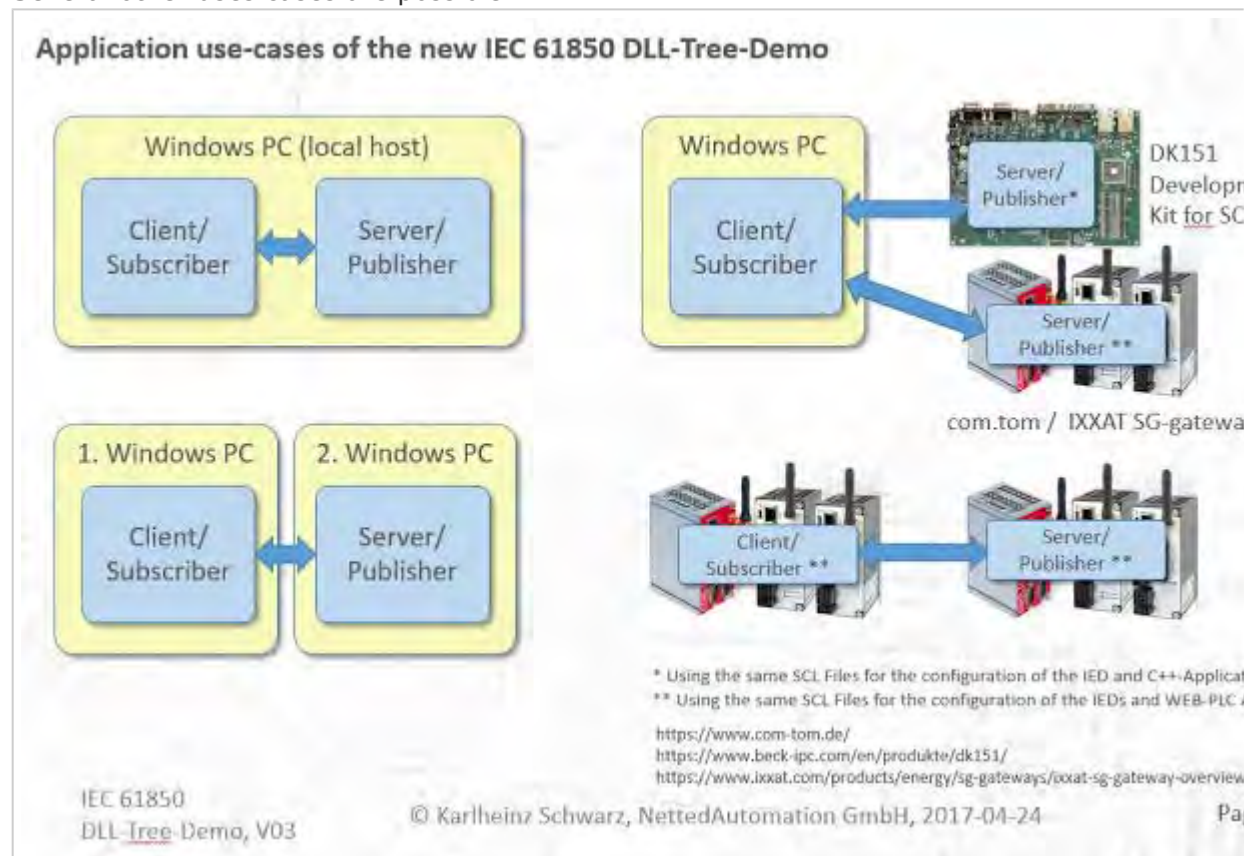
NEW IEC 61850 Demo Package for Windows available

The main purpose of the new demonstration and evaluation package is to provide a free of charge simple and easy to use IEC 61850 Client/Subscriber Tool (running on Windows PCs) that can be used to communicate with a Server/Publisher implemented on the platforms:

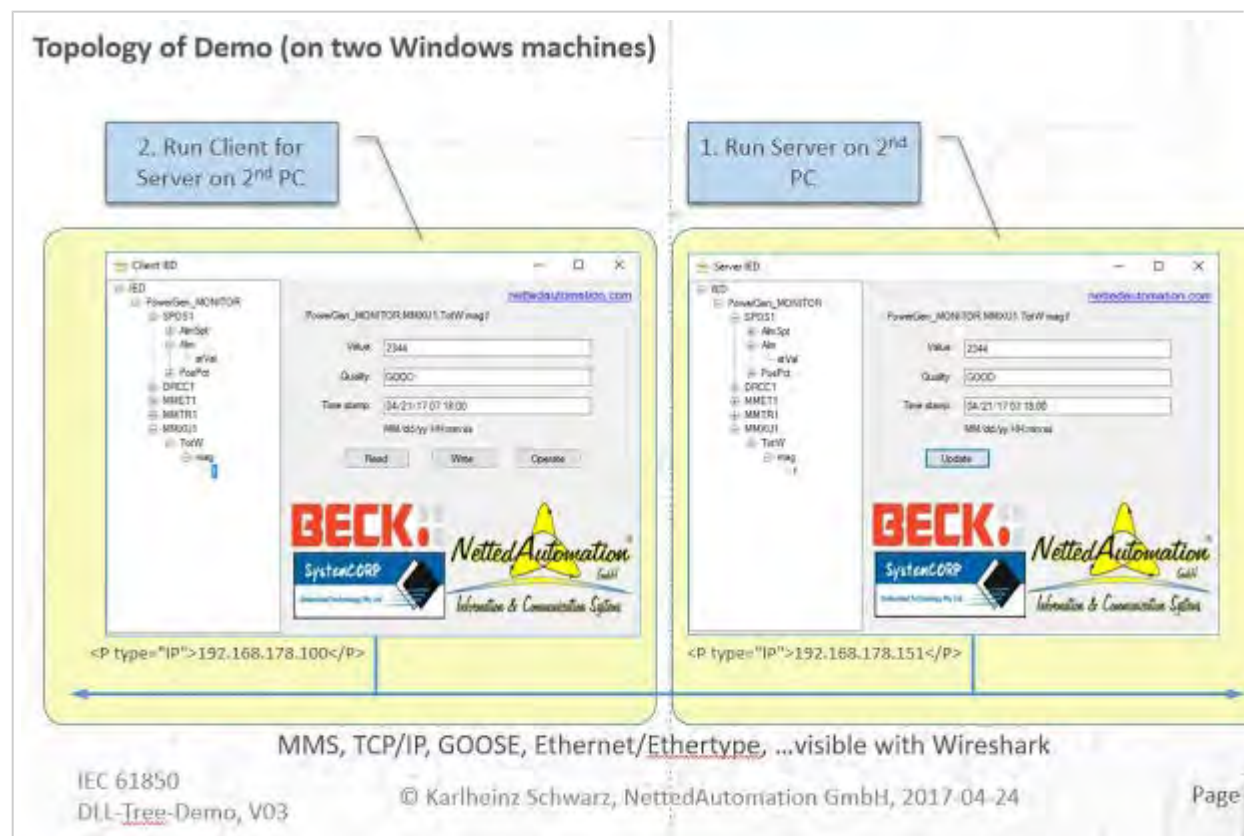
Beck IPC DK151 Development Kit for SC145 (DK61)
Beck IPC com.tom / IXXAT SG-gateways (WEB-PLC)

SystemCorp Smart Grid Controllers Windows PC

Several other uses cases are possible:



The demonstration uses a single generic SCL model (and a derived JSON file [JavaScript Object Notation] that can (beyond the main purpose) be used on the above platforms to automatically configure (tree structured graphical applications) for Clients, Server/Publisher, and Client/Subscriber roles as shown on the next slides.



The specification of additional models (.icd and .json) could be provided for a fee.

Contact NettedAutomation if you are looking for other models, please.

Click [HERE](#) for further details and instructions to download the new package including the documentation.

Click [HERE](#) for documentation only.

The package is used in [our training courses](#).

Posted by [Karlheinz Schwarz](#) at 11:42 AM No comments:

Labels: [Beck IPC](#), [client](#), [Demo Kit](#), [Evaluation](#), [GOOSE](#), [hands-on Training](#), [HMS](#), [IEC 61400-25](#), [IEC 61850](#), [IXxAT](#), [MMS](#), [publisher](#), [seminar](#), [server](#), [subscriber](#), [SystemCorp](#), [Windows](#)

Sunday, April 23, 2017

Final Call for IEC 61850 Training Courses in May 2017 in Karlsruhe (Germany)

News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Sunday, April 23, 2017

Final Call for IEC 61850 Training Courses in May 2017 in Karlsruhe (Germany)

The following two training courses are just one (two) weeks away:

02.-05. May 2017, Karlsruhe/Germany:



Click [HERE](#) for details - and register as soon as possible.

09.-12. Mai 2017, Karlsruhe/Deutschland
[HIER](#) klicken - für Details zum Training in Deutsch

Posted by [Karlheinz Schwarz](#) at 7:07 AM [No comments:](#) 

Labels: [Beck Chip](#), [Fernwirktechnik](#), [hands-on Training](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [Profibus](#), [Profinet](#), [protection](#), [RTU](#), [SCADA](#), [seminar](#), [SystemCorp](#), [Training](#)

Thursday, April 20, 2017

Dubai (UAE): NEW IEC 61850 Seminar for Protection, Control, and Generation

You are invited to register for one of the **world leading IEC 61850 Seminars for Protection, Control, and Generation** to be conducted by

FMTTP, Al-Ojaimi, and NettedAutomation
in Dubai (UAE) at the Sheraton Dubai Mall of the Emirates
11-13 July 2017

With the focus on protection and control in **HV/MV substations, power generation (PV, Wind, DER, Hydro), distribution systems** using Client/Server, GOOSE, SV, SCADA and SCL Language covering:

- IEC 61850 / IEC 61400-25 Introduction (Edition 1, 2, and 2.1) and experience after more than 10 years in operation. Where are we today?
- Return of experience, applications and practical demonstrations:
- Protection and Control in Substation Automation
- Engineering and Configuration
- Maintenance
- Monitoring and SCADA system
- Specification of the IEC 61850 protection and control system.
- Through the practical demonstrations, you will learn:
- To handle IEC 61850 relay protections from different vendors and their software tools; to be able to efficiently manage flexibility in engineering and interoperability.
- To use the state of the art IEC 61850 testing tools and equipment to efficiently detect the technical problems and work-out their solutions.
- To understand SCL files, setup clients and servers for MMS communication to SCADA and RTU Systems
- All the presentations are supported by practical examples or demonstrations.

Who should attend?

- Protection and Electrical Engineers (protection, control, engineering, SCADA, asset

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

For your Convenience

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[Blog as single PDF until 08 April 2016 \[14 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

Subscribe To IEC 61850 News Update









Blog Archive

- ▼ 2017 (21)
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 - [Final Call for IEC 61850 Training Courses in May 2...](#)
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 - [HMS Smart Grid Gateways Are Now IXXAT SG Gateways](#)
 - [FDIS for IEC 62351-7 published - Network and Syste...](#)
 - [IEC SC 65C Published 5,000+ Pages of New Fieldbus ...](#)
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 - January (3)
- 2016 (110)
- 2015 (94)
- 2014 (129)

- managers)
- System integrators
- Product managers of vendors
- R&D engineers
- Maintenance personnel
- Experts responsible for network infrastructure

Click [HERE](#) for program and registration information.
Click [HERE](#) for other training opportunities.

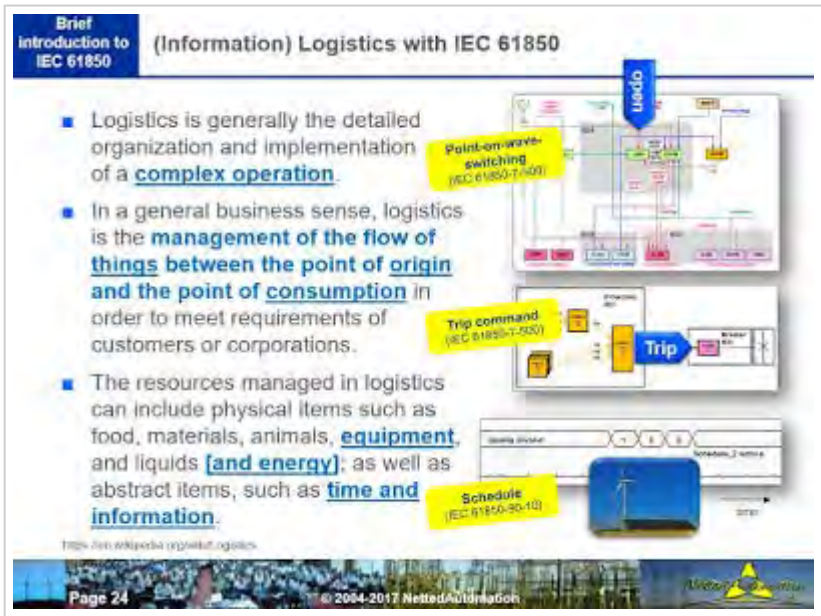
Posted by [Karlheinz Schwarz](#) at [12:34 AM](#) [No comments:](#) 

Labels: [diagnosis](#), [engineering](#), [IEC 61850](#), [maintenance](#), [MMS](#), [power generation](#), [protection](#), [PV](#), [RTU](#), [SCADA](#), [SCL](#), [security](#), [seminar](#), [Substation](#), [testing](#), [Training](#), [wind power](#)

Monday, April 17, 2017

What is a Function in IEC 61850?

The term "**Function**" is used in a variety of flavors throughout the standard series IEC 61850. If you ask five experts, you may get six answers.
IEC TC 57 has proposed (57/1863/DC) to develop a new Technical report IEC 61850-6-100: "SCL Function Modelling for Substation Automation"
A "function" is more or less a synonym for operation or action ... as described in [Wikipedia](#):
"A function model or functional model in systems engineering and software engineering is a structured representation of the **functions (activities, actions, processes, operations)** within the modeled system or subject area."
In my seminars I compare IEC 61850 with Logistics:



IEC 61850 defines simple and more and more complex functions. A schedule according to IEC 61850-90-10 defines a set of quite complex (or comprehensive) functions. In most cases the functions defined by IEC 61850 are just functional components that are used as bricks to build a comprehensive application function.
The brick-concept of IEEE 1550 (UCA 2.0) indicated the use of the standard models: the Bricks (which are now the Logical Nodes in IEC 61850).
IEC 61850-7-2 **Services define functions (called services)** that provide information logistics, e.g., for accessing the device information model, allow exchange of any value made available by a device based on events for real-time and non-real-time applications, or services for controlling a controllable item like a circuit breaker or a fan.
Functions may be composed using the standard IEC 61499 (Function blocks) as described in the following papers:
V. Vyatkin, G. Zhabelova, N. Higgins, K. Schwarz, and N.-K. C. Nair, [Towards intelligent smart grid devices with IEC 61850 interoperability and IEC 61499 open control architecture](#), IEEE Conference on Transmission and Distribution, New Orleans, April, 2010
N. Higgins, V. Vyatkin, N. Nair and K. Schwarz, "[Intelligent Decentralised Power Distribution Automation with IEC 61850, IEC 61499 and Holonic Control](#)", IEEE Transactions on Systems, Machine and Cybernetics, Part C, 40(3), 2010,
J. Xu, C.-W. Yang, V. Vyatkin, S. Berber, [Towards Implementation of IEC61850 GOOSE Messaging in IEC61499 Environment](#), IEEE Conference on Industrial Informatics (INDIN'13), Bochum, July 29-31, 2013
Click [HERE](#) for more papers.

More to come ... stay tuned to this blog!

Posted by [Karlheinz Schwarz](#) at [1:48 AM](#) [No comments:](#) 

Labels: [distribution automation](#), [Functionblock](#), [Functions](#), [IEC 61499](#), [IEC 61850](#), [logical node](#), [logistics](#), [operate](#), [SCL](#)

Thursday, April 13, 2017

HMS Smart Grid Gateways Are Now IXXAT SG Gateways

The **HMS Smart Grid Gateways** (supporting a wide range of standards like IEC 60870-5-104, IEC 61850, Modbus TCP/IP, ...) are now marketed by HMS under the HMS brand **IXXAT**

- [2013](#) (130)
- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

Energy SG Gateways.
IXXAT SG-gateways...

- enable easy remote control and management of electrical systems
- allow to log and display application data and energy consumption
- provide IEC61850 client/server (publisher/subscriber) and IEC60870-5-104 client/server support
- have in-built Modbus TCP client and Modbus RTU Master interfaces
- provide connectivity for I/O, M-Bus, PROFIBUS, PROFINET and EtherNet/IP based devices

Click [HERE](#) for more details [EN]
Click [HERE](#) for more details [DE]

Posted by [Karlheinz Schwarz](#) at [10:22 PM](#) [No comments:](#) 

Labels: [Gateway](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [IXXAT](#), [Modbus-TCP](#), [Profibus](#), [Profinet](#), [RTU](#)

Friday, April 7, 2017

FDIS for IEC 62351-7 published - Network and System Management (NSM) data object models

IEC TC 57 has just published the 232 page FDIS (57/1857/FDIS) of the part IEC 62351-7 for final vote:

Power systems management and associated information exchange –
Data and communications security –
Part 7: Network and System Management (NSM) data object models

The vote closes 2017-05-12.

"This part of IEC 62351 defines network and system management (NSM) data object models that are specific to power system operations. These NSM data objects will be **used to monitor the health of networks and systems, to detect possible security intrusions, and to manage the performance and reliability of the information infrastructure**. The goal is to define a set of abstract objects that will allow the remote monitoring of the health and condition of IEDs (Intelligent Electronic Devices), RTUs (Remote Terminal Units), DERs (Distributed Energy Resources) systems and other systems that are important to power system operations. ... The NSM objects provide monitoring data for IEC protocols used for power systems (IEC 61850, IEC 60870-5-104) and device specific environmental and security status. As a derivative of IEC 60870-5-104, IEEE 1815 DNP3 is also included in the list of monitored protocols. The NSM data objects use the naming conventions developed for IEC 61850, expanded to address NSM issues. For the sake of generality these data objects, and the data types of which they are comprised, are defined as abstract models of data objects."

The document comprises many useful information objects related to devices and communication security issues like:

Intrusion detection systems (IDS)
Passive observation techniques
Active security monitoring architecture with NSM data objects

End-to-end security
End-to-end security concepts
Role of NSM in end-to-end security

NSM requirements
Detecting unauthorized access
Detecting resource exhaustion as a denial of service (DoS) attack
Detecting invalid buffer access DoS attacks
Detecting tampered/malformed PDUs
Detecting physical access disruption
Detecting invalid network access
Detecting coordinated attacks

Posted by [Karlheinz Schwarz](#) at [9:42 PM](#) [No comments:](#) 

Labels: [DNP3](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 62351-7](#), [Network Management](#), [security](#), [system management](#)

Saturday, April 1, 2017

IEC SC 65C Published 5,000+ Pages of New Fieldbus Editions (IEC 61158)

IEC SC 65C (subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation) has published **5,000+ pages** with the following documents **available for [PUBLIC](#)**

comments (<http://www.iec.ch/comment>):

1. 65C/864A/CDV ([77 pages](#))
IEC 61158-1 ED2: Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series
2. 65C/865A/CDV ([219 pages](#))
IEC 61158-3-X ED4: Industrial communication networks - Fieldbus specifications - Part 3 - X: Data-link layer service definition - Type X elements
3. 65C/866A/CDV ([1,445 pages](#))
IEC 61158-4-X ED4: Industrial communication networks - Fieldbus specifications - Part 4 - X: Data-link layer protocol specification - Type x elements
4. 65C/867A/CDV ([1,721 pages](#))
IEC 61158-5-X ED4: Industrial communication networks - Fieldbus specifications - Part 5-X: Application layer service definition - Type X elements
5. 65C/868A/CDV ([2,205 pages](#))
IEC 61158-6-X ED4: Industrial communication networks - Fieldbus specifications - Part 6-X: Application layer protocol specification - Type X elements
6. 65C/869/CDV
IEC 61918 ED4: Industrial communication networks - Installation of communication networks in industrial premises

There are many other documents that are part of this standard series.
Take your time to comment on these documents.

What's about interoperability? Read what part 1 says in clause 4.2:

"Most of the fieldbus types specified in the IEC 61158 series include a range of selectable and configurable options within their detailed specifications. **In general, only certain restricted combinations of options will interwork or interoperate correctly.**"

It seems like an April fool' s joke - BUT, NO, IT IS REALLY TRUE.

Posted by [Karlheinz Schwarz](#) at 11:03 AM No comments: 

Labels: [EtherCAT](#), [EthernNet/IP](#), [fieldbus](#), [IEC 61158](#), [IEC 61850](#), [interoperability](#), [Profibus](#), [Profinet](#)

Thursday, March 23, 2017

ASCII Text, XML, SCL, Models, and Errors All Over

IEC 61850 makes use of ASCII text, XML, SCL, and comprehensive Information Models. At any level you may find errors. How to figure out, e.g., if a DataSet member references a FCDA that is not available in any Logical Node model?

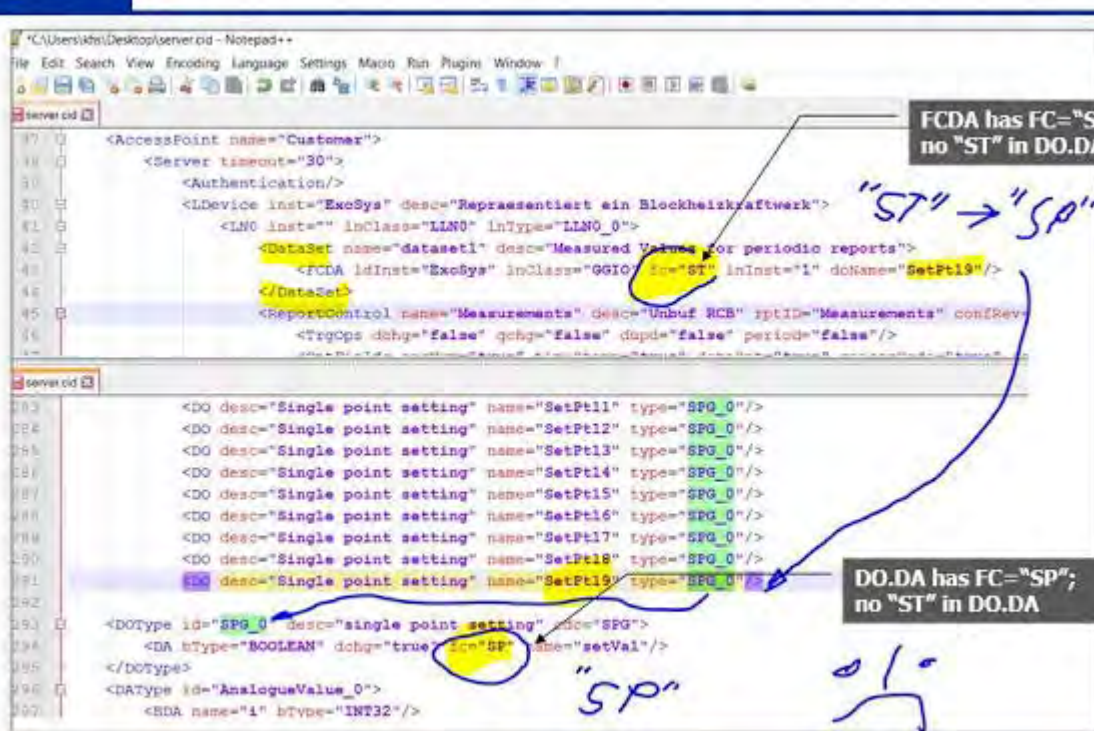
I run through the following inconsistency:

There is a DType "SPG_0" defined that contains a **fc="SP"** (bottom).

The DO "SetPt19" uses this DType with **fc="SP"** (above)

The marked DataSet member FCDA refers to DO "SetPt19" with **fc="ST"**.

Use of SCL Files
(8) Plausibility/verification, check if system is able to run



FCDA has FC="ST"; no "ST" in DO.DA

"ST" -> "SP"

DO.DA has FC="SP"; no "ST" in DO.DA

SP

2016-09-20

Page 21
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This reference is not correct - there is **no DO "SetPt19" with fc="ST"** !! How does a stack react when it has to parse such a wrong model? Hmm!

It took me some time to figure out what the issue was when I loaded the file onto a HMS Gateway with WEB-PLC:

Use of
SCL Files

(8) Plausibility/verification, check if system is able to run

The following tools did not care about the error:

Only the stack from SystemCorp reported the error:

WEB-PLC – Settings

Anybus

Event Log Settings Update Export

Event Log

The following list shows event messages produced by the device. Note that the messages are stored in a ring queue, i.e. when the queue is completely filled, new messages will overwrite the oldest messages.

Timestamp	Message
20.09.2016 16:04:46	IEC 61850 driver: Error loading SCL file. Error code: -26. Error string: The Functional Constrained Data Attribute in the dataset cannot be found. Failing back.

2016-09-20

Page 22

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NettedAutomation

In the meantime I have checked the wrong file with six (well known) IEC 61850 tools - NONE of them complained about this inconsistency.


The SystemCorp stack complained, because it was not able to find the referenced object to implement the model! WOW!

This example confirms what I always tell people in my courses: Develop your own simple tools for finding errors in the "ASCII Text" - it is just a simple search you need ... I am not saying that the many tools on the market are useless!! No way! But many simple checks could be done with simple tools. Even tool developer may not have a clue what kind of checks would be helpful.

In this case it would have been quite easy to check (ASCII search and comparison) all members of all DataSets and check in the Logical Node models if there is a DataObject that matches with the reference in the DataSet. Such a ASCII text search would have resulted in something like: Did not find an fc="ST" for the object "SetPt19".

It is that easy! Believe me.

My experiences with this and many other issues are one of the core topics in my courses. Click [HERE](#) for courses in German in Karlsruhe/Germany.

Posted by [Karlheinz Schwarz](#) at 6:05 AM No comments: 

Labels: [ASCII](#), [consistency checks](#), [education](#), [IEC 61850](#), [Object model](#), [SCL](#), [seminar](#), [tools](#), [Training](#), [validation](#), [XML](#)

Wednesday, March 22, 2017

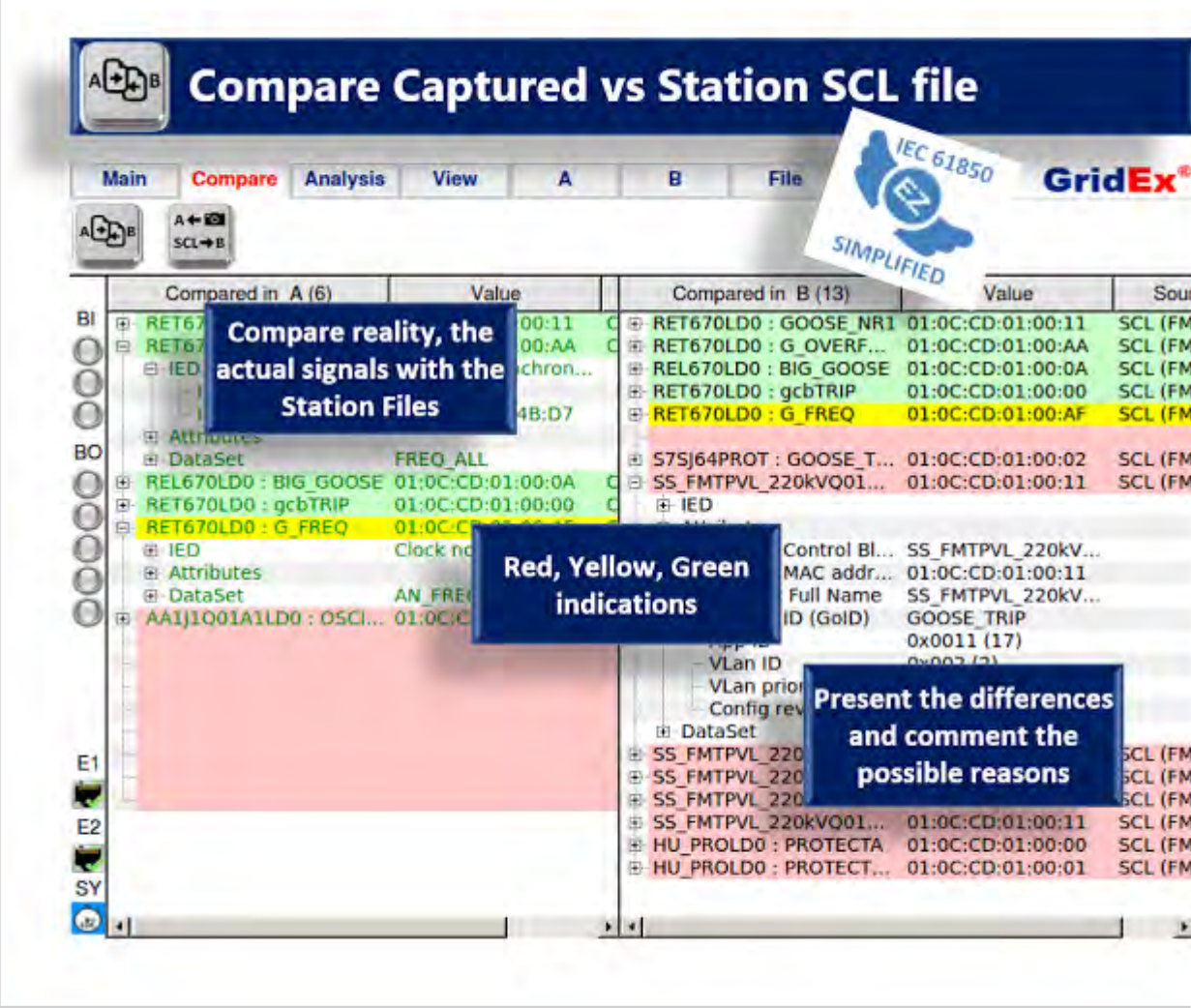
GridEx: The Smart Tool to Test Your IEC 61850 Network

FMTP (From Minus to Plus, Sweden) has gained a lot of positive feedback from experts using the GridEx Tool around the globe. GridEx built-in intelligence based on 30 years combined field experience in Protection Control with IEC 61850.

The new Test Tool looks very ruggedized:



The standalone tool provides many very crucial functions for simplifying the test and operation of automation systems based on IEC 61850. Here is one example function:



Click [HERE](#) for more details on the GridEx.

Posted by [Karlheinz Schwarz](#) at 6:48 AM No comments:

Labels: [FMTP](#), [GOOSE](#), [IEC 61850](#), [sampled value](#), [testing](#), [trouble shooting](#)

CD published: Conformance Test Cases for the IEC 62351-5

IEC TC 57 just published a 110 page crucial document on security testing (57/1852/CD):

IEC TS 62351 - Data and communications security -
Part 100-1: Conformance test cases for the IEC 62351-5 and its companion standards for secure data exchange communication interfaces

Comments are welcome by 2017-06-09

The scope is to specify common available procedures and definitions for conformance and/or interoperability testing of the IEC/TS 62351-5 (Security for IEC 60870-5 and derivatives), the IEC/TS 60870-5-7 and also their recommendations over the IEC 62351-3 for profiles including TCP/IP. These are the security extensions for IEC 60870-5 and derivatives to enable unambiguous and standardised evaluation of IEC/TS 62351-5 and its companion standards protocol implementations.

Posted by [Karlheinz Schwarz](#) at [12:40 AM](#) [No comments:](#) 

Labels: [conformance test](#), [iec 60870-5](#), [IEC 62351](#), [security](#), [TCP/IP](#), [testing](#)

Tuesday, March 21, 2017

BIG Data, Smart Data, or Fake Data

Do you trust the process data you rely on for decisions to be made for many different applications? Hmm! It may be - I hope you could trust the data.

BBC just published a crucial paper with the title:
"How fake data could lead to failed crops and other woes"

Click [HERE](#) for the paper.

I guess this has been said many times - not yet by everybody.
What is most important: You have to do something to protect the data you (or your device) produce - so that the receiver can trust that the data are not FAKE data.

Maybe we extend the quality details defined in IEC 61850-7-3:

overflow
outOfRange
badReference
oscillatory
failure
oldData
inconsistent
inaccurate
fake (extended)

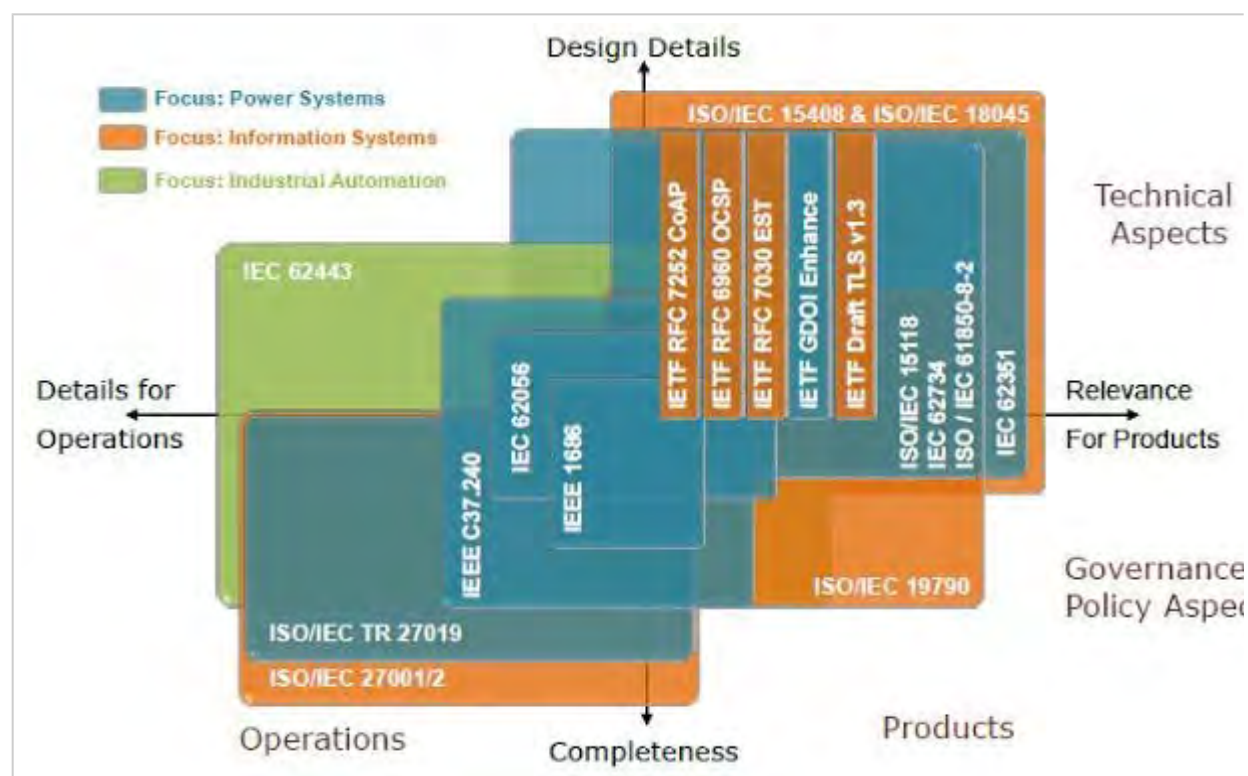
I am kidding ... sure.

Do you know that IEC 61850 does not define any measure to protect the data while they are on rest or travel? It's true - no crucial definitions on security. This is intended.
The series IEC 62351 defines many very crucial measures and describes how to apply them to power systems and IEC 61850 refers to IEC 62351:

IEC/TS 62351 - Power systems management and associated information exchange - Data and communications security:

- Part 1: Introduction to security issues
- Part 2: Glossary of terms
- Part 3: Profiles Including TCP/IP
- Part 4: Security for profiles including MMS
- Part 5: Security for IEC 60870-5 and derivatives
- Part 6: Security for IEC 61850 profiles
- Part 7: Objects for Network Management
- Part 8: Role-Based Access Control
- Part 9: Key Management
- Part 10: Security Architecture
- Part 11: Security for XML Files
- Part 12: Resilience and Security Recommendations for Power Systems with DER
- Part 13: Guidelines on what security topics should be covered in standards and specifications

Check an overview from part 13:



Click [HERE](#) for the source of published parts of IEC 62351.
An excellent source of hints in German can be found at [GAI NetConsult \(Berlin\)](#).

You should do more than buying and reading the various parts of IEC 62351 - You should implement many of the crucial measures defined in these documents,

Good luck!

Posted by [Karlheinz Schwarz](#) at 9:09 AM No comments: 

Labels: [Cyber Security](#), [DNP3](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 62351](#), [security](#), [TASE.2 ICCP](#), [XML](#)

Wednesday, March 8, 2017

Who can tell you what IEC 61850 really is?

Has ever someone learned what IEC 61850 really provides from product presentations of vendors? Maybe to some extent?

How do people understand and learn what the standard series IEC 61850 really offers to the protection, automation and supervision of energy systems and what this all means for their application (as vendor, user, consultant, ...)?

A bit by reading power point presentations and papers ... and listen to presentations ... and to some extent by attending presentations and hands-on exercises conducted by equipment and tool vendors.

Is this enough?

If you are happy with the products - without understanding how far IEC 61850 is really implemented - then you could go and ... quite **often at the end of the day you may learn that you got far to less**



or far too much compared to what the standard would provide for your needs:



You need more vendor-independent information and experience from long-term experts like Andrea Bonetti (FMTP) or Karlheinz Schwarz (SCC). Sure, any demonstration or hands-on exercise of any IEC 61850 feature requires products like the great IEDScout of Omicron or ... BUT: the products implement just a fraction of what IEC 61850 is all about.

If you want to learn the Philosophy of IEC 61850 and compare it with the many different other approaches like IEC 60870-5-104, or other products, then **you need independent information and experience**. And finally you need to understand how the product X of vendor A compares to the product Y from vendor B.

To meet two of the **most experienced experts** and **discuss with them** your needs, doubts and complains, ... please register for the next training courses in Stockholm next week or in Karlsruhe in May.

Click [HERE](#) for the details of seminars in German.

Click [HERE](#) for the courses in English.

See you soon.

After the education of more than 4,000 attendees I know what people need ... and what they get by vendor-driven "education".

Posted by [Karlheinz Schwarz](#) at 3:52 AM [No comments:](#)

Labels: [DNP3](#), [education](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61850](#), [Omicron](#), [protection](#), [seminar](#), [testing](#)

Saturday, March 4, 2017

XMPP, XML, and MMS: Two New TC 57 CDVs available for Public Comments

IEC TC 57 has published the following two CDV documents and **allows you access** to them:

57/1823/CDV

IEC 61850-8-1/AMD1 ED2: Amendment 1 - Communication networks and systems for power utility automation - Part 8-1: Specific communication service mapping (SCSM) - **Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3**

57/1833/CDV

IEC 61850-8-2 ED1: Communication networks and systems for power utility automation - Part 8-2: Specific communication service mapping (SCSM) - **Mapping to Extensible Messaging Presence Protocol (XMPP)**

You can study these two documents and provide comments.

Click [HERE](#) for the access (need to register only).

XMPP is used here to transport the XML message payloads between IEC 61850 server and client. The main contents of the messages are **MMS messages (defined in ASN.1) and encoded with ASN.1 XER** (XML encoding rule) - instead of ASN.1 BER (basic encoding rule).

Example (excerpt):

```
<mmsServices>
  <confirmed-RequestPDU>
    <invokeID>778</invokeID>
    <ConfirmedServiceRequest>
      <read>
        ...
```

Quite interesting. Most of what you have understood of MMS (subset used in IEC 61850-8-1) is applicable for 8-2 as well.

Click [HERE](#) for an introduction to ASN.1 and a discussion of why we need encoding rules.

Posted by [Karlheinz Schwarz](#) at 9:29 AM [No comments:](#)

Labels: [ASN.1](#), [BER](#), [Encoding](#), [IEC 61850](#), [IEC 61850-8-1](#), [iec 61850-8-2](#), [iso 9506](#), [MMS](#), [Web Service](#), [XER](#),

[XMPP](#)

Wednesday, March 1, 2017

IEC TC 57 and WG 10 in Figures

IEC TC 57 Working Group 10 "Power system IED communication and associated data models" met last week in Geneva (Switzerland) at the IEC central office.
Mr. Charles Jacquemart (IEC Technical Officer) presented some very interesting figures about the TC 57 and especially WG 10. The following slides are published here with the permission of Mr. Jacquemart.

TC 57 History:

IEC Technical Committee 57

- Set up in 1964 under the title "Line traps"
- Current title: "Power systems management and associated information exchange"
- IEC TC 57 has come a long way since its creation in 1964, under the title "Line traps", to its current position as one of the most visible IEC TCs, under the title "Power systems management and associated information exchange"
- Number of valid publications (IEC IS, TS, TR): 166
- Number of active projects in the programme of work, including PWIs (Preliminary Work Items): 65

IEC TC 57 WG 10 meeting 2017-02, Geneva

IEC

Crucial Publications:

Most important TC 57 publications
(short titles) (status 2017-02) (1/2)

- IEC 60870, Telecontrol protocols
- IEC 61334, Distribution automation using distribution line carrier systems
- IEC 61850, Communication networks and systems for power utility automation
- IEC 61968, Application integration at electric utilities
- IEC 61970, Energy management system application program interface (EMS-API)

IEC TC 57 WG 10 meeting 2017-02, Geneva

IEC

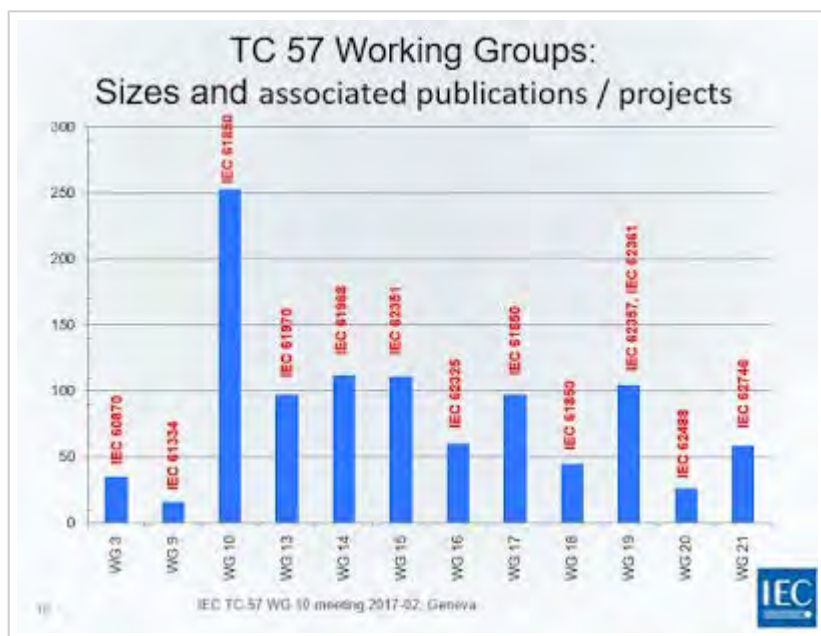
Most important TC 57 publications
(short titles) (status 2017-02) (2/2)

- IEC 62325, Framework for energy market communications
- IEC 62351, Data and communications security for power systems management
- IEC 62357, Reference architecture
- IEC 62361, Interoperability in the long term
- IEC 62488, Power line communication systems
- IEC 62746, Systems interface between customer energy management system and the power management system

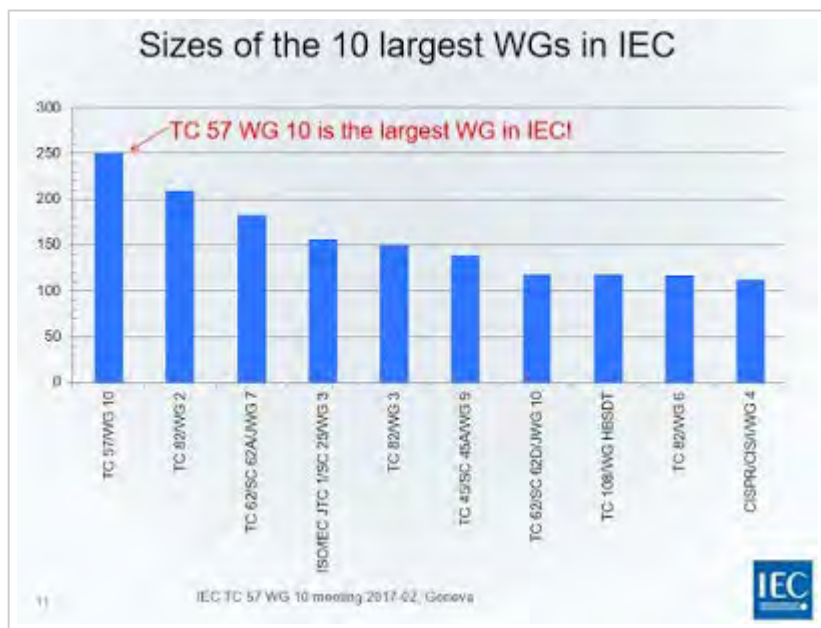
IEC TC 57 WG 10 meeting 2017-02, Geneva

IEC

Various TC 57 Working Groups (250 members in WG 10!!):



IEC TC 57 WG 10 is the LARGEST WG in the whole IEC!!



Sales of IEC 61850 standards:



You are right, IEC 61850 is one of the most crucial standard series in IEC and also in the market of power systems!
More to come!

Posted by [Karlheinz Schwarz](#) at 6:12 AM [No comments:](#)

Labels: [electric power system](#), [IEC](#), [IEC 61850](#), [IEC TC 57](#), [IEC TC 57 WG10](#)

Wednesday, February 22, 2017

Read One of the Best Papers on IEC 61850 ever Published

Eric A. Udren (a friend of mine) from Quanta Technology, LLC of Raleigh, North Carolina has written one of the best papers on the application of IEC 61850 in general and in the USA I ever read:

What Drives the Business Case for IEC 61850?

published in the December 2016 issue of the PAC World magazine.

This paper summarizes the experience of more than 10 years with the application of the standard series IEC 61850. It is a very easy to read and understand [summary of the content of my training courses](#). After more than 230 training courses I conducted globally since 2003 and more than 4,200 experts educated in these courses I fully agree with the crucial recommendations of the paper:

Eric states at the very beginning (3rd sentence!): " ... one must first understand that IEC 61850 is not just a communications protocol." Well said. He lists many crucial facets.

The main part of Eric's conclusion is [highlights are added by myself]:

"The following action items can help the utility to achieve technical success and lowest life cycle costs:

- **Develop requirements** for and relationships with product vendors, who must commit to support interoperable and sustainable products and designs over the service life of the PAC design.
- Apply the **sustainable design principles** of the previous sections. If some of these seem unfamiliar, **get expert help** from vendors and from vendor-independent industry experts with experience in PAC system design and integration.
- **Create strong, rigid design standards**; develop broadly useable documentation for new PAC design features like network configuration, data flows, and GOOSE messaging connections of functional points.
- Set up rigid **documentation and configuration management systems**. With IEC 61850, much of the PAC design is no longer evident in the physical installation – this managed design information is the only tool to maintain the system.
- Create a **development laboratory** to validate the performance of the design. Keep the laboratory throughout the installation life to train personnel, to troubleshoot bugs that arise in the field, and to test new product or firmware insertions in the existing design before authorizing those for field use.
- **Develop and run training programs** for field maintenance personnel, including hands-on participation and feedback during the design and laboratory test phases.
- **Develop and run training programs** for other enterprise stakeholders, including system planning, capital planning, purchasing, and operations teams.
- After the pilot or trial phase, plan a crisp **organizational transition** to the new design at the fastest sustainable rate."

Click [HERE](#) to access the paper for free.


There have been a lot of misleading and strange statements on the benefits of IEC 61850 communicated ... trust the real experts like Eric Udren ...

One of the real show-stoppers of a beneficial application is the lack of education of many engineers. We offer the right experience and knowledge for your people to harvest the benefits of the application of IEC 61850 and other standards:

Click [HERE](#) for the latest announcements of courses in German.

Click [HERE](#) for the latest announcements of courses in English.

I look forward meeting you in one of the public courses or in an inhouse seminar. Peopleware is one of the most crucial issues in future energy systems.

Posted by [Karlheinz Schwarz](#) at [1:26 AM](#) [No comments:](#) 

Labels: [configuration language](#), [education](#), [energy management](#), [hands-on Training](#), [iec 60870-5](#), [IEC 61850](#), [peopleware](#), [SCL](#), [seminar](#), [Smart Grid](#), [smart metering](#), [USA](#)

Thursday, February 16, 2017

IEC-61850-Seminare in Deutsch (Mai und Dezember 2017)

NettedAutomation GmbH bietet in 2017 zwei IEC-61850-Seminare **zu unschlagbaren Preisen** in Karlsruhe an:

09.-12. Mai 2017

05.-08. Dezember 2017

Die drei (3) Blöcke (1 Tag + 2 Tage + 1 Tag) können einzeln oder in Kombination gebucht werden. Sie entscheiden selbst, ob Sie nur einen Tag von Ihrem Arbeitsplatz fern bleiben möchten oder zwei, drei oder vier. Je nachdem, wieviel Zeit Sie investieren wollen oder können und welchen Bedarf Sie haben.

Lernen Sie, wie über 4.000 Teilnehmer vor Ihnen, was IEC 61850 und andere Normen wie IEC 60870-5-10x oder IEC 62351 (Security) bedeuten. Gewinnen Sie einen Einblick in relevante Realisierungen wie die FNN-Steuerbox oder VHPready, die auf IEC 61850 aufbauen. Verstehen Sie, wie Feldbusse über kostengünstige Gateways in die Anlagen eingebunden werden können.

[HIER klicken](#), um zur Beschreibung und den Anmeldeunterlagen zu gelangen [pdf, 430 KB].

Beachten Sie auch, dass die meisten Seminare als Inhouse-Kurse stattfinden! Falls Sie Interesse an einem Inhouse-Kurs (in deutsch, englisch, italienisch oder schwedisch) haben sollten [kontaktieren Sie uns bitte!](#)

Posted by [Karlheinz Schwarz](#) at [9:16 AM](#) [No comments:](#) 

Labels: [FNN-Steuerbox](#), [Gateway](#), [HMS](#), [iec 60870-5](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [VHP Ready](#), [VHPready](#)

IEC TC 57 has Published Several New Documents

IEC TC 57 has published several new documents related to IEC 61850 and IEC 62351 (Security):

(57/1840/RVC)

IEC 61850-7-3: Amendment 1 - Communication networks and systems for power utility automation - Part 7-3: Basic communication structure - Common data classes
The amendment has been accepted with 100 % in favour

(57/1838/FDIS)

IEC 62351-9: Data and communications security –
Part 9: Cyber security key management for power system equipment
voting closes 2017-03-17

(57/1835/RVN)

Communication networks and systems for power utility automation - Part XXX: System management for IEC 61850 (proposed **IEC 61850-XXX TS**)
The new work item proposal has been accepted with 100 % in favour

(57/1834/RVN)

IEC 61850-7-7: Basic communication structure – Machine-processable format of IEC 61850-related data models for tools
The new work item proposal has been accepted with almost 100 % in favour

Posted by [Karlheinz Schwarz](#) at 8:45 AM [No comments:](#) 

Labels: [common data classes](#), [Cyber Security](#), [IEC 61850](#), [IEC 62351-9](#), [system management](#)

Tuesday, February 14, 2017

Seminar on Protection and Control in Stockholm (13-17 March 2017)

FMTP, KTH, OPAL RT, and NettedAutomation offer a very comprehensive training course on IEC 61850 and related standards at the FMTP Office Vingvägen 4:

190 60 Stockholm-Arlanda (Airport)
13-17 March 2017

Note that the same seminar will be conducted in Karlsruhe (Germany) on 02-05 May 2017 !!

Click [HERE](#) for details.

FMTF POWER & NETTEDAUTOMATION

Seminar contents:

- **Introduction on the IEC 61850 Standard** (Edition 1, 2, and 2.1) and experience after 10 years in operation. Where are we today?
- **Smart Grid and IEC 61850.**
Status of Smart Grid in Nordic Countries
Role of IEC 61850 in Smart Grid systems
Role of the Communication Structure in Smart Grid systems
- **Substation Automation and IEC 61850.**
Application of IEC 61850 standard in Substation Automation: SCL Language, protection dependability and security, real time performance and requirements, specification and engineering processes, commissioning and maintenance testing.
- **Return of experience, applications and practical demonstrations:**
 - Protection and Control in Substation Automation
 - Engineering and Configuration
 - Commissioning and Maintenance
 - Monitoring and SCADA system
 - Specification of the IEC 61850 protection and control system.



Through the practical demonstrations the participants will learn:

- To handle **IEC 61850 relay protections from different vendors** and their software tools; to be able to efficiently manage flexibility in engineering and interoperability.
- To use the **state of the art IEC 61850 testing tools and equipment** to efficiently detect the technical problems and work-out their solutions.
- To **understand SCL files, setup clients and servers for MMS communication** to SCADA and RTU Systems
- To use vendors and third party IEC 61850 Engineering tools to **Specify, Configure and Document** Substation Automation Systems
- Group Practical Exercises with PC and Hardware and Software tools
- IEC 61850 Real time system simulation and IEC 60255 |



Click [HERE](#) for details.

Posted by [Karlheinz Schwarz](#) at [10:41 AM](#) [No comments:](#)

Labels: [configuration language](#), [control](#), [education](#), [engineering system](#), [hands-on Training](#), [Helinks](#), [IEC 61400-25](#), [IEC 61850](#), [KTH](#), [network analyzer](#), [OPAL RT](#), [protection](#), [SCADA](#), [seminar](#), [testing](#), [Training](#)

Thursday, February 2, 2017

Wind Energy Generation Systems - About to Use and Extend SCL

IEC TC 88 (Wind energy generation systems) has just published a new work item proposal for the series IEC 61400-25 (Communications for monitoring and control of wind power plants):

(88/621/NP):

Part 25-7: Communications for monitoring and control of wind power plants – Configuration description language for communication in wind automation systems related to IEDs

The voting closes 2017-04-21.

The scope of this NWIP is to describe the adoption of the System Configuration description Language (SCL) defined in IEC 61850-6 to the wind domain.

Posted by [Karlheinz Schwarz](#) at [8:31 AM](#) [No comments:](#)

Labels: [configuration language](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 651400-25-7](#), [SCL](#), [system configuration](#), [wind power](#)

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WEITERE INFORMATIONEN OK

Tuesday, January 17, 2017

Animal "Attacks" on Power Systems - Worry About Squirrels

BBC news has published an interesting report on "Squirrel 'threat' to critical infrastructure".

According to the report "The real threat to global critical infrastructure is not enemy states or organisations but squirrels, according to one security expert. Cris Thomas has been tracking power cuts caused by animals since 2013. Squirrels, birds, rats and snakes have been responsible for more than 1,700 power cuts affecting nearly 5 million people, he told a security conference."

Click [HERE](#) to read the report.

Posted by [Karlheinz Schwarz](#) at 9:51 PM [No comments:](#) 

Labels: [critical infrastructure](#), [power outage](#)

Are You Looking for Authenticated Encrypted Time Signals?

GPS-based time signals could be less robust and reliable - this has been discussed in various forums. Electric power systems rely on time synchronization you can trust.

In a new US DOE project (TASQC - Timing Authentication Secured by Quantum Correlations) experts are planning to develop authenticated encrypted time signals that mitigate known vulnerabilities in GPS-based time. The project aims to:

- Develop and demonstrate a secure time distribution system using quantum-correlated signals over geographically wide area;
- Develop and demonstrate protocols for time-stamp authentication for data reported from power systems;
- Expand capability of the developed infrastructure for secure authentication of broadcast messages;
- Evaluate the system for cyber- and physical-vulnerabilities;
- Partner with industry to develop timing requirements for power systems and to refine design of system and protocols.

Phil Evans, Ph.D., TASQC Principle Investigator, Oak Ridge National Laboratory, respectfully requests your assistance for the TASQC project by both [answering the questions in a brief survey](#), and distributing it amongst your colleagues in the electric power industry.

Posted by [Karlheinz Schwarz](#) at 9:40 PM [No comments:](#) 

Labels: [GPS](#), [real-time](#), [time stamp](#), [time synchronization](#)

Saturday, January 14, 2017

IEC TC 57 Published Several New IEC 61850 Documents

IEC TC 57 has published several new documents of the standard series IEC 61850 (Communication networks and systems for power utility automation):

57/1832/CD
IEC 61850-2: Glossary [57 pages]
Comments are required by 2017-04-07

57/1829/CD
IEC 61850-80-5: Guideline for mapping information between IEC 61850 and IEC 61158-6 (Modbus) [45 pages]
Comments are required by 2017-04-07

57/1828/RVC
IEC 61850-7-2 A1 Ed.2: Abstract communication service interface (ACSI)
The CDV has been accepted.

Posted by [Karlheinz Schwarz](#) at 3:01 AM [No comments:](#) 

Labels: [ACSI](#), [IEC 61850](#), [IEC 61850-2](#), [IEC 61850-7-2](#), [IEC 61850-80-5](#), [Modbus](#)

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

For your Convenience

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[Blog as single PDF until 08 April 2016 \[14 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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[Dubai \(UAE\): NEW IEC 61850 Seminar for Protection,...](#)

[What is a Function in IEC 61850?](#)

[HMS Smart Grid Gateways Are Now IXXAT SG Gateways](#)

[FDIS for IEC 62351-7 published - Network and Syste...](#)

[IEC SC 65C Published 5,000+ Pages of New Fieldbus ...](#)

► March (7)

► February (5)

► January (3)

► 2016 (110)

► 2015 (94)

► 2014 (129)

Saturday, December 24, 2016

DTR IEC 61850-7-500: How to use IEC 61850 for SAS

IEC TC 57 has published a Draft Technical Report (57/1817/DTR; 84 pages) with guidelines on how to apply IEC 61850 for substation automation:

Communication networks and systems for power utility automation –
Part 7-500: Basic information and communication structure – Use of logical nodes for modeling application functions and related concepts and guidelines for substations

Voting closes 2017-02-17

This is a document that you **MUST read** when you are involved in substation automation.

This Technical Report of IEC 61850 describes the use of the information model for devices and functions of IEC 61850 in applications in substation automation systems but it may be used as informative input also for the modeling of any other application domain. In particular, it describes the use of compatible logical node names and data objects names for communication between Intelligent Electronic Devices (IED) for use cases. This includes the relationship between Logical Nodes and Data Objects for the given use cases. ...
Part 7-5 describes in examples the use of logical nodes for modeling application functions and related concepts and guidelines in general independently from any application domain respectively valid for all application domains in the electric power system (substation automation, distributed energy resources, hydro power, wind power, etc.). This part 7-500 describes in examples the use of logical nodes for application functions in substation automation including also line protection between substations. It implies also some tutorial material where helpful. But it is recommended to read parts IEC 61850-5 and IEC 61850-7-1 in conjunction with IEC 61850-7-3 and IEC 61850-7-2 first.

Posted by [Karlheinz Schwarz](#) at 1:53 AM No comments:

Labels: [IEC 61850](#), [IEC 61850-7-5](#), [iec 61850-7-500](#), [modeling method](#), [Object model](#), [Substation Automation](#)

New: Modelling of Logics for IEC 61850 Based Applications

IEC TC 57 has published a very interesting proposal (57/1814/DC; 49 pages) for modelling logics:

IEC TR 61850-90-11, Communication networks and systems for power utility automation –
Part 90-11: Methodologies for modelling of logics for IEC 61850 based applications

Comments are expected by 2017-02-03

This part of IEC 61850 describes the methodologies for the modelling of logics for IEC 61850 based applications in power utility automation. In particular, it describes the functional view of logic based on existing logical nodes for generic process automation and the operational modes of the logic. Furthermore it includes the specification of the standard language to be applied to specific the logic as well as the related data exchange format between engineering tools and their application as well as the mapping of logic elements to IEC 61850 data types.

The IEC 61131-3 PLC programming language is used to describe syntax of functions.

Example PLD (Programmable Logic Description): The PLD file contains the logic unit program code in PLC OpenXML format, representing the description of the logic programmable scheme that can then be mapped to a GAPC LN instance. Excerpt:



... more to come next year.

Posted by [Karlheinz Schwarz](#) at 1:43 AM No comments:

Labels: [Functions](#), [IEC 61131-3](#), [IEC 61850](#), [IEC 61850-90-11](#), [logic](#)

Guideline for definition of Basic Application Profiles (BAPs) using IEC 61850

IEC TC 57 has published a document for comments (57/1813/DC, 27 pages) on application profiles::

- [2013](#) (130)
- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Draft IEC TR 61850-7-6, Communication networks and systems for power utility automation –

Part 7-6: Guideline for definition of Basic Application Profiles (BAPs) using IEC 61850

Comments are expected by 2017-02-03

This guideline is focused on building Application / function profiles and specifies a methodology to define **Basic Application profiles (BAPs)**. These Basic Application profiles shall provide a framework for interoperable interaction within or between typical substation automation functions. BAPs are intended to define a subset of mandatory features of IEC 61850 in order to increase interoperability in practical applications.

In the context of standards the term “profile” is commonly used to describe a subset of an entity (e.g. standard, model, rules).


Accordingly an IEC 61850 standard profile contain a selection of data models (mandatory elements), communication services applicable and relevant engineering conventions (based on the Substation Configuration Language SCL defined in IEC 61850-6) for an application function of a specific use case in the domain of power utility automation.

Depending on the scope and objective different profile types can be distinguished:

- User profile – defined subset that is valid for a specific user / organization (e.g. utility)
- Product / Device profile – implemented subset in a specific vendor product /device
- Domain profile – defined subset for a specific domain and relevant use cases (e.g. monitoring of substation)
- Application / function profile

A nice example is contained in Annex A:

Example for BAP of distributed automation function “reverse blocking” using BAP template

Posted by [Karlheinz Schwarz](#) at [1:28 AM](#) [No comments:](#) 

Labels: [BAP](#), [IEC 61850](#), [IEC 61850-7-6](#), [profile](#)

CIM for Distribution Network Operations

IEC TC 57 has published the FDIS (57/1810/FDIS; 160 pages) of the future standard IEC 61968-3 Ed2:

Application integration at electric utilities - System interfaces for distribution management -

Part 3: Interface for network operations

Voting closes 2017-02-03

IEC 61968 provides utilities the means to supervise main substation topology (breaker and switch state) and control equipment status. It also provides the means for handling network connectivity and loading conditions. Finally, it makes it possible for utilities to locate customer telephone complaints and supervise the location of field crews.

IEC 61968-3 specifies the information content of a set of message payloads that can be used

to support many of the business functions related to network operations. Typical uses of the message payloads defined in IEC 61968-3 include **data acquisition** by external systems, **fault**

isolation, fault restoration, trouble management, maintenance of plant, and the commissioning of plant.

This part is closely related to the Common Information Model (CIM).

Posted by [Karlheinz Schwarz](#) at [1:14 AM](#) [No comments:](#) 

Labels: [CIM](#), [distribution automation](#), [IEC 61968](#)

Monday, December 19, 2016

Closing 2016 - Greetings from Karlsruhe

As 2016 comes to a close, I say "a hearty Thank You!" for choosing our services, visiting the IEC 61850 blog, and for the great cooperation this year.

I wish you, your family, and the many people around you a happy, healthy and prosperous New Year 2017 ... living in peace and harmony.


Hope your home is a safe place to live. Take care.

Please, help to keep the power flowing and the grass green - with the various standards defined by IEC and IEEE.

I look forward to meeting you in 2017 - maybe soon in [San Diego \(CA\) on January 30, 2017](#).

Please drop us an email if you like this blog or you would like me to post other interesting information on the blog.

Bye for now.

Posted by [Karlheinz Schwarz](#) at 4:45 AM [No comments:](#) 

Labels: [IEC](#), [IEC 61850](#), [IEEE](#), [San Diego](#)

Saturday, December 10, 2016

OpenGridMap - Help to collect data and produce power grid approximations for CIM

OpenGridMap is a new open community that crowdsources realistic power grid data to be used for research purposes. Here you will find the tools for crowdsourcing power grid data. The goal is to create an open platform for inferring realistic power grids based on actual data. Our vision is to provide a tool to researchers and practitioners that is able to produce realistic input data for **simulation studies**. OpenGridMap will support the entire process from data collection to formatting grid data for various purposes. We explore innovative ways to capture data and produce power grid approximations, e.g., using smartphone apps, drones, expert classification, existing map APIs, and graph inference algorithms.

Click [HERE](#) to visit the OpenGridMap website.

The next step would be to convert the collected data into a CIM and SCL format ... it is underway for CIM (Common Information Model):

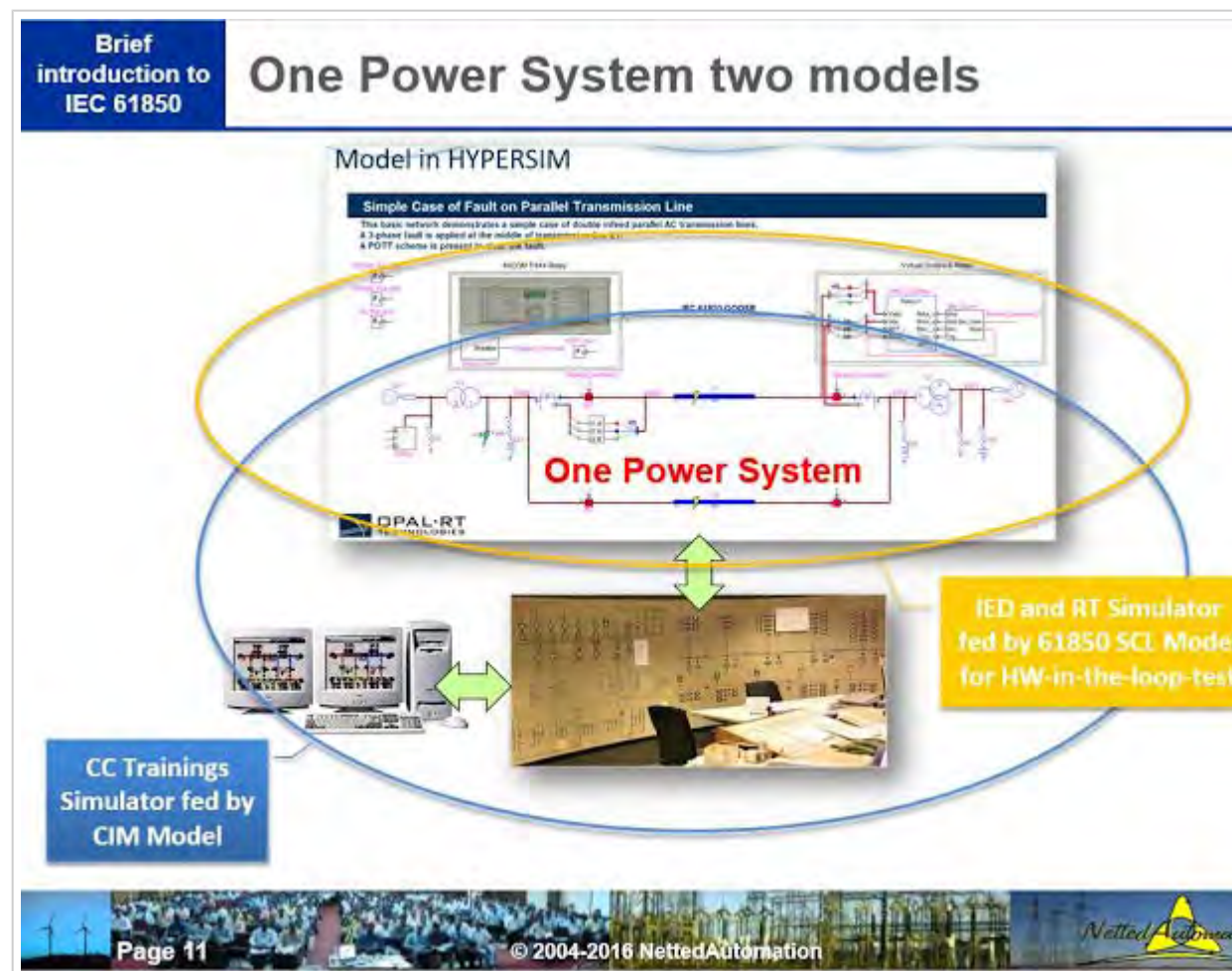
OpenGridMap: towards automatic power grid simulation model generation from crowdsourced data


By Jose Rivera, Technische Universität München

"OpenGridMap is an open source project that crowdsources realistic power grid data to be used for research purposes. In this paper, we propose an approach for the automatic generation of power grid simulation models from crowdsourced data. The proposed approach orders the crowdsourced data into a power circuit relation which **is then used to produce a CIM description file and subsequently a power grid simulation model.** ..." ... and I guess the modelling in IEC 61850-6 SCL (System Configuration Language) will follow soon - I am sure.

Click [HERE](#) for the above mentioned paper.

More to come as discussed during the Training Courses conducted by NettedAutomation this week in Karlsruhe:



Posted by [Karlheinz Schwarz](#) at 4:43 AM [No comments:](#) 

Labels: [CIM](#), [electric power system](#), [hands-on Training](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [OPAL RT](#), [OpenGridMap](#), [seminar](#), [simulation](#)

Friday, December 2, 2016

[IEC-61850-Seminare zu unschlagbaren Preisen in Karlsruhe auch in 2017](#)

Wir bieten auch im nächsten Jahr zwei Intesiv-Hands-On-Seminare an:

09.-12. Mai 2017
05.-08. Dezember 2017

Die drei (3) Blöcke (1 Tag + 2 Tage + 1 Tag) können einzeln oder in Kombination gebucht werden. Sie entscheiden selbst, ob Sie nur einen Tag von Ihrem Arbeitsplatz fern bleiben möchten oder zwei, drei oder vier. Je nachdem, welche Zeit und welchen Bedarf Sie haben.

[HIER klicken](#), um zur Beschreibung und den Anmeldeunterlagen zu gelangen [pdf, 430 KB].

Posted by [Karlheinz Schwarz](#) at [5:32 AM](#) [No comments:](#) 

Labels: [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [protection](#), [SCADA](#), [seminar](#)

Thursday, December 1, 2016

BDEW IT-Sicherheitsempfehlungen öffentlich zugänglich

Der BDEW (Bundesverband für Energie- und Wasserwirtschaft e.V., Berlin) hat seit Jahren weitreichende Empfehlungen für die IT-Sicherheit veröffentlicht und mehrfach aktualisiert. Aus aktuellem Anlass (unter anderem die Einbrüche in DSL-Router) ist die **Beachtung der vorliegenden Empfehlungen unbedingt angebracht!!**

IT-Sicherheitsempfehlungen

1. Allgemeine Empfehlungen

- Whitepaper- Anforderungen an sichere Steuerungs- und Telekommunikationssysteme (PDF)
- Ausführungshinweise zur Anwendung des Whitepaper - Anforderungen an sichere Steuerungs- und Telekommunikationssysteme (PDF)
- Checkliste zum Whitepaper - Anforderungen an sichere Steuerungs- und Telekommunikations-systeme (XLSX)


2. Technische Empfehlungen für den sicheren Datenaustausch in der Marktkommunikation

- Studie über sichere webbasierte Übertragungswege, Version 2.1 (PDF)
- Marktüberblick AS2-Lösungen in der Energiewirtschaft (15 MB) (PDF)
- Leitfaden "Implementierung AS2 in Unternehmen der Energiewirtschaft" (PDF)
- PKI Zertifikatsrichtlinie (Certificate Policy) des BDEW (PDF)
- Unternehmensübergreifende PKI-Topologien, PKI-Dienste und Einsatzrahmenbedingen (PDF)
- Zehn Schritte zur VEDIS-Sicherheit (PDF)
- Häufig gestellte Fragen - FAQ zu VEDIS (PDF)
- Zertifizierungsrichtlinie (PDF)
- Umgang mit Schlüsselmateriale (PDF)

[HIER klicken](#), um die 12 Dokumente (jeweils mit einem eigenen Link) frei herunterzuladen.

Das Lesen und Verstehen wird etwas Zeit in Anspruch nehmen - die Umsetzung wird ungleich aufwendiger werden!

Sie sollten Ihr Management überzeugen, **diese Empfehlungen ernst zu nehmen** - nicht nur, um irgendwelche Anforderungen in Regulierungen oder Gesetzen zu erfüllen.

Posted by [Karlheinz Schwarz](#) at [10:58 PM](#) [No comments:](#) 

Labels: [BDEW](#), [security](#), [Sicherheit](#), [Whitepaper](#)

Wednesday, November 30, 2016

Draft IEC 62351-90-2 Deep Packet Inspection (DPI) of encrypted communications

IEC TC 57 just published a very crucial draft document proposing a new topic to the security of communication in power delivery systems applicable to DNP3, IEC 60870-5-104, IEC 60870-6 (TASE.2), IEC 61850 and the like:

57/1792/DC

Proposed draft for IEC **TR 62351-90-2**, Power systems management and associated information exchange – Data and communications security –

Part 90-2 **Deep Packet Inspection (DPI) of encrypted communications**

The standard series IEC 62351 comprises methods to secure communication channels between IEDs and between IEDs and SCADA systems. Complex communication networks have to be monitored and health-checked properly, both from an operational and from a security perspective.

The monitoring process used is called **Deep Packet Inspection (DPI)**, and **relies on the availability of the whole payload for inspection**. The need for DPI on communication channels between IEDs and SCADA and/or between IEDs by an independent third party is really important.

This report serves as a guide for the implementation of **DPI in encrypted communications**. It is intended as an overview of existing and possible new solutions for DPI, analyzing the impact on several factors, including security, performance and cost.

Posted by [Karlheinz Schwarz](#) at [11:40 PM](#) [No comments:](#)

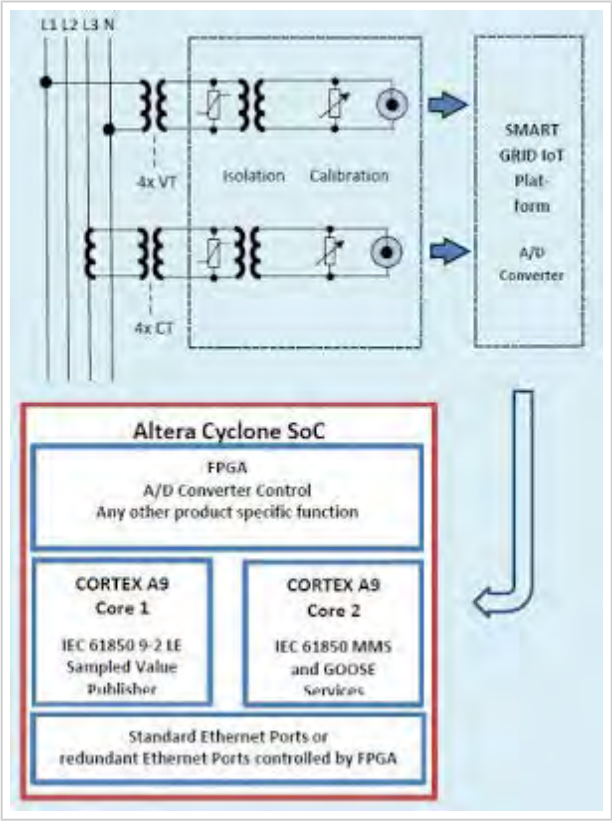


Labels: [Cyber Security](#), [DNP3](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61850](#), [IEC 62351](#)

Monday, November 21, 2016

NEW HW: IEC 61850-9-2 LE Sampled Value Publisher

The SystemCorp "IEC 61850-9-2 LE Sampled Value Publisher" is a hardware platform for specific sampled value publisher applications for the Smart Grid IoT Platform from Novtech using the Altera (now part of Intel) dual core ARM/FPGA Cyclone V SoC. This Smart Grid IoT Platform provides eight high precision analogue inputs. The A/D converter is directly controlled by the FPGA producing the sampling rate required for the SV publisher, which is implemented in one ARM core. The Sampled Values are published at a rate of 4000 frames per second for a grid frequency of 50Hz and 4800 frames per second for 60 Hz. An eight channel VT/CT interface module is also available from SystemCORP Embedded technology allowing a direct connection of the Smart Grid IoT Platform to 110 V VTs and 5 A CTs.



Click [HERE](#) for downloading a two page description and additional information [pdf, 390 KB].

Posted by [Karlheinz Schwarz](#) at [8:34 AM](#) [No comments:](#)

Labels: [9-2LE](#), [IEC 61850](#), [IEC 61850-9-2](#), [Intel](#), [sampled value](#), [SystemCorp](#)

Tuesday, November 1, 2016

Crucial IEEE 802 And Other IEEE Standards For Free Download

The IEEE Get program grants public access to view and download current individual standards at no charge:

IEEE 802® Standards


IEEE 1622™ Standard: Electronic Distribution of Blank Ballots for Voting Systems | Design Automation Standards

IEEE 2600™ Standards: Hardcopy Device and System Security

IEEE C95™ Standards: Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields

IEEE/ANSI N42 Standards: Radiation Detection Standards.

Click [HERE](#) for the list of IEEE Standards available for free download.

Posted by [Karlheinz Schwarz](#) at [1:37 AM](#) [No comments:](#) 

Labels: [free download](#), [IEEE](#), [standards](#)

Monday, October 31, 2016

Reminder: Many ISO/IEC Standards Are Publicly Available

ISO and IEC provide free access to many older and newer standards like

ISO/IEC 27000 (Fourth edition **2016-02-15**):

Information technology — Security techniques — Information security management systems — **Overview and vocabulary**

Click [HERE](#) for the above standard ISO/IEC 27000.

Click [HERE](#) for the complete list of publicly available standards.

Posted by [Karlheinz Schwarz](#) at [11:45 PM](#) [No comments:](#) 

Labels: [IEC](#), [ISO](#), [Publicly Available](#), [standards](#)

Friday, October 28, 2016

IEC 61850 - Take a Closer Look For The Best Possible Start in San Diego

FMTP (Uppsala, Sweden), NettedAutomation (Karlsruhe, Germany), and OPAL-RT (Montreal, Canada) will conduct a one day intensive course that opens doors You never dreamed possible:

Demystifying and mastering the complexity of IEC 61850

Location:

Holiday Inn Express San Diego South - Chula Vista
632 E Street
Chula Vista, CA 91910

Date:

Monday, 30 January 2017 from 10:00 AM to 4:00 PM (PST)

The online registration is now open:

Click [HERE](#) for Registration.

**A 60 US\$ Early Bird Discount applies until 31 Dec 2016.
Register today!**

Posted by [Karlheinz Schwarz](#) at [10:46 AM](#) [No comments:](#) 

Labels: [FMTP](#), [IEC 61850](#), [NettedAutomation](#), [OPAL RT](#), [San Diego](#), [seminar](#), [Training](#), [USA](#)

Thursday, October 27, 2016

Industrial Internet of Things (IIOT) - Security Framework

The Industrial Internet Consortium (IIC) has published a draft Security Framework (173 pages).

The framework is quite interesting for all experts involved in information exchange systems ... also in the energy application domain.

The Introductions says in the second paragraph:

"These [IIOT - Industrial Internet of Things] systems differ from traditional industrial control systems by being connected extensively to other systems and people, increasing their diversity and scale. They also differ from traditional information technology (IT) systems in that they use **sensors and actuators** in an industrial environment. These are typically systems that **interact with the physical world where uncontrolled change can lead to hazardous conditions**. This potential risk increases the importance of safety, reliability, privacy and resiliency beyond the levels expected in many traditional IT environments."

The power systems are using sensors and actuators communicating with protection and automation systems for the last decades. The industry has developed the standard series IEC 61850, IEC 62351, IEC 60870-5-104, DNP3, IEC 61968/70, and IEC 61400-25 to provide a basis for safe, reliable, resilient, and secure power delivery systems. These stable standards are state-of-the-art in power delivery systems. And they are referenced in many Frameworks and Roadmaps. The series IEC 62351 is one of the crucial series dealing with security in power automation systems:

Click [HERE](#) for a copy of the IIC framework [pdf, 4.6 MB].
Click [HERE](#) for a white paper about the IEC 62351 series [pdf, 3.5 MB] and [HERE](#) for a page on Wikipedia.

The IIC Security Framework gives an overview about many aspects in the future distributed automation and which aspects are crucial to be managed.

Posted by [Karlheinz Schwarz](#) at [12:08 AM](#) [No comments:](#) 

Labels: [DNP3](#), [IEC 61850](#), [IEC 62351](#), [IIC](#), [IIOT](#), [security](#)

Tuesday, October 18, 2016

Basic Application Profiles (BAPs) using IEC 61850

IEC TC 57 has proposed to develop a new Technical Report (TR):

IEC TR 61850-7-6: Communication networks and systems for power utility automation – Part 7-6: Guideline for definition of **Basic Application Profiles (BAPs) using IEC 61850** (57/1782/DC)

The proposed work will:

- describe the methodology of profiling in the context of IEC 61850
- give a common understanding about the modular profiling concept of basic application profiles (BAP)
- define the contents of a standardized basic application profile (BAP template)
- give guidance for the use of that BAP template
- and also show an example of a BAP.

Posted by [Karlheinz Schwarz](#) at [9:34 PM](#) [No comments:](#) 

Labels: [BAP](#), [IEC 61850](#), [IEC 61850-7-6](#), [profile](#)

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WEITERE INFORMATIONEN OK

Tuesday, October 18, 2016

IEC-61850-Seminar in Karlsruhe vom 06.-09. Dezember 2016 zu Einem Unschlagbarem Preis

Wir bieten vom

06.-09. Dezember 2016 in Karlsruhe ein IEC-61850-Intensiv-Seminar an

Die drei (3) Blöcke (1 Tag + 2 Tage + 1 Tag) können **einzeln oder in Kombination** gebucht werden. Sie entscheiden selbst, ob Sie nur einen Tag von Ihrem Arbeitsplatz fern bleiben möchten oder zwei, drei oder vier. Je nachdem, welche Zeit und welchen Bedarf Sie haben.

Am **ersten Tag** wird ein Überblick über das Normungsumfeld und die einzelnen Normen gegeben. Im Mittelpunkt stehen dabei die grundlegenden Eigenschaften und Bedeutung der Normenreihe IEC 61850 für Systemdesign, System- und Geräteengineering, Datenmodellierung, Datenmodelle (Schutz, Messwerte, Steuerungen, Power Quality Monitoring, Wind Power, Hydro Power, Dezentrale Erzeuger, ...), Kommunikationsmöglichkeiten (Client/Server, Publisher/Subscriber) und Sicherheitslösungen (IEC 62351).

Der Vergleich mit IEC 60870-5-104, DNP3, Modbus und Feldbussen rundet den ersten Tag ab.

Am **zweiten Tag** werden die Modellierungsmethode, die vielfältigen Modelle (Logische Knoten), die Kommunikationsdienste und -protokolle und die System-Konfigurations-Sprache (SCL) im Detail vorgestellt. Die Lösungen nach VHPready und FNN-Steuerbox werden präsentiert und diskutiert.

Am **dritten Tag** werden anhand vieler praktischer SCL-Beispiele Systembeschreibungen (SSD), Systemkonfigurationen (SCD), Gerätekonfigurationen (ICD und CID für Server/Publisher, Client/Subscriber und Server/Subscriber) diskutiert, erstellt und formal geprüft. Dabei kommt eine Reihe von Werkzeugen und Geräten zum Einsatz.

Am **vierten Tag** wird das Erlernte in praktischen Übungen mit marktgängigen Steuerungsgeräten, Gateways und Werkzeugen vertieft. Eine Windows-Evaluierungspaket mit Client, Server, GOOSE-Publisher, Client/GOOSE-Subscriber und Server/GOOSE-Subscriber wird allen Teilnehmern kostenlos zur Verfügung gestellt; dieses Paket kann auch nach dem Seminar noch genutzt werden.

Und viels andere mehr.

Eine Spezialität unserer Seminare ist, dass die Teilnehmer zu Wort kommen: Fragen, Erfahrungen, Bedenken, Berichten über gelungene und weniger gelungene Projekte! **Es erwartet Sie ein lebhafter Dialog zwischen dem Referenten und den Teilnehmern.**

Sie können den 1. Tag, den 2. und 3. Tag sowie den 4. Tag getrennt oder in jeder Kombination buchen!

Mit unserer Schulung bereiten wir Sie hervorragend auf neue Herausforderungen vor!

Klicken Sie [HIER](#), um mehr Details und die Anmeldeinformationen herunterzuladen [pdf, 320 KB].

Reservieren Sie noch heute Ihren Platz!

Die mehr als 4.100 Teilnehmer meiner über 230 Seminare seit 2004 würden sicher alle bestätigen, dass das komplexe Thema IEC 61850 unbedingt eine geeignete Schulung verlangt -- und dass wir eine erst-klassische und einzigartige Schulung bieten! Zu einem unschlagbaren Preis! Garantiert!

Es erwartet Sie Erfahrungen mit hunderten von Firmen und Organisationen!

Posted by [Karlheinz Schwarz](#) at [1:23 PM](#) [No comments:](#) 

Labels: [CIM](#), [DNP3](#), [Feldbus](#), [Gateway](#), [hydro power](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 62351](#), [meter](#), [power quality](#), [SCL](#), [security](#), [seminar](#), [wind power](#)

Saturday, October 15, 2016

Wind Energy Generation Systems: Edition 2 Drafts of IEC 61400-25 Published

IEC TC 88 has published recently the following draft documents for the edition 2 of the corresponding parts:

IEC 61400-25-1: Wind energy generation systems -
Part 25-1: Communications for monitoring and control of wind power plants -

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

For your Convenience

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[Blog as single PDF until 08 April 2016 \[14 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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▼ 2017 (21)

▼ April (6)

[Final Call for IEC 61850 Training Courses in May 2...](#)

[Dubai \(UAE\): NEW IEC 61850 Seminar for Protection...](#)

[What is a Function in IEC 61850?](#)

[HMS Smart Grid Gateways Are Now IXXAT SG Gateways](#)

[FDIS for IEC 62351-7 published - Network and Syste...](#)

[IEC SC 65C Published 5,000+ Pages of New Fieldbus ...](#)

► March (7)

► February (5)

► January (3)

► 2016 (110)

► 2015 (94)

► 2014 (129)

Overall description of principles and models
(88/587/**CDV**)

IEC 61400-25-4: Wind energy generation systems -
Part 25-4: Communications for monitoring and control of wind power plants -
Mapping to communication profile
(88/600/**FDIS**)

IEC 61400-25-5: Wind energy generation systems -
Part 25-5: Communications for monitoring and control of wind power plants -
Conformance testing
(88/589/**CDV**)

IEC 61400-25-6: Wind power generation systems -
Part 25-6: Communications for monitoring and control of wind power plants -
Logical node classes and data classes for condition monitoring
(88/606/**FDIS**)

Note 1: The title of TC 88 was changed in 2015 from **Wind turbines** to **Wind energy generation systems**

Note 2: Please note the tissue database for the whole standards series:
<http://tissue.iec61400-25.com/default.mspix>

Major Changes in these documents:

IEC 61400-25-1:
Changes compared to Edition 1:
• General harmonization of text and overview models with the other parts of the IEC 61400-25 series
• Harmonization of definitions in other related standards
The users of IEC 61400-25 have formed a community, USE61400-25. For further information see <http://www.use61400-25.com>.

IEC 61400-25-4:
A lot of modifications have been implemented in order to harmonize with other parts of the series IEC 61400-25 as well as with IEC 61850. Note that a mapping to OPC UA is not part of this
second edition of IEC 61400-25-4

IEC 61400-25-5:
The scope of revision includes:
• Harmonization with test cases in IEC61850-10 Edition 2.0
• The use of SCL in the conformance testing process is out of the scope for Ed2, but will be considered for Edition 3.
• Reduction of overlap between standards and simplification by increased referencing to the IEC 61850 standard series
The following main revisions have been made compared to Edition 1.0:
• The complete document has been restructured in order to match the structure of IEC 61850-10 Edition 2.0.
• All test cases applying SCL files are still not a part of the present document as the SCL specifications for wind power domain are still pending to be published.

IEC 61400-25-6:
This edition includes the following significant technical changes with respect to the previous edition:
a) Major restructuring of the data model to accommodate needed flexibility.
b) UFF58 format is no longer used.
c) Access to data is now using the standard reporting and logging functions.
d) Recommendations for creating data names to accommodate needed flexibility have been defined.

Posted by [Karlheinz Schwarz](#) at [1:22 AM](#) [No comments:](#) 

Labels: [DNP3](#), [Edition 2](#), [IEC 61400-25](#), [IEC 61850](#), [IEC TC 88](#), [OPC UA](#), [SCL](#), [wind power](#)

IEEE PES published Report on "Centralized Substation Protection and Control"

The IEEE Power System Relaying Committee has published a very comprehensive **report worth to be read by power system engineers** dealing with substation protection and automation (partlywith focus on the North American market):

Centralized Substation Protection and Control IEEE PES
Power System Relaying Committee Report of Working Group K15
of the Substation Protection Subcommittee
(2015-12)

Excerpt of the Introduction:
"The power grid is now **more dynamic than ever** before and newer tools are increasingly developed to manage the grid better. Renewable energy sources are changing power system characteristics at a time **when utilities are also focusing on improving customer service and resiliency of the grid, by using advanced monitoring and control technologies....**

- [2013](#) (130)
- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

In addition, **communication technologies are advancing and related international standards are maturing to be deployed in substation environment.** ... the IEEE Power System Relaying Committee has formed a working group to prepare a report describing and analyzing the state-of-the-art technologies for centralized protection and control (CPC) within a substation...

This report starts by reviewing the advancements in substation protection and control technology. Next the report describes CPC and reviews its history. Then the report reviews some of the existing technologies that can support CPC.

Finally the report concludes that CPC technology, when appropriately applied, significantly improves the reliability of protection and control systems and the power grid at an affordable cost - with enhanced applications capability and maintainability for both hardware replacement and software upgrade."

Click [HERE](#) for the full report [pdf, 80 pages, 4.4 MB]

The report gives inside views of the challenges in managing future power systems. Power systems are very complex - and will become more complex in the near future. In addition to the fact that **"utilities are also focusing on improving customer service and resiliency of the grid"** the utilities are quite often focusing on increasing their shareholder values ... and outsourcing many tasks. In the German ["vdi nachrichten"](#) (a very famous weekly German technical newspaper) I read yesterday an interesting statement of the new president of the [BDEW \(Bundesverbandes der Energie- und Wasserwirtschaft\)](#):


Translated: " ... Unfortunately the industry **invests too little** in view of the challenges in research and development. The German Pharmaceutical industry employs **40,000 humans in R&D laboratories.**

In the energy industry there are not such research and development mechanisms. That is not because of the fact that our industry is come to a hold and does not see challenges. **It is financially no more able to implement comparable research activities.** We have no more enterprises, which can do that. Everyone knows nevertheless around the difficult situation of many large energy enterprises. Also normal public distribution utilities cannot advance innovative developments in the storage area."

Original: " ... Leider investiert die Branche angesichts der Herausforderungen zu wenig in Forschung und Entwicklung. Die deutsche Pharmaindustrie beschäftigt 40 000 Menschen in F- und E-Laboren.

In der Energiewirtschaft gibt es solche Forschungs- und Entwicklungseinrichtungen nicht. Das liegt nicht daran, dass unsere Branche verstockt ist und Herausforderungen nicht sieht. Sie ist finanziell nicht mehr zu vergleichbaren Forschungsleistungen in der Lage. Wir haben keine Unternehmen mehr, die das können. Jeder weiß doch um die schwierige Lage vieler großer Energieunternehmen. Auch normale Stadtwerke können bahnbrechende Entwicklungen im Speicherbereich nicht voranzutreiben."

Vendors, too, are struggling with similar challenges. **We need more universities to compensate these situations.** When it comes to the definition and application of information exchange systems in power or energy systems, we could be quite happy that we have the well accepted standards IEC 61968/70 (CIM), IEC 60870-5-104, DNP3, IEC 61850, IEC 61400-25, IEC 61850-2 (IEC 60870-6), ...

Posted by [Karlheinz Schwarz](#) at [12:30 AM](#) [No comments:](#) 

Labels: [CIM](#), [control](#), [DNP3](#), [education](#), [electrical engineer](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEEE](#), [protection](#), [Research](#), [Smart Grid](#), [TASE.2](#) [ICCP](#)

Friday, October 14, 2016


Distribution On-Load Tap Changer Control Using IEC 61850 Client /Server Architecture

Mr. Andrius Maneikis has successfully finished his master thesis at KTH (Stockholm, Sweden) in electrical engineering with the title:

Distribution On Load Tap Changer Control Using IEC 61850 Client /Server Architecture

Please click [HERE](#) to download his thesis [pdf, 93 pages, 17 MB].

Abstract. Distributed generation is transforming the power system grid to decentralized system where separate units like wind power generators or solar panel shall coexist and operate in tandem in order to supplement each other and make one extensive system as a whole so called smart grid. It is utmost important to have a control ability over such units not only on a field level but on a system level as well. To be able to communicate with numerous devices and maintain interoperability universal standard is a must. Therefore, one of the core standards relevant to smart grids is IEC 61850 – Power Utility Automation which comes into assistance and tackles aforementioned challenges. This project uses IEC 61850 architecture to implement client/server windows applications for on-load tap changer remote control. The proposed solution and designed applications are tested together with a real time simulator [OPAL] where simple power system is modelled to emulate the system response to control signals in a real time. In this way, the implemented applications can be tried and assessed as if performing in real environment. Consequently, a user of the client application is able to remotely control voltage on the power transformer's secondary side and manipulate the switching equipment simulated in the model.

Posted by [Karlheinz Schwarz](#) at 1:51 AM No comments: 

Labels: [client](#), [DLL](#), [IEC 61850](#), [interoperability](#), [KTH](#), [master thesis](#), [OPAL RT](#), [server](#), [tap changer](#), [Windows](#)

Friday, October 7, 2016

Huge KIT Energy Lab 2.0 - Relies on IEC 61850

The KIT (Karlsruher Institut für Technologie) in my hometown Karlsruhe/Germany is deeply involved in several projects related to the Energiewende. One of the crucial components is the "Energy Lab 2.0".

In "**A Concept for the Control, Monitoring and Visualization Center in Energy Lab 2.0**" the authors Clemens Düpmeier, Veit Hagenmeyer, Ralf Mikut, and Karl-Uwe Stucky present an interesting concept.

Click [HERE](#) for a 16 page presentation presented in November 2015.

The research focuses on the **APPLICATION** of Control, Monitoring, and Visualization of various aspects of **energy systems (gas, electricity, heat) - not just electrical systems**.

IEC 61850 is THE solution for the process instrumentation - share process information in a standardized way.

These people have understood that the **focus is on applications rather than on protocols** ...

The 14 Layer Cake I had after a nice dinner in Jakarta show that the automation of the energy systems of the future is more than "just another protocol" ... applications based on standard protocols are the crucial aspects:



Hm, the cake was very delicious.

Posted by [Karlheinz Schwarz](#) at 10:48 PM No comments: 

Labels: [control](#), [Energy](#), [Gateway](#), [HMS](#), [IEC 61850](#), [KIT](#), [monitoring](#), [protocol](#), [SCADA](#)

Tuesday, October 4, 2016

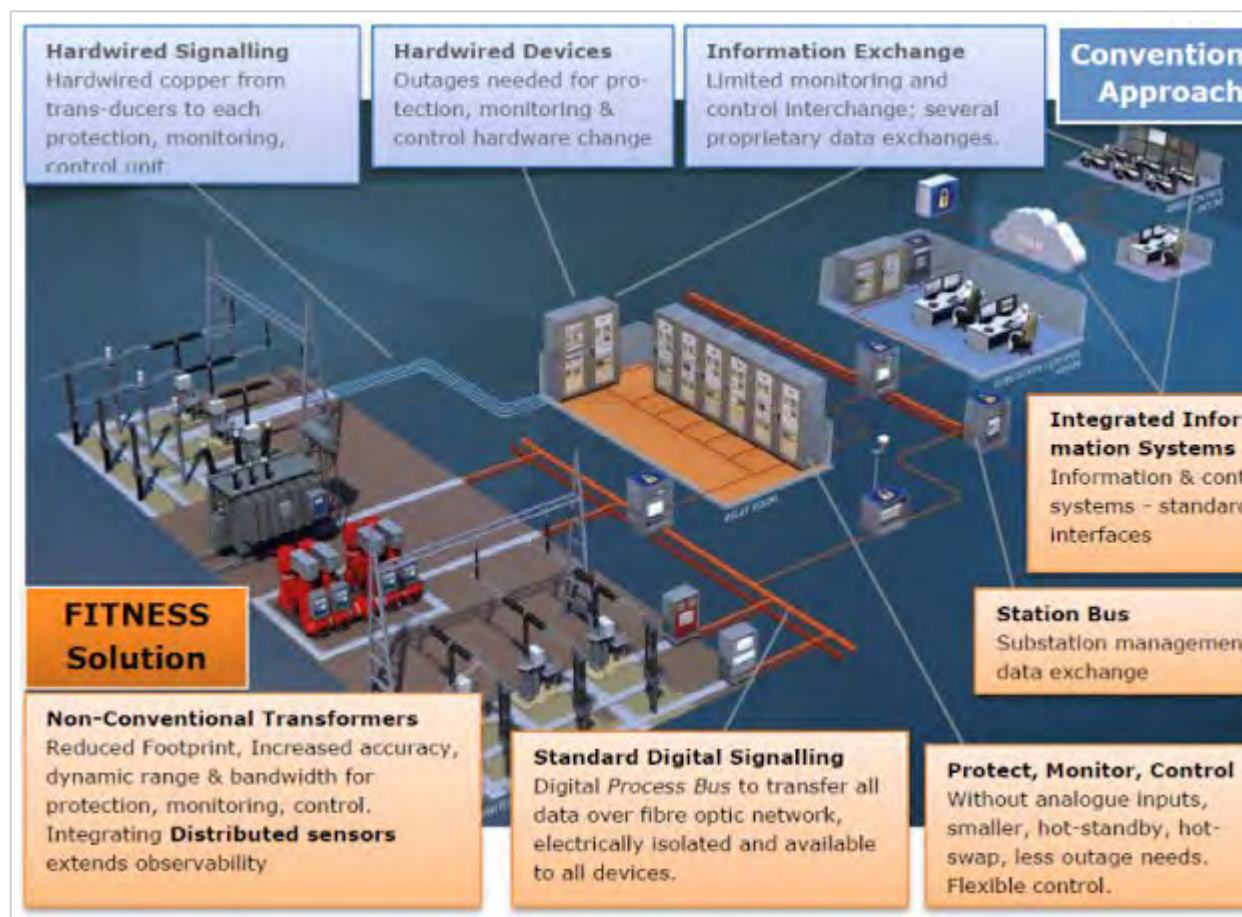
FITNESS Pilot: Are You Fit For The Future?

Are You Fit For The Future?

IEC 61850 is a crucial component in the FITNESS pilot project:

Presentation of the project: Thursday October 27, 2016 from 1:30 PM to 5:30 PM

Future Intelligent Transmission Network SubStation (**FITNESS**) is the **pilot live multi-vendor digital substation demonstration in GB**. The project was successfully awarded under RIIO NIC, Ofgem, in late 2015 and detailed design work began in 2016. Together with our partners GE Grid Solutions, ABB, Synaptec and the University of Manchester we will **like to invite** to share the objectives of project FITNESS, selection of substation architecture, discussions about change in substation design principles to optical measuring techniques and of course international substation standard IEC 61850. The event will be a part of the international IEC WG10 "Power systems management and associated information exchange" meeting and will provide an excellent opportunity to discuss and interact with international experts:



[Source and details](#) (SP Energy Networks)

Posted by [Karlheinz Schwarz](#) at 10:22 PM [No comments:](#)

Labels: [ABB](#), [GE Grid](#), [IEC 61850](#), [IEC 61850-9-2](#), [pilot](#), [process bus](#), [protection](#), [station bus](#), [Substation](#)

Monday, October 3, 2016

Receive a 40% Discount when You Register Soon For the IEC 61850 Training in Singapore (24-26 Oct)

The three-day IEC 61850 intensive training course in

Singapore on 24-26 October 2016

will give all professionals in the utility industry a comprehensive introduction on IEC 61850. It provides all crucial knowledge engineers need regarding the scope, use-cases, capabilities, benefits, restrictions, limits of IEC 61850, and availability of products (IEDs and Tools).

We are extending a **40% discount** for participants who registers with us by 14 October 2016.

Click [HERE](#) for more information.

I look forward seeing you there.

Posted by [Karlheinz Schwarz](#) at 5:00 AM [No comments:](#)

Labels: [demonstrations](#), [education](#), [IEC 61850](#), [seminar](#), [Training](#)

Sunday, September 25, 2016

How to use Generic Input/Output Logical Node "GGIO"

The Logical Node Class GGIO (Generic Process I/O) is (in my experience) the most liked and hated Logical Node. Why? GGIO is often used instead of well known Logical Nodes.

Example: Use of GGIO0.ST.Ind1.stVal instead of XCBRO.ST.Pos.stVal

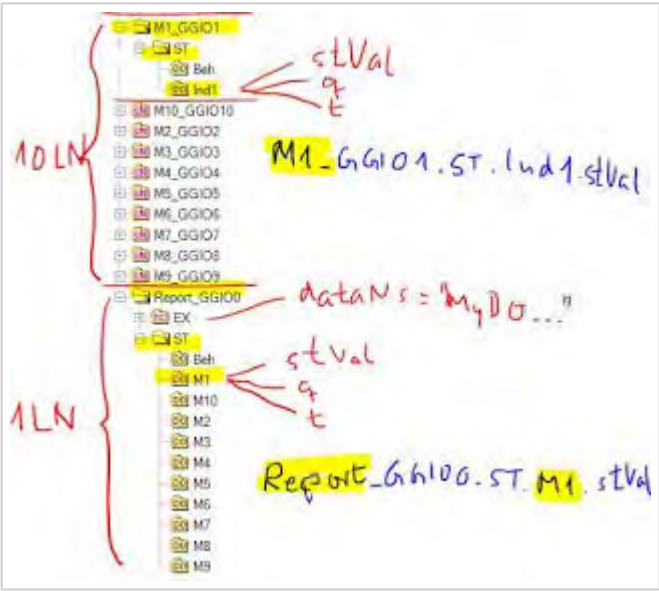
The use of GGIO is not standardized!

You may use it or not ... one way or the other.

Last week I was contacted by an utility engineer on how to map reporting signals (M1-Boolean, M2-Boolean, M3- ...)?

There are two general approaches in the use of GGIO:

1. Add semantic to Prefix of LN and use many GGIO instances (M1_GGIO1, ...)
2. Add semantic to extended Data Objects in GGIO (M1, ...)



In the first case we instantiate GGIO 10 times.
In the second we extend the model by defining Data Objects M1 ... M10

The main difference is that in the second example we can use the prefix of the GGIO ("Report_") -> "Report_GGIO0" as a wrapper for Reporting. The semantic of the signals is further defined by extended Data Objects "M1", "M2", ...
Both modelling approaches are defined in IEC 61850-7-1 and 7-4. The second approach may not be supported by all tools and devices.
I personally would prefer the second approach.

Posted by [Karlheinz Schwarz](#) at 10:32 PM No comments:

Labels: [Extensions](#), [GGIO](#), [IEC 61850](#), [logical_node](#), [modeling_method](#), [Semantic](#)

Friday, September 23, 2016

Draft Edition 6 of Common Information Model (CIM) base

IEC TC 57 has just published the Draft Edition 6 (six!) of the CIM base (57/1779/FDIS):
IEC 61970-301: Energy management system application program interface (EMS-API) -
Part 301: Common information model (CIM) base
Voting closes 2016-11-04

This 6th edition comprises **455 pages** compared to 182 pages (Ed1), 187 pages (Ed2), 260 pages (Ed3), and 323 pages (Ed5).

New topics comprise:

- DC model for CIM
- Static Var Compensator voltage regulation
- Package DC
- Annex A (informative) Custom extensions
European extensions

Click [HERE](#) for a nice introduction to CIM [pdf].

Posted by [Karlheinz Schwarz](#) at 11:00 PM No comments:

Labels: [CIM](#), [energy_management](#), [IEC 61850](#), [IEC 61970](#)

Wednesday, September 21, 2016

How secure are “Air-Gapped” Systems?

Many experts believe that it is sufficient to have an "air-gap" between their system and the internet or other outside systems. Because they expect that an "air-gap" would not allow to attack their system.
Several other experts do not believe that.
A demonstration of a destructive cyber attack vector on “air-gapped” systems will be given during a conference in October 2016:
ICS Cyber Security Conference (www.icscybersecurityconference.com)

Click [HERE](#) for the full report.

Posted by [Karlheinz Schwarz](#) at 12:44 PM No comments:

Labels: [Cyber Attack](#), [Cyber Security](#), [security](#)

Tuesday, September 20, 2016

IEC TC 57 Just Published the Draft IEC 61850-90-14 (FACTS)

One of the most comprehensive draft extensions (some 175 pages) of the standard series

IEC 61850 has been published the other day for comments:


IEC TR 61850-90-14 – Communication networks and systems for power utility automation – Part 90-14: **Using IEC 61850 for FACTS (Flexible AC Transmission Systems) data modelling** (57/1776/DC)
Comments are expected by 2016-10-28

"Due to the latest boom of deploying an exponentially increasing number of power electronics and semiconductor based equipment directly in the area of medium, high and ultra-high voltage transmission networks, the call for integrating those direct current related processes and control systems into IEC 61850 is only logical and consecutive.
Two main groups of DC based types of applications exist: FACTS devices (shunt and series connected) that mainly influence the network at a definite point of connection and Power Converters (e.g. HVDC, SFC) that additionally allow to transmit active power between two different points of connection. ...
FACTS and Power Conversion are thus indispensable to secure power supply and represent a vital component within the backbone of efficient, reliable and resilient future smart grids. This technical report finally enables those technologies to also become an integral part of the IEC 61850 world."

12 new logical node classes are proposed:

- AEPC Automatic Emergency Power Control
- ARUB Automatic Run-Up/Run-Back Module
- ASEQ Generic Automatic Sequencer
- ATCC Automatic Tap Changer Controller
- CFPC Control of FACTS and Power Conversion
- CREL Control Release
- GFUN Generic Control Function
- MCON Converter Measurement
- RLFR DC Line Fault Recovery Sequence
- XFPC FACTS and Power Converter device
- XDCC DC Circuit
- ZHAF Harmonic Filter

I hope that the vendors AND users will contribute to the review of this crucial extension.

Posted by [Karlheinz Schwarz](#) at [10:59 PM](#) [No comments:](#) 

Labels: [FACTS](#), [HVDC](#), [IEC 61850](#), [IEC 61850-90-14](#)

Thursday, September 15, 2016

Demystifying and Mastering the Complexity of IEC 61850 (San Diego, 30 January 2017)

FMTP (Uppsala, Sweden) and NettedAutomation (Karlsruhe, Germany) will conduct a one day intensive course that opens doors You never dreamed:

Demystifying and mastering the complexity of IEC 61850

Where: **San Diego (CA)** – exact location will be announced well in advance
When: Monday, **January 30, 2017**, 10am-4pm

Speakers:

Mr. Andrea Bonetti (Senior Protection and Power Automation Engineer)
Mr. Karlheinz Schwarz (Senior Communication and Application Engineer)
Learn the challenges and drawbacks after 20 years of IEC 61850 and related Standards.

Who should attend?
All people that have heard about the complexity of the standard series IEC 61850 – BUT had not yet a chance to understand what it really provides. People that are looking for comprehensive and neutral information.
Click [HERE](#) for more details and registration information [pdf, 350KB].

Posted by [Karlheinz Schwarz](#) at [11:21 AM](#) [No comments:](#) 

Labels: [education](#), [FMTP](#), [IEC 61850](#), [North America](#), [seminar](#), [Training](#), [USA](#)

List of some 700 IEC 61850 Certificates Issued by the UCAIUG

The UCAIUG group has issued almost 700 certificates for IEC 61850 implementations.

Click [HERE](#) to access the list of UCAIUG Certificates.

Posted by [Karlheinz Schwarz](#) at [2:46 AM](#) [No comments:](#) 

Labels: [certificate](#), [conformance test](#), [IEC 61850](#), [test lab](#), [testing](#), [TÜV SÜD](#), [UCAIUG](#)

Wednesday, September 14, 2016

IEC 61850 in North America

These days we hear some noise from a few US people telling you that the interest in IEC 61850 in North America is still low. Ok. What does this mean? Almost nothing. IEC 61850 is used in many applications in North America - many are not publicly reported. Why should a customer that is happy with the solution talk about it in the public? When you check the list of open positions in the US, you can see that there is new interest in this technology - in addition to traditional communication solutions like Modbus and DNP3: Check for example a open position at GOOGLE (Data Center Control Systems Engineer, Mountain View, CA):

"Minimum qualifications:

- BS degree or equivalent practical experience.
- 10 years of experience in the design and operation of mission critical facilities, including programming and design experience.
- Experience with facility power and cooling related infrastructure systems for data centers or equivalent critical infrastructure, including PLCs, SCADA systems, historians, industrial automation and controls systems design. **Experience with bussed I/O including IEC 61850 and Modbus.**
- Experience in the compliance requirements of pertinent codes, regulations, and standards."

Click [HERE](#) for the complete GOOGLE Job description.
Another 20+ open positions in the US can be found on www.simplyhired.com. Click [HERE](#).

In Germany you find 10+ open job descriptions. Click [HERE](#).

The number of visitors of this blog from the US is also growing and already high: 300+ per day (average during the last months).

More to come.

Posted by [Karlheinz Schwarz](#) at [12:26 AM](#) [No comments:](#) 

Labels: [GOOGLE](#), [IEC 61850](#), [Modbus](#), [Open Positions](#), [USA](#)

Tuesday, September 13, 2016

Pt 100 Temperature Relay with IEC 61850 GOOSE

Ziehl (Schwäbisch Hall, Germany) has integrated IEC 61850 GOOSE into their Pt 100 temperature relay for up to 12 sensors with electric 10 MBit/s Ethernet interface.

The TR1200IP can be used wherever multiple Pt 100 sensors (up to 12) need to be evaluated simultaneously:

- Motors or generators,
- also with simultaneous monitoring of bearings or, e.g., exhaust temperatures
- Transformers, also with additional core-temperature monitoring
- Machines and plants

Type TR1200IP temperature relays register the temperature of up to 12 sensors simultaneously and provide the values to the electric 10 MBit/s Ethernet interface. 2 IP protocols are supported, so the registered temperatures can be subsequently evaluated by connected devices that are linked with the TR1200IP via an Ethernet network. In motors, that could be a motor contactor, in transformers a transformer contactor with integrated overload function and thermal monitoring. An alarm relay reports devices and sensor errors. Sensor breaks or sensor short-circuits are also transmitted via the protocol to the connected evaluation unit.

Click [HERE](#) for a general overview.
Click [HERE](#) for GOOSE configuration.
Click [HERE](#) for the manual.

The GOOSE messages could be received by an HMS SG Gateway either as a client or a server. The SG Gateway could convert the received GOOSE messages into an IEC 61850 server to provide Reporting and Logging and convert to IEC 60870-5-104 or DNP3.

Posted by [Karlheinz Schwarz](#) at [3:49 AM](#) [No comments:](#) 

Labels: [DNP3](#), [GOOSE](#), [IEC 60870-5-104](#), [IEC 61850](#), [measurements](#), [Modbus](#), [Reporting](#), [temperature monitoring](#)

Monday, September 12, 2016

Case Study - IEC 61850 Application for a Transmission Substation in Ghana

A lot of discussions about the benefits of using IEC 61850 have happened in the past and are still going on ... and will go on also in 2017 and beyond.

A nice paper has been presented some three years ago:

Case Study: IEC 61850 Application for a Transmission Substation in Ghana

"One of the benefits of implementing IEC 61850 is **minimizing or even eliminating the copper field wiring** used to exchange protection and control data between intelligent electronic devices (IEDs) across a substation. Conversely, implementing IEC 61850 has introduced commissioning, testing, and maintenance complexity that can be alleviated with proper training, documentation, and testing plans. The design and implementation of the Kintampo, Ghana, transmission substation required redundant protection and control functions distributed among the IEDs and a robust communications network to implement IEC 61850 protocols. ...

As the acceptance of IEC 61850 communications by utilities grows, this type of large-scale project will grow as well. ...

A system solution that is **repeatable, pre-engineered, pretested, and designed to specifications is extremely important because it provides the user with a standardized solution that can be implemented across the system, minimizing different designs.**"

Click [HERE](#) for the 10 page paper [pdf]

Posted by [Karlheinz Schwarz](#) at 8:43 AM [No comments:](#) 

Labels: [engineering](#), [GOOSE](#), [IEC 61850](#), [RTU](#), [SCADA](#), [Schweitzer](#), [SCL](#), [SEL](#)

Saturday, September 10, 2016

How to get Interoperability and Interchangeability with IEC 61850?

The standardization process in the context of IEC 61850 is picking up quite fast. As you have learned in the posts of today and older ones, there are several new topics on the list of items to work on for future new parts of IEC 61850.

One of the crucial objectives is the interoperability and **INTERCHANGEABILITY** of devices from different vendors in a multi-vendor system.

To reach this goal, we need standards! Sure. But what is absolutely required is the EDUCATION of experts from Vendors, Utilities and System integrators.

We offer the right courses for you: With focus on protection, automation and SCADA.In English and German.

Due to the request from power engineers FMTP and NettedAutomation have scheduled several dates for public training courses in 2017:

The next courses are:

19-23 September 2016 in Stockholm, Sweden [EN]

10-13 Oktober 2016 in Karlsruhe, Germany [EN]

07-09 Dezember 2016 in Karlsruhe, Germany [DE]

Click [HERE](#) for more details.

Hurry to reserve your seat!

You would get more than in any other course - because two of most experienced experts (Andrea Bonetti and Karlheinz Schwarz) will guide you through the most crucial aspects of IEC 61850. The combined experience of the two is unparalleled.

Posted by [Karlheinz Schwarz](#) at 4:57 AM [3 comments:](#) 

Labels: [ABB](#), [configuration](#), [education](#), [engineering](#), [hands-on Training](#), [IEC 61850](#), [IEDScout](#), [Omicron](#), [protection](#), [seminar](#), [Siemens](#), [Training](#)

ENTSO-E proposes some Extensions of IEC 61850

IEC TC 57 distributed a proposal from ENTSO-E to add some features to IEC 61850 (57/1771/DC):

Proposed new work items by ENTSO-E to **introduce additional specification features of IEC 61850 based systems within SCL**

Edition 2 of IEC 61850-4 was published in 2011. Edition 2 of IEC 61850-6 was published in 2009. Ultimately, the proposal by the ENTSO-E statement and example of engineering process, aims to serve the market in order to **reach the multi-vendor interoperability of systems in an efficient way.**

Crucial Topics are:

1. **Input and data flow modelling / Virtual IED** - Introduction of additional specification features of IEC 61850 based systems within SCL.
2. **System engineering efficiency** - Introduction of additional specification and configuration features of IEC 61850 based systems within SCL.
3. **Communication Network Description** - Introduction of additional specification and configuration features of IEC 61850 based systems within SCL.

Please note that big utilities (in Europe ...) have already used SCL to specify the details they want vendors to implement. The time where vendors could model the automation system the way they like it most seems to be over soon. Utilities start to understand that even **interchangeability** is the ultimate goal!!

It all depends on the willingness to cooperate!

Teamwork makes the dream work!

Posted by [Karlheinz Schwarz](#) at [4:41 AM](#) [No comments:](#) 

Labels: [engineering](#), [ENTSO-E](#), [IEC 61850](#), [interchangeability](#), [interoperability](#), [SCL](#)

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Saturday, September 10, 2016

Machine-processable Format of IEC 61850-related Data Models

IEC TC 57 proposes a new work item (57/1768/NP) IEC 61850-7-7:

Communication networks and systems for power utility automation – Part 7-7: Basic communication structure – **Machine-processable format of IEC 61850-related data models for tools (proposed 61850-7-7)**

Closing date for voting: 2016-11-25

This technical specification will define an XML schema for describing the **code components** of the data model parts of IEC 61850, **to be used as input for tools** (typically engineering or specification tools).

In order to foster an active tool market with good quality, and at the end to improve IEC 61850 interoperability, the market needs a **machine-processable file describing data model related parts of the standard as input**. This will avoid the need for any engineering tool related to the IEC 61850 datamodel to get the content of the standard **manually entered, with the highest risk of mistakes**.

The NP comes with a 150 page draft.

Posted by [Karlheinz Schwarz](#) at 4:30 AM No comments:

Labels: [engineering system](#), [IEC 61850](#), [models](#), [SCL](#), [system configuration](#), [tools](#)

New Work Proposal for Extending the System Configuration Language (SCL) for HMIs

IEC TC 57 has published (57/1767/NP) a proposal for extending the System Configuration Language (SCL) to provide high-level direction in terms of how best to **bind the HMI graphical objects with the IEC 61850 data objects/attributes** using the configuration description language defined in IEC 61850-6. It builds upon the existing System Configuration Language (SCL) defined in IEC 61850-6, in addition to possibly incorporating other non-IEC namespaces such as the W3C's **Scalable Vector Graphics (SVG) namespace**.

Communication networks and systems for power utility automation - Part 6xx: **Configuration description language for communication in power utility automation systems related to Human Machine Interfaces (proposed IEC 61850-6xx)**

This work will definitely helping to simplify the graphical representation of DataTypeTemplates in IEC 61850-6 (SCL).



A SCL DataTypeTemplate for a temperature measurement "STMP_0" could be bound to a graphical representation.

Training by NettedAutomation

- [Seminare in Deutsch in 2017](#)
- [New Flyer for Training with crucial topics](#)
- [Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

For your Convenience

- [Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)
- [New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)
- [Blog as single PDF until 08 April 2016 \[14 MB\]](#)
- [Some videos explaining basics ... Gateway applications](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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- 2016 (110)
- 2015 (94)
- 2014 (129)



The depicted LNType has five related DataObjects. The temperature curve could be shown at an HMI as implemented in the client (HMI) interface of the VHPready demo. The VHPready demo could be downloaded. Click [HERE](#) for the access. The client application of the demo is programmed in C#. A graphical template could be programmed ... if you need it. We could offer such a template if you are interested.

Posted by [Karlheinz Schwarz](#) at 4:23 AM [No comments:](#)

Labels: [client](#), [Demo Kit](#), [HMI](#), [IEC 61850](#), [monitoring](#), [SCADA](#), [SCL](#), [server](#), [VHPready](#)

New Part IEC 61850-90-20 proposed - Guideline to Redundancy Systems

IEC TC 57 has proposed a new part for IEC 61850 (57/1766/DC):

Proposal to develop IEC TR 61850-90-20: Communication networks and systems for power utility automation – **Part 90-20: Guideline to redundancy systems**

As more application domains are added to the IEC 61850, additional modelling, description and functional capabilities need to be added to the “core” of IEC 61850. One of the **missing capabilities is functional redundancy**, required by e.g. HVDC, FACTS and industrial applications. Other redundancy systems might also need additions to the standard for correct modelling. This should be investigated in this work.

It is intended to write a Technical Report.

Posted by [Karlheinz Schwarz](#) at 3:27 AM [No comments:](#)

Labels: [Functions](#), [IEC 61850](#), [redundancy](#)

IEC 61850 Applications Outside Power Utilities

IEC 61850 is often applied in non-utility application domains. Three examples are documented in the following papers:

1. Refinery in North America

"Integrating SCADA, Load Shedding, and High-Speed Controls on an Ethernet Network at a North American Refinery"

This paper discusses the implementation of an Ethernet communications network in a ring that connects substations in a closed communications loop at a large industrial facility. Data are transmitted at protection speeds and must be dependable for industrial power system operation and maintenance applications. The redundant electric power system Ethernet communications network is used for a supervisory control and data acquisition (SCADA) system that automates industrial electric power system operations. Click [HERE](#) for the complete paper [pdf]

2. Petrochemical Plant

"SACE Emax 2 -- IEC 61850 integration with MV systems"

PVC plant in Jemeppe needed to upgrade the LV side of the electrical plant, so that it could be fully integrated into IEC 61850 protocol used in MV switchboards. Not only customer needed to monitor status and parameters from air circuit breakers installed in the LV switchboards, but also to control them remotely and to interlock them with MV ones. Jemeppe plant was aiming at a higher system productivity, by avoiding protocol converters, and an increase of safety for technicians thanks to remote control for air circuit breakers. Click [HERE](#) for the complete paper [pdf]

3. Siemens helps Solvay

Solvay Group: International Chemical and Pharmaceutical Company

Solvay uses IEC 61850 for the Operation of high, medium and low voltage systems.

Worldwide systems in use with IEC 61850 up to the network control level, others being planned

Click [HERE](#) for more information [pdf]

Posted by [Karlheinz Schwarz](#) at 1:15 AM [No comments:](#)

Labels: [ABB](#), [Ethernet](#), [GOOSE](#), [IEC 61850](#), [SCADA](#), [Siemens](#), [Solvay](#)

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- [2008](#) (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Thursday, September 1, 2016

New Gateway for EtherNet/IP from and to IEC 61850, DNP3, IEC 60870-5-104, ...

The Anybus® SG-gateway is designed to specifically target Demand Response (networking of industrial electric loads) and Virtual Power Plants (networking of energy resources like biogas plants or combined heat and power units) applications.

REMOTE TERMINAL UNIT FOR SMART GRID APPLICATIONS

The SG-gateway with EtherNet/IP implements a real-time EtherNet/IP adapter interface with an integrated 2-port switch, allowing seamless network integration regardless of network topology (line, star, bus).



Click [HERE](#) for details.

Posted by [Karlheinz Schwarz](#) at 2:35 AM No comments:

Labels: [EtherNet/IP](#), [fieldbus](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61158](#), [IEC 61850](#), [Modbus](#), [Modbus-TCP](#), [Profibus](#), [Profinet](#)

Friday, August 26, 2016

Amendment to Power Quality Meter Goes IEC 61850 and IEC 60870-5-104

The recent post "[Power Quality Meter Goes IEC 61850 and IEC 60870-5-104](#)" needs some explanation to understand what the Gateway could do.

In the case described in the post, we use **one gateway** for **one power quality meter**. Of course this is only one example. A single gateway can acquire signals from **many power quality meters** from different brands and via different protocols: Modbus I/O, Modbus/TCP, Profibus, ProfiNet, Ethernet/IP, and IEC 61850.

The gateway acts as well as a data concentrator, data manager, or proxy gateway. You may use it for any other signals - outside the power quality application. It may be connected to a substation LAN and tap GOOSE messages flying around.

The nice thing is: It can transform between (almost) ANY protocol without the need that IEC 61850 or IEC 60870-5-10x is integrated directly into the end device like a power quality meter.

In the future we will see more devices that have IEC 61850 integrated into their devices (by using a special piece of hardware or integrated onto the main controller of the device).

Posted by [Karlheinz Schwarz](#) at 12:44 AM No comments:

Labels: [Gateway](#), [iec 60870-5](#), [IEC 61850](#), [Modbus](#), [power quality](#), [Profibus](#), [Profinet](#)

Thursday, August 25, 2016

How to Exchange a Voltage Measurement with IEC 61850?

As discussed before you will find a reasonable example to learn the benefits of applying IEC 61850.

Let's look at a voltage measurement:

Information exchange

Many designations and many communication solutions

IEC

International Electrotechnical Commission
International Standardization Organization

ELECTROPEDIA

en voltage
fr tension
ar جهد كهربائي
de Spannung
es tensión (eléctrica)
fi jännite
it tensione (elettrica)
ja 電圧 U (記号)
no spenning
pl napięcie elektryczne
pt tensão (eléctrica)
ru напряжение
sv spänning

tension float32 V
Spannung int32 kV
jännite int16 V
spenning int32 kV
tensão int32 V

Modbus A*

Spannung Skal.

addr=1 int16 0.1
2 int16 0.1
3 int16 0.1

Modbus X*

jännite

27182 float32
27183 float32
27184 float32

A
B
C
jännite

V V V

http://www.electropedia.org/lexicon/display/top?term=jännite-121-11-27

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Virtual Automation

According to IEC Electropedia we find many names for the same semantic: voltage, Spannung, spenning, ... Ok. These help humans to understand what we are talking about. But what about machines (controllers, SCADA systems, ..)? They have to use a **data type** (int16, int32, float32, ...) and a **reference** (address ...) for a specific protocol like Modbus. Each vendor will likely use different types and addresses. What's about the **scale** in applications that use integer? Is the scale known when you read the value of a voltage? Do you know the **offset** or the **multiplier** (V, kV, mV, ...)? How do you know **where** the measurement is taken in the electrical system (location in the single line diagram)? Answers to these questions may be found in a set of documents sitting on a shelf or on someones computer - hard to find out if the owner is on vacation. With IEC 61850 we have a model that could be implemented so that all these details are always accessible online from each device that is a source of measurements:

Information exchange

ONE designation and ONE communication solutions (1)

en voltage
fr tension
ar جهد كهربائي
de Spannung
es tensión (eléctrica)
fi jännite
it tensione (elettrica)
ja 電圧 U (記号)
no spenning
pl napięcie elektryczne
pt tensão (eléctrica)
ru напряжение
sv spänning

One STANDARD Model for all communication use-cases

IEC 61850-7-x

MMXU
PhV
phsA
instCVal.mag.i
q
t
units
SIUnit
multiplier
magSVC
scale
offset

A
B
C
jännite

V V V

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Virtual Automation

Phase A voltage has a standard name "MMXU.PhV.phsA" with the value, quality, timestamp, units, and scale. These names are used all over in any IEC 61850 device.

IEC 61850 services allow to retrieve the MMXU model and read the values:

Information exchange

ONE designation and ONE communication solutions (4)

Retrieve Selfdescription MMXU

← MMXU.PhV.phsA.instCVal.mag.i
← MMXU.PhV.phsA.q
← MMXU.PhV.phsA.t
← MMXU.PhV.phsA.units
← MMXU.PhV.phsA.magSVC

Read MMXU

← MMXU.PhV.phsA.instCVal.mag.i = 2390
← MMXU.PhV.phsA.q = good
← MMXU.PhV.phsA.t = 2014-11-10 13:31
← MMXU.PhV.phsA.units = V / 10**0
← MMXU.PhV.phsA.magSVC = 0.1 / 0

IEC 61850

MMXU
PhV
phsA
instCVal.mag.i
q
t
units
SIUnit
multiplier
magSVC
scale
offset

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Virtual Automation

The device has all information to interpret the voltage value for phase A.

Finally we need to know where the value is measured in the single line diagram. IEC 61850-6 (SCL) provides the solution specified as an SCL file (simplified SSD - Substation Specification Description):


```
<Substation name="MySub">
  <VoltageLevel name="400 kV">
    <Bay name="3A63">
      <Function name="BayFunction_ABC">
        <LNode lnInst="1" lnClass="MMXU" lnName="BayController" lnInst="MEAS" prefix="AC" lnType="ABC_MMX
```

The above voltage could be designated as follows:

MySub_400kV_3A63_BayFunction_ABC/ACMMXU1.PhV.phsA

The value is located in the device "BayController". The device is communication wise identified by an IP Address.

This information really exposes all information needed to interpret a measurement.

Note that this name needs not to be communicated when the value is reported cyclically or issued by a limit change. The report message could only carry the value, quality and timestamp.


The SCL file has all information to configure the whole system and the devices.

Any question?

Hope you have learned this: IEC 61850 goes very far beyond a protocol! We only need the protocol when we retrieve the selfdescription or read out or report the values.

And: the nice thing is that any device that implements the standard uses the same model, configuration, and services. **What else do we need?**

If we would apply just a protocol like Modbus then most of the information exposed (directly from the device) through the standard IEC 61850 would have to be stored in paper docs or excel sheets ...

Posted by [Karlheinz Schwarz](#) at [3:28 AM](#) [No comments:](#) 

Labels: [configuration](#), [configuration language](#), [engineering](#), [IEC 61850](#), [Reporting](#), [SCL](#), [self-description](#), [signal designation](#), [system configuration](#), [XML](#)

Once Again: Is IEC 61850 another Protocol?

IEC 61850 and related standards like IEC 61400-25 offer **very complex definitions** that are intended to ease the life-cycle of the whole system: design, engineering, configuration, operation, maintenance, system extension, documentation, error diagnosis, ...

In my experience with **protocols since 1982** (when I started working for Siemens) I have seen (too) many protocols coming and going. I guess I could list several hundred protocols including IEC 60870-5-10x, DNP3, Profibus FMS, Profibus DP, ...

Many experts (especially in the higher management and HR) have years of experience with one or several protocols - working with 600 baud or even 100 Mbit/s Ethernet based links. It happens quite often that those experts are promoted for higher management functions. Many of them have no experience with the approach of IEC 61850. But they often have to decide if, how and when the new technology will be used.

Because of the complexity, they may decide not to use it at all and even not trying to understand what it really could offer their engineers - at least as long as they are the persons in charge.

The real issue is (as Dee Hock, Founder of Visa put it): "The problem is never how to get new, innovative thoughts [IEC 61850] into someones mind, but how to get old ones out." One of these "old ones" is the opinion that IEC 61850 is something like DNP4 or IEC 60870-5-105 -- just another but more complex protocol (MMS, ISO 9506). This (old, too old, wrong) opinion has also a big impact on decisions, e.g., to get a green-light for attending an IEC 61850 training course. Managers and HR often have the opinion: Why do we need this comprehensive training (of 2, 3, 4, or 5 days) for just another protocol? Often the light stays at RED!

We could put it in future in a different way:

1. IEC 61850 **Protocol Training** -> 1/2 day
2. IEC 61850 **Services** (Client/Server, Publisher/Subscriber, Reporting, Control, Setting Groups, ...) -> 1 day
3. IEC 61850 **Modeling and Models** -> 1 day
4. IEC 61850 **Engineering and Configuration** -> 3 days
5. **How to use it** for protection, SCADA, monitoring, power generation applications -> x days (depending on what application you have in mind).

If you don't understand what Models and SCL provide ... either take a course or stop discussing it.

IEC 61850 is not intended to replace any other protocol with MMS! In order to harvest the fruits of the application of IEC 61850, you have to look at any other topic than protocols.

But you have to be open to take a closer look at the issues listed under bullets 2 to 5.

You will not get an answer by just reading the standards ... take a course to get a reasonable

understanding.

Be an **ENGINEER** - not just a boss or a leader.
Click [HERE](#) for a nice illustration at LinkedIn (or optionally [HERE](#)) to see the difference between old approaches and the engineers solution. IEC 61850 is a very big vehicle to carry a lot of loads - to make life easier.

I will post some example to show you the real benefits.

Posted by [Karlheinz Schwarz](#) at [2:23 AM](#) [No comments:](#) 

Labels: [configuration](#), [DNP3](#), [education](#), [engineering](#), [IEC 61400-25](#), [IEC 61850](#), [Object model](#), [Profibus](#), [SCL](#), [teamwork](#), [Training](#)

Tuesday, August 23, 2016

Neues Format für viertägiges IEC 61850 Seminar im Dezember 2016 in Karlsruhe

Der Bedarf an **guter mehrtägiger Schulung** kollidiert oft der **notwendigen Anwesenheit am Arbeitsplatz!** Die NettedAutomation GmbH hat jetzt eine **Antwort für Sie gefunden:**

Wir bieten bieten vom

06.-09. Dezember 2016 in Karlsruhe
drei Seminarblöcke (1 Tag, 2 Tage und 1 Tag)

an, die **einzelnen oder in Kombination** gebucht werden können. Sie entscheiden selbst, ob Sie nur einen Tag von Ihrem Arbeitsplatz fern bleiben möchten oder zwei, drei oder vier. Je nachdem, welche Zeit und welchen Bedarf Sie haben.

Am **ersten Tag** wird ein Überblick über das Normungsumfeld und die einzelnen Normen gegeben. Im Mittelpunkt stehen dabei die grundlegenden Eigenschaften und Bedeutung der Normenreihe IEC 61850 für Systemdesign, System- und Geräteengineering, Datenmodellierung, Datenmodelle, Kommunikationsmöglichkeiten (Client/Server, Publisher/Subscriber) und Sicherheitslösungen.

Am **zweiten Tag** werden die Modellierungsmethode, die vielfältigen Modelle (Logische Knoten), die Kommunikationsdienste und -protokolle und die System-Konfigurations-Sprache (SCL) im Detail vorgestellt.

Am **dritten Tag** werden anhand vieler praktischer SCL-Beispiele Systembeschreibungen (SSD), Systemkonfigurationen (SCD), Gerätekonfigurationen (ICD und CID für Server/Publisher, Client/Subscriber und Server/Subscriber) diskutiert, erstellt und formal geprüft. Dabei kommt eine Reihe von Werkzeugen und Geräten zum Einsatz.

Am **vierten Tag** wird das Erlernete in praktischen Übungen mit marktgängigen Geräten und Werkzeugen vertieft.

Sie können den 1. Tag, den 2. und 3. Tag sowie den 4. Tag getrennt oder in jeder Kombination buchen!

Mit unserer Schulung bereiten wir Sie hervorragend auf neue Herausforderungen vor!

Klicken Sie [HIER](#) um mehr Details und Anmeldeinformationen herunterzuladen [pdf, 320 KB].

Die mehr als 4.100 Teilnehmer meiner über 230 Seminare seit 2004 würden sicher alle bestätigen, dass das komplexe Thema IEC 61850 unbedingt eine geeignete Schulung verlangt -- und dass wir eine erst-klassische Schulung bieten!

We will offer the same seminar in English from 13-16 Dezember 2016 as well in Karlsruhe (Germany). Details will be available the next days.

Posted by [Karlheinz Schwarz](#) at [9:30 AM](#) [No comments:](#) 

Labels: [FNN-Steuerbox](#), [Gateway](#), [GOOSE](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [OPC](#), [Profibus](#), [Profinet](#), [security](#), [seminar](#), [Smart Grid](#), [VHPready](#)

Friday, August 19, 2016

New Flyer for IEC 61850 Training conducted by FMTP and NettedAutomation

FMTP (Uppsala, Sweden) and NettedAutomation (Karlsruhe, Germany) designed a new flyer for IEC 61850 training courses:



Do you want to reach interoperability for Protection, SCADA, Generation, Design, and Engineering?
We are here to help you!

4,100+ Experts
from 800+ Companies
from 30+ Countries
trained in 230+ courses

IEC 61850 is applied for several years to most new substation designs all over the world. During our seminars, truly experienced and vendor independent senior engineers will help you to see and understand how to use the core parts of the IEC 61850 standard series to reach interoperability, how substation design, engineering, monitoring, protection, and control applications use the standards. You will learn the crucial lessons learned since the first projects.

Crucial topics presented, demonstrated and discussed during our courses:

Where it all starts	Modeling and Naming
• IEC 61850 standardization since 1995	• Overview of IEC 61850-5 and IEC 61850-7-4
• Overview about the standard series	• Modeling approach (Hierarchical models)
• Information modelling and models	• Basic information models (critical Needs)

The flyer lists all crucial topics that are comprised by the various training opportunities: public or in-house, 3, 4, or 5 days ... or as many days you (our customer) want.

In some cases we offered a 1 day introduction course - the maximum number of training days was 11 days (in three sessions) for a big transmission utility in Europe. Another training took 10 days in one block. The maximum number of attendees was 350 for 3 days:




Click [HERE](#) for a brief report of the Bangalore event.

**You get whatever you need -
wherever you are,
whenever you are prepared to get it.
Talk to your management or HR - to get it.
You deserve it!**



Click [HERE](#) for the new 2 page flyer [pdf, 1. MB]

I look forward to meeting you some time down the street.

Posted by [Karlheinz Schwarz](#) at 12:16 PM No comments: 

Labels: [Cyber Security](#), [Edition 1](#), [Edition 2](#), [education](#), [FMT](#), [hands-on Training](#), [hydro power](#), [IEC 61400-25](#), [IEC 61850](#), [protection](#), [renewables](#), [SCADA](#), [seminar](#), [Training](#)

Thursday, August 18, 2016

IEC 61859 Training Course in Stockholm is Filling-Up - Reserve your Seat Now

FMT, KTH, OPAL RT, and NettedAutomation have scheduled a very comprehensive IEC 61850 Training in **Stockholm (Sweden) for 19-23 September 2016**.

The course is filling-up very fast.

Please reserve your seat as soon as possible.

Protection and Control with IEC 61850

5 Days Seminar with practical demonstrations

KTH Stockholm, Sweden

19-23 September 2016

With OPAL-RT Leader in Real time system within Power industry, IEC 61850 Real time system simulation







Click [HERE](#) for the brochure with all details.

[A similar Course \(4 days\) is scheduled for Karlsruhe \(Germany\) 10.-13. October 2016.](#)

See you soon.

Posted by [Karlheinz Schwarz](#) at [3:47 AM](#) [No comments:](#)

Labels: [ABB](#), [Alstom](#), [education](#), [FMTP](#), [General Electric](#), [GOOSE](#), [hands-on Training](#), [IEC 61850](#), [Megger](#), [OPAL RT](#), [protection](#), [Schneider Electric](#), [seminar](#), [Siemens](#), [test lab](#)

Wednesday, August 17, 2016

IEC just published Draft Guidelines for Handling Role-based Access Control in Power Systems

IEC TC 57 just published (57/1764/DC):

Draft IEC TR 62351-90-1, Power systems management and associated information exchange – Data and communications security – Part 90-1: **Guidelines for Handling Role-based Access Control in Power Systems**

This draft technical report addresses the handling of access control of users and automated agents to data objects in power systems by means of role-based access control (RBAC) as defined in IEC 62351-8. IEC 62351-8 defines three different profiles to distribute role information and also defines a set of mandatory roles to be supported. Adoption of RBAC has shown that the defined mandatory roles are not always sufficient and that the method for defining custom roles should be standardized to ensure interoperability. Hence, the main focus of this document lies in developing a standardized method for defining and engineering custom roles, their role-to-right mappings and the corresponding infrastructure support needed to utilize these custom roles in power systems.

Comments are welcome latest by 2016-10-07.

Posted by [Karlheinz Schwarz](#) at [6:57 AM](#) [No comments:](#)

Labels: [IEC 61850](#), [IEC 62351](#), [RBA](#), [Role Based Access](#)

Tuesday, August 16, 2016

IEC 61850: Gateway for Cloud Computing and Fog Computing

Cloud computing and Fog Computing is in principle supported by a single gateway offered by HMS:

- Bridges any signal from the process level directly to your own or third party cloud.
- Maps any signal from Modbus, Profibus, ProfiNet, Ethernet/IP, IEC 61850, IEC 61400-25, IEC 60870-5-104 ... to Modbus, Profibus, ProfiNet, Ethernet/IP, IEC 61850, IEC 61400-25, IEC 60870-5-104 ...
- Provides many logic functions AND, OR, Timer, Counter, ... to build applications.
- Has digital Input and Output pins.
- Reads M-Bus.
- Supports Client, Server, Client/Server, Client/GOOSE-Subscription (with or more Server/GOOSE-Publishers), and Sever/GOOSE-Subscription
- What else do you need for simple applications?

Click [HERE](#) for more information.

Posted by [Karlheinz Schwarz](#) at [12:01 PM](#) [No comments:](#)

Labels: [Cloud Computing](#), [EthernNet/IP](#), [GOOSE](#), [HMS](#), [IEC 61850](#), [Modbus](#), [PLC](#), [Profibus](#), [Profinet](#)

Next Hype: Do You Know Fog Computing?

Some 30 years ago the hype was: MAP (Manufacturing Automation Protocol). One of the next hype is "Fog Computing".

"The Manufacturing Automation Protocols (MAP) and Technical Office Protocols (TOP) were the first commercially defined and accepted functional profiles. Both arose because of the operational concerns of two large corporations, General Motors and Boeing. It is generally accepted that MAP and TOP were the forerunners, first in adopting OSI standards and then in developing usable profiles.

It all started at the end of the **1970s**. GM had on its manufacturing plant shop floors some **20 000 programmable controllers, 2000 robots, and more than 40 000 intelligent devices**, all in support of its business. The main problem was that less than one-eighth of the equipment could communicate beyond the limits of its **own island of automation**; the main inhibiting factor to greater integration being the lack of an appropriate communications infrastructure. As devices supplied were mostly vendor-specific, to do a particular job, they were **not designed or optimised to intercommunicate** or support each other's functions. GM finally realised the gravity of their situation when they began to evaluate the cost of automation, attributing half the cost to the need for devices to intercommunicate. To resolve the matter a task force was created comprising representatives from GM's divisions and their suppliers, with the objective of developing an independent computer network protocol capable of supporting a true multi-vendor environment on the shop floor. They used the OSI model and standards as a basis for interconnection and development of further enhancements. " (Source: The Essential OSI, NSW Technical and Further Education Commission 1991)

The first MAP Profile was published in 1982, Version 1.0 in 1984, MAP 3.0 in 1988. Long time ago!

The MAP approach was understood by just a few experts. Most people believed that MAP was too complex, too ... The **fieldbusses** were thought as the solutions that could cover a kind of Mini-MAP and realtime communication. MAP passed away and hundreds of fieldbusses have been developed since the late 80s. The result was that myriads of automation islands hit the factory floor. These islands were bridged with OPC and so on ... Now we write 2016! Is there anything new?

Not that much. We still have the problem that the **sheer unlimited number of (usually raw) signals** (measurements, status, settings, ...) are polled or pushed from the sensor and actuator level all the way up to the SCADA level or even higher. This approach of signal acquisition does not scale in the future where we expect thousand of times more devices, sensors, controllers, ... as GM had to manage in the 70s. Does the Cloud Computing solve this challenge? It is unlikely that this (more or less raw data acquisition) will work?

And now? What to do? Use Fog Computing!

"Fog computing is the missing link to accelerate IoT. It spans the continuum from Cloud to Things in order to bring compute, control, storage and networking **closer to where the data is being generated**.

The sheer breadth and scale of IoT solutions requires collaboration at a number of levels, including hardware, software across edge and cloud as well as the protocols and standards that enable all of our "things" to communicate. Existing infrastructures simply **can't keep up with the data volume and velocity created by IoT devices**, nor meet the low latency response times required in certain use cases, such as emergency services and autonomous vehicles. The strain on networks from cloud-only or cloud-mostly models **will only get worse** as IoT applications and devices continue to proliferate. In addition, the devices themselves are starting to become smarter, allowing for additional control and capabilities closer to where the data is being generated."

(<http://www.openfogconsortium.org/about-us/#frequently-asked-questions>)

Quite interesting that the hype Cloud Computing is seen from a different perspective in 2016.

The approach of IEC 61850 (starting in 1998) is from the very beginning the same as discussed in the Fog Computing community: Compute, control, store, and networking **closer to where the data is being generated (at THE process level like in substations or power generation all over)**. Many information models standardized in IEC 61850 and IEC 61400-25 define distributed functions like protection, active power control or reactive power compensation ... schedules for tariffs, alarming, tripping, reporting by exception (RBE), ... in order to reduce the needed bandwidth and allow for realtime and near realtime behavior.

Lesson learned: Fog Computing is already practiced in the domain of power automation - and based on well defined standards (IEC 61850 and IEC 61400-25)! Both standard series make use of the most crucial standard of MAP: **MMS** (Manufacturing Message Specification, ISO 9506). It took some 30 years for more people to understand the challenges! ;-) There is nothing new under the sun.

Posted by [Karlheinz Schwarz](#) at [9:39 AM](#) [No comments:](#) 

Labels: [Cloud Computing](#), [Fog Computing](#), [IEC 61400-25](#), [IEC 61850](#), [IOT](#), [MAP](#)

Saturday, August 6, 2016

IEC 61850-90-10 Draft Technical Report on Schedules just published

IEC TC 57 just published the Draft Technical Report:
IEC/TR 61850-90-10 Ed.1.0 (57/1762/DTR)
Communication networks and systems for power utility automation -
Part 90-10: IEC 61850 objects for scheduling

Closing date for voting is 2016-09-30

Schedules establish which behavior (e.g., tariff 1 or 2, mode 1 or 3) or expectation (e.g., forecast) is applied during specified time periods. A schedule consists of a series of entries with a setting for the value of a setpoint, the selection of a particular mode or the value of a parameter for a mode.

There are different ways to operate a scheduled entity based on the following operation principles:

- The actual values of a scheduled entity (e.g. active and reactive power produced or consumed) are directly controlled using **setpoints and controls**. For example, the DER system reacts on changes of the setpoints or on controls (e.g. start or stop the DER system) in real time.
- The functional behavior of a scheduled entity is configured to operate in a mode in which it responds to locally sensed conditions (e.g. Volt-VAr Mode in case of DER) or externally provided information (e.g. prices).

The schedules offer a very powerful functionality that can be used in many different applications.

Currently we have two major applications in Germany that make use of the schedules:

1. [VHPready](#)
2. FNN Steuerbox

NettedAutomation has implemented the most crucial concepts on an embedded controller used in the [HMS gateways](#).

More to come soon.

Posted by [Karlheinz Schwarz](#) at [12:42 AM](#) [No comments:](#) 

Labels: [Automation](#), [DER](#), [Gateway](#), [HMS](#), [IEC 61850](#), [IEC 61850-90-10](#), [Schedule](#)

Thursday, August 4, 2016

What is a Critical Infrastructure?

According to [Wikipedia](#):
"**Critical infrastructure** is a term used by governments to describe **assets** that are essential for the **functioning of a society** and economy - the infrastructure."

The first three infrastructures listed are:

1. electricity generation, transmission and distribution;
2. gas production, transport and distribution;
3. oil and oil products production, transport and distribution;
4. ...

Many other areas could be taken into account - all domains where we have some automation in one form or another you may or may NOT TRUST. So far we have trusted our teachers, our employers, our parents, our car, our friends, our banks, our electric power delivery system ... There seems to be a change coming step by step.
What could we all do about it?

For our family we have just decided to install a 9,8 kWp Photo Voltaic system on our roof. This is - hopefully - a power harvesting machine we could trust ... as long as the sun is shining.


The latest issue discussed is on "Election Systems" according to the [FederalNewsRadio](#):

"The Homeland Security Department is actively considering whether it should add the nation's **election system** — or the individual systems that 9,000 local and state jurisdictions use to collect, tally and report votes — as an entity that needs DHS protection from cybersecurity attacks."

What if we put it all under the new term "Critical Everything" (CE)?
All depends on human beings we have to trust! I want to be such a person - my wife, my family, our friends, you, ... can trust.

When we engineers develop something, we should pay a lot of attention to make the "something" robust, safe, ... better safe than sorry.

Let's do our best in the interest of all our societies.

Posted by [Karlheinz Schwarz](#) at 8:44 AM [No comments:](#) 

Labels: [Critical Infrastructure Protection](#), [electric power system](#), [power system engineer](#), [security](#)

Sunday, July 31, 2016

Power Quality Meter Goes IEC 61850 and IEC 60870-5-104

Friday last week I was involved in installing a high level Power Quality Meter ([UMG 512 from Janitza](#)) to monitor the power for a new building:



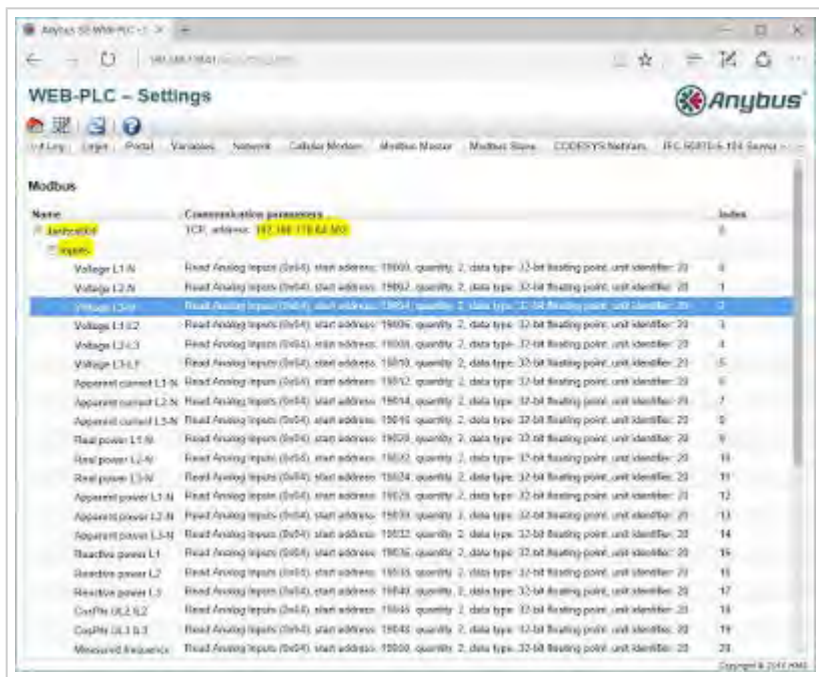
The objective was to apply a smart gateway between the Meter and IEC 61850 and IEC 60870-5-104. It took some 90 minutes to install the meter and configure it for Modbus TCP communication. The gateway used is an [HMS Anybus SG Gateway I/O](#).



The gateway offers connectivity to Profibus, ProfiNet, Ethernet/IP, and other protocols. The gateway reads out 22 signals from the Meter (all new Meters from Janitza use the same addresses for the basic signals):

Modbus address list					
Address list					
Frequently required readings					
Address	Format	IED/WH	Description	Unit	Note
19000	Float	RD	.G.U1.N0	V	Voltage L1-N
19002	Float	RD	.G.U1.N1	V	Voltage L2-N
19004	Float	RD	.G.U1.N2	V	Voltage L3-N
19006	Float	RD	.G.U1.L0	V	Voltage L1-L2
19008	Float	RD	.G.U1.L1	V	Voltage L2-L3
19010	Float	RD	.G.U1.L2	V	Voltage L3-L1
19012	Float	RD	.G.I1.N0	A	Apparent current, L1-N
19014	Float	RD	.G.I1.N1	A	Apparent current, L2-N
19016	Float	RD	.G.I1.N2	A	Apparent current, L3-N
19018	Float	RD	.G.I1.SUM0	A	Vector sum, (I1-I1+I2+I3)
19020	Float	RD	.G.P1.N0	W	Real power L1-N
19022	Float	RD	.G.P1.N1	W	Real power L2-N
19024	Float	RD	.G.P1.N2	W	Real power L3-N
19026	Float	RD	.G.P1.SUM0	W	Power, P1+P2+P3
19028	Float	RD	.G.S1.N0	VA	Apparent power L1-N
19030	Float	RD	.G.S1.N1	VA	Apparent power L2-N
19032	Float	RD	.G.S1.N2	VA	Apparent power L3-N
19034	Float	RD	.G.S1.SUM0	VA	Sum: S1+S2+S3
19036	Float	RD	.G.Q1.N0	var	Reactive power L1 (fundamental comp.)
19038	Float	RD	.G.Q1.N1	var	Reactive power L2 (fundamental comp.)
19040	Float	RD	.G.Q1.N2	var	Reactive power L3 (fundamental comp.)
19042	Float	RD	.G.Q1.SUM0	var	Quasi-Q1+Q2+Q3 (fundamental comp.)
19044	Float	RD	.G.COS_F1.N0	-	CoPF1, U1, 1.1 fundamental comp.
19046	Float	RD	.G.COS_F1.N1	-	CoPF1, U1, 1.2 fundamental comp.
19048	Float	RD	.G.COS_F1.N2	-	CoPF1, U1, 1.3 fundamental comp.
19050	Float	RD	.G.FREQ	Hz	Measured frequency

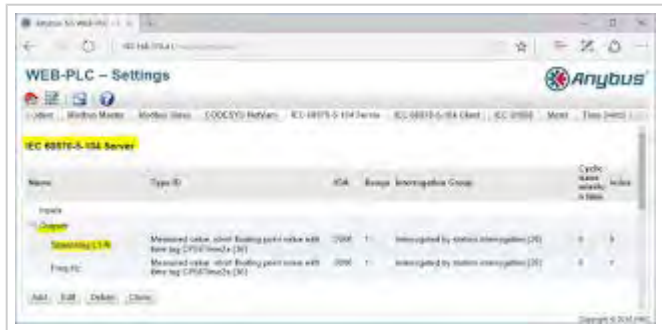
The Modbus signals (from an UMG 604) are listed in the gateway for polling:



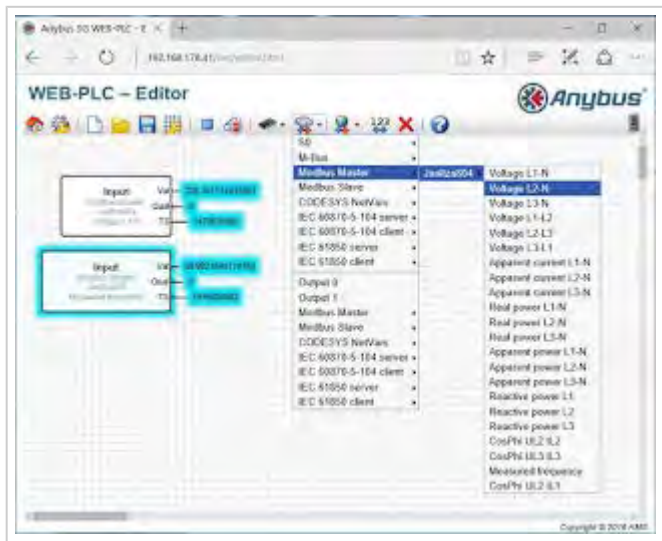
As well we need to configure the Signals for IEC 61850 and IEC 60870-5-104:



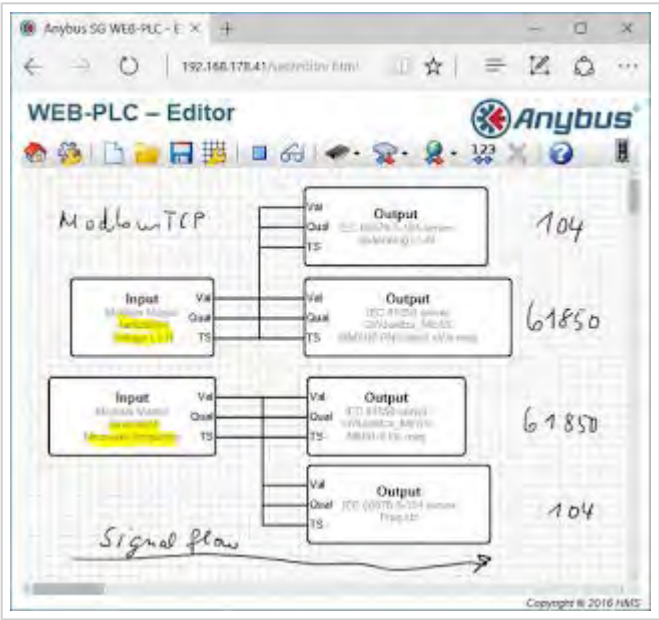
The signals in IEC 61850 are configured with an SCL File. The 104 signals need manually configuration.



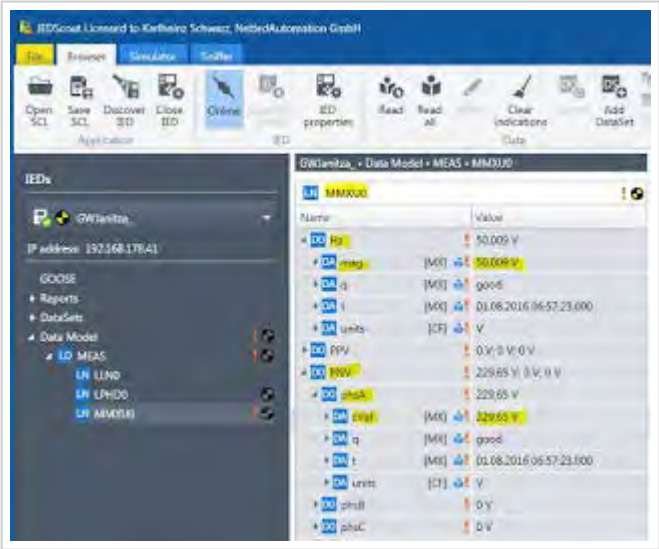
Finally we need to program the mapping from Modbus to IEC 61850 LNs and IEC 60870-5-104 signals. The drop-down menu is used to place the signals to the screen:



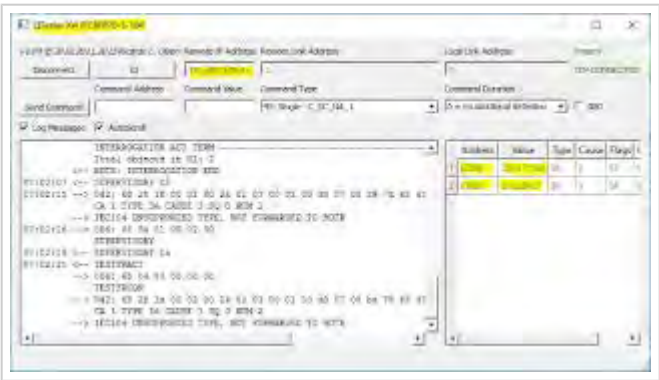
Finally the inputs are linked to the outputs:



The signals from the Meter are automatically exposed through IEC 61850 and IEC 60870-5-104 servers.
The [IEDScout 4.1](#) from Omicron is used to connect to the IEC 61850 Server in the Gateway:



And the QTester104 receives messages from the IEC 60870-5-104 server:



Lesson learned: It took less than one hour to configure the Gateway and use it.
This is likely the easiest and fastest way to communicate Power Quality Meter signals through IEC 61850 and IEC 60870-5-104.

Posted by [Karlheinz Schwarz](#) at 10:42 PM No comments:

Labels: [Gateway](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [Janitza](#), [Modbus](#), [Modbus-TCP](#), [power quality](#), [Profibus](#), [Profinet](#)

Wednesday, July 27, 2016

Could You Measure a Change in Air Flow caused by a Wind Turbine in a distance of 100 km?

Assume an air flow of $x \text{ m}^3$ per second. What happens at your position if a big wind turbine is starting to rotate in a distance of 100 km? Do you expect that you could measure that the air flow is reduced due to the wind turbine that removes energy from the air flow? It may be possible if the turbine would be located in a huge tube. So far so good.
Another question: Could you believe "that a **short-circuit** at Lawrence Berkeley lab one day was observed by a micro-PMU [Phasor Measurement Units] in Los Angeles, **550 kilometers away, as a 0.002 percent dip in voltage**"? It is more likely that one can measure a 0.002 percent dip in 550 km distance than a change in air flow 100 km away caused by a wind turbine.
With a network of many micro-PMUs it may be possible to figure out that somebody is switching on a computer. If you install enough micro-PMUs you may get there.
With a good power quality meter and pattern recognition I could figure out when my wife switches on the Toaster or Microwave.

Each of load (in our home or in the neighborhood) has a specific finger print. So that I could see the patterns and learn what they mean - after some training.

Some people made this observation "We're **watching the volts and the amps** and we're not even inside the substation. We're five miles away. We came up with this idea: What if we were to **tell the substation operator that this substation switch is opening and closing**? If they were the ones opening and closing it, that's great. But if not, that's a pretty good sign that there's a cyber attack at least being experimented with."

This is a true story (I guess).

Click [HERE](#) for a news report from IEEE Spectrum.

More Big Data to come. Be aware in your home that a power quality meter connected to the copper wire some 20 to 50 m away may be watching you. What about privacy? Is it a good thing to know (almost) everything?
"For in much wisdom is much grief; and he that increaseth knowledge increaseth sorrow."
(Kohelet 1:18)

Posted by [Karlheinz Schwarz](#) at [8:46 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [monitoring](#), [pattern recognition](#), [PMU](#), [power quality](#)

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Wednesday, July 27, 2016

FERC is about to Strengthen the Critical Infrastructure Protection (CIP) Requirements

Security is (so far) likely the **most crucial key word in 2016**. We all want to live in a secure world with a secure power delivery system and many other infrastructures. There are many rules set by well known standard setting organizations. One is the US Federal Energy Regulatory Commission (FERC). They have published the Critical Infrastructure Protection (CIP) Reliability Standards years ago. Usually the rules are improved after something serious happened. What happend some months ago? Yes, the Dec 23, 2015 cyber attack on the electric grid in Ukraine. A lot of reports have been published recently. FERC seeks comments (in this summer) on possible modifications to the CIP Reliability Standards - and any potential impacts on the operation of the **Bulk-Power System** resulting from such modifications - to address the following matters:

- 1. **separation between the Internet and BES Cyber Systems in Control Centers** performing transmission operator functions; and
- 2. **computer administration practices that prevent unauthorized programs from running, referred to as “application whitelisting,”** for cyber systems in Control Centers.

Click [HERE](#) to access the FERC Docket No. RM16-18-000 that has all the details.

Security standards are one measure to improve the protection of technical systems - but the most crucial issue is: TRUST! **Trust is what it's really all about.** I hope that all readers of this IEC 61850 blog trust me! I do my best!

By the way, the **security requirements on paper or in a PDF document do not protect any system**. It is the human beings (you can trust) that have to understand the complexity of the power delivery system, the software applications, communication, and administration of the hardware and software. This requires **well educated people - educated in many different (or even all) domains -, sufficient resources, and decisions to implement what is needed.**

Rene Descartes (1596-1650) understood it already very well what we have to do: "Hence we must believe that all the sciences are so **interconnected**, that it is much easier to **study them all together than to isolate one from all others**. If, therefore, anyone wishes to search out the truth of things in serious earnest, he ought not to select one special science, for all the sciences are **cojoined** with each other and **interdependent**."

And: **Teamwork makes the dream work!**

Stay safe!

Posted by [Karlheinz Schwarz](#) at [1:01 AM](#) [No comments:](#) 

Labels: [CIP](#), [Critical Infrastructure Protection](#), [Cyber Security](#), [education](#), [FERC](#), [IEC 61850](#), [IEC 62351](#)

Saturday, July 23, 2016

IEC TC 57 Published FDIS IEC 62351-11 Security for XML Documents

Have you ever seen a multi MegaByte XML file used for system or device configurations, COMTRADE, COMFEDE, or other purposes? I have big SCL files that represent real substation specifications. What happens if one (1) single character is removed or changed by somebody ...? A change of a single character can have very severe consequences! In order to secure XML Files in the context of IEC and other standards organizations, IEC TC 57 just published the document: 57/1753/FDIS: Power systems management and associated information exchange – Data and communications security – IEC 62351-11: Security for XML Documents

Voting closes 2016-09-02

IEC 62351-11 specifies schema, procedures, and algorithms for securing XML documents that are used within the scope of the IEC as well as documents in other domains (e.g. IEEE, proprietary, etc.). This part is intended to be referenced by standards if secure exchanges are required, unless there is an agreement between parties in order to use other recognized secure exchange mechanisms. It utilizes well-known W3C standards for XML document security and provides profiling of these standards and additional extensions.

Posted by [Karlheinz Schwarz](#) at [10:50 AM](#) [No comments:](#) 

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

For your Convenience

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[Blog as single PDF until 08 April 2016 \[14 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

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► March (7)

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► 2014 (129)

Labels: [configuration language](#), [IEC 61850](#), [IEC 62351](#), [iec 62351-11](#), [SCL](#), [security](#), [XML](#)

Wednesday, July 20, 2016

PowerEDGE Offers 3 day Training Course on IEC 61850 and Related Topics in Singapore (24-26 Oct 2016)

The Asian-Pacific region is demanding for competent education services in connection with the application of advanced automation solutions based on IEC 61850 and related standards. PowerEDGE invites you to attend the most comprehensive Training Course on IEC 61850 ... tap the experience of 230+ courses with 4,100+ attendees all over. The training will be conducted in Singapore on 24-26 October 2016. Click [HERE](#) for more details and registration information.

Posted by [Karlheinz Schwarz](#) at [1:35 AM](#) [No comments:](#) 

Labels: [Asia](#), [education](#), [hands-on Training](#), [IEC 61850](#), [IEC 62351](#), [security](#), [seminar](#)

Thursday, July 14, 2016

How to Protect Electric Power Delivery Systems?

These days we see a lot of discussions on **security** in the domain of electric power delivery systems. One thing is for sure: The power delivery infrastructure is under heavy stress ... just to list a few issues:

1. Aging equipment (primary and secondary).
2. Increasing cyber attacks.
3. Increasing **physical attacks**.
4. Aging Workforce.
5. Political objective to reduce the rate per kWh of electric power consumed.
6. ...

A lot has been discussed recently regarding these and other issues.

Today I would like to have a brief look on the third bullet "**Physical Attack**". The Wall Street Journal (WSJ) published the other day a report on physical attacks of substations in the US: "Grid Attack: **How America Could Go Dark**". After reading these news I decided not to post anything about that report. But: When I got up this morning I read the (bad) news about the tragic attack on humans in Nice (France) last night with 80 people on the death toll of 80, I said to myself, I have to talk about these physical attacks.

First of all, our prayers are for the French people in general and especially for those that have lost one of their loved one, for those that are insured, and those that have experienced this attack.

Second, please read the WSJ report to understand the situation of our - partly very unprotected - electric power delivery system:

Click [HERE](#) for the report.

More or less the same could be reported about many substations worldwide.

Next time we may see a truck driving into a major substation, power plant, or high voltage transmission tower, ... How can we protect ourselves and the technical systems that are needed every second in our life?

2. Timothy 3:1-5 says: "1 But understand this, that in the **last days** there will come times of difficulty. 2 For people will be lovers of self, lovers of money, proud, arrogant, abusive, disobedient to their parents, ungrateful, unholy, 3 heartless, unappeasable, slanderous, without self-control, **brutal**, not loving good, 4 treacherous, reckless, swollen with conceit, lovers of pleasure rather than lovers of God, 5 having the appearance of godliness, but denying its power."

It is unlikely that all humans will understand the importance of the electric power delivery system (and other critical infrastructures) and to control themselves NOT TO TOUCH the system (AND of course other humans)! So, we have to do our best to better physically protect the crucial stations - which is better than do nothing. Attacks will continue to happen - but we have to spent more resources to increase the physical security.

We all have to accept the increase in your electric power bill - if we want to continue using power whenever we need it - 24/7. I hope that we learn better what the real value of our electric power infrastructure is for our daily life!

Posted by [Karlheinz Schwarz](#) at [11:45 PM](#) [No comments:](#) 

Labels: [aging infrastructue](#), [control](#), [critical infrastructure](#), [Critical Infrastructure Protection](#), [Cyber Attack](#), [power outage](#), [protection](#), [reliable power delivery](#)

- [2013](#) (130)
- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

KEMA (now DNV GL) has Developed a New Suite of Test Tools for IEC 61850

DNV GL (former KEMA, Arnhem/NL) has developed a suite of IEC 61850 test tools, which will be sold under license to both utilities and technology providers. Under the name **UniGrid**, DNV GL provides a new and improved test tool. UniGrid enables test and simulation of a complete IEC 61850 substation automation system and it can be used for various types of conformance and interoperability tests.



The product is planned to be available later this year.

Click [HERE](#) to request a copy of the new Brochure.

Posted by [Karlheinz Schwarz](#) at [3:09 AM](#) [No comments:](#) 

Labels: [conformance test](#), [DNV GL](#), [IEC 61850](#), [interoperability tests](#), [KEMA](#), [testing](#), [tools](#)

Saturday, July 9, 2016


New Work Items Proposed within IEC TC 57 (IEC TS 62351-100-1)

57/1747/NP

Power systems management and associated information exchange – Data and communications security – Part 100-1: Conformance test cases for the IEC 62351-5 and its companion standards for secure data exchange communication interfaces (proposed IEC TS 62351-100-1).

The scope is to specify common available procedures and definitions for conformance and/or interoperability testing of the IEC 62351-5, the IEC 60870-5-7 and their recommendations over the IEC 62351-3. These are the security extensions for IEC 60870-5 and derivatives.

Ballot closes 2016-09-30

Posted by [Karlheinz Schwarz](#) at [9:31 AM](#) [No comments:](#) 

Labels: [conformance test](#), [DNP3](#), [iec 60870-5](#), [IEC 62351](#), [security](#)

New Work Items Proposed within IEC TC 57 (IEC 62351-14)

57/1746/NP

Power systems management and associated information exchange - Data and communications security - Part 14: Cyber security event logging (proposed IEC 62351-14)

This part 14 of the IEC 62351 series specifies technical requirements for logging cyber security events: transport, log data and semantics, such as how to send and receive security events securely, reliably, how to forward security events or logs, etc.

The purpose of this standard is to specify the requirements needed by the power industry to meet their cyber security needs, to comply with cyber security regulations and standards, and to guarantee interoperability among different vendor products.

Logical Node "GSAL" (Generic security application), IEC 61850-7-4, is recommended to take into account with the already published data objects:

AuthFail	Authorisation failures
AcsCtlFail	SEC Access control failures detected
SvcViol	SEC Service privilege violations
Ina	SEC Inactive associations
NumCntRs	Number of counter resets

Ballot closes 2016-09-30

Posted by [Karlheinz Schwarz](#) at [9:25 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [IEC 61850](#), [IEc 61850-7-4 Ed2](#), [IEC 62351](#), [logging](#), [security](#)

New IEC TC 57 and TC 88 CDV Documents Available for Public Comments

Please note that the following documents are now available for public comments:

57/1721/CDV
IEC 61970-452 Ed.3: Energy management system application program interface (EMS-API) - Part 452: CIM static transmission network model profiles

88/587/CDV
IEC 61400-25-1 Ed.2: Wind energy generation systems - Part 25-1: Communications for monitoring and control of wind power plants - Overall description of principles and models

Click [HERE](#) for accessing the two documents for comments.

Please note that the general title of the series of IEC 61400-25 has changed to "Wind energy generation systems" ... so does the title change as well:

IEC 61400-25-1: Wind energy generation systems -
Part 25-1: Communications for monitoring and control of wind power plants - Overall description of principles and models

Posted by [Karlheinz Schwarz](#) at [9:06 AM](#) [No comments:](#) 

Labels: [CDV](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61970](#), [public comments](#)

Friday, July 8, 2016

Old School versus New School - The Change of Generations in the Power Industry

Recently there was a conference in Cologne (Germany) held on how to improve human resources developments in power utilities. It seems that many managers expect that they fall short of hiring the best engineers.
Why is the situation in the power industry so crucial? There are many reasons - according to my personal experience. One crucial fear is the **change of generations: Old School versus New School**.
It is a pity that maintaining and improving the **largest and the most crucial machines ever** (the interconnected power delivery systems) are not so attractive to young people. What would young people do if there would not enough power to send their messages and photos back and forth? What would hospitals do without electric power? Or ...

Many discussions in the public are centered around one issue: getting cheap and cheaper power. I have experienced this quite often when HR managers start discussing with me to offer cheaper training courses ... I guess many of them have to learn that the **change of generations of engineers will become THE challenge** in the power industry. Why: Because the complexity of the secondary power system solutions has reached a level that can't easily be managed by inexperienced and less-motivated engineers. These engineers have to be trained in power systems theory **AND** information systems theory.

We (older) engineers had a chance to learn new technologies step by step over a long period - sometimes 20 or more years. These days we see new approaches being popping-up over night - more or less. The pressure is coming, e.g., from Internet technologies, Industry 4.0, and Smart Phones. These new possibilities will have a big impact on the way how power is generated, transmitted, and (of course) how it is distributed and used.


How do we get prepared for the future power delivery system? Solid education is one of the key issues and expensive.

But many HR managers want to get the best for free. The best things in life may be free. But not the power delivery. The real cost of power delivery will likely only be understood after a longer huge black-out.

One objective of HR managers is to hire more young and motivated engineers - another should be to give the experienced and interested engineers more chances to receive the

education they need for the years to come.

Ask for a permission to attend a training - good luck!

Posted by [Karlheinz Schwarz](#) at 6:16 AM 1 comment: 

Labels: [aging infrastructue](#), [aging work force](#), [change of generations](#), [education](#), [human resources](#), [Training](#)

Experience with the OMICRON IEDScout Version 4.10 - The Name Space Concept

As you may know we have defined a very powerful namespace concept into IEC 61850. It allows to use logical nodes and data objects from multiple application domains in one single SCL File.

This concept has been incorporated into the standard (IEC 61850-6, -7-1, -7-2, -7-3, 7-4, and 8-1) some 15 years ago. At that time I was the editor of parts -7-1 and -7-2. By the way: These five (5) parts are often called "The Core Parts of IEC 61850".

The name space "IEC 61850-7-4:2003" indicates that ALL instances within this logical device are derived from the 2003 editions of IEC 61850-7-4, IEC 61850-7-3, and IEC 61850-7-2. The **logical device name space** could be understood as the **prime name space**. The attribute IdNs is an attribute contained in the name plate of the logical node zero (LLN0). A device that implements more than one Logical Device can support multiple prime name spaces - one per Logical Device.

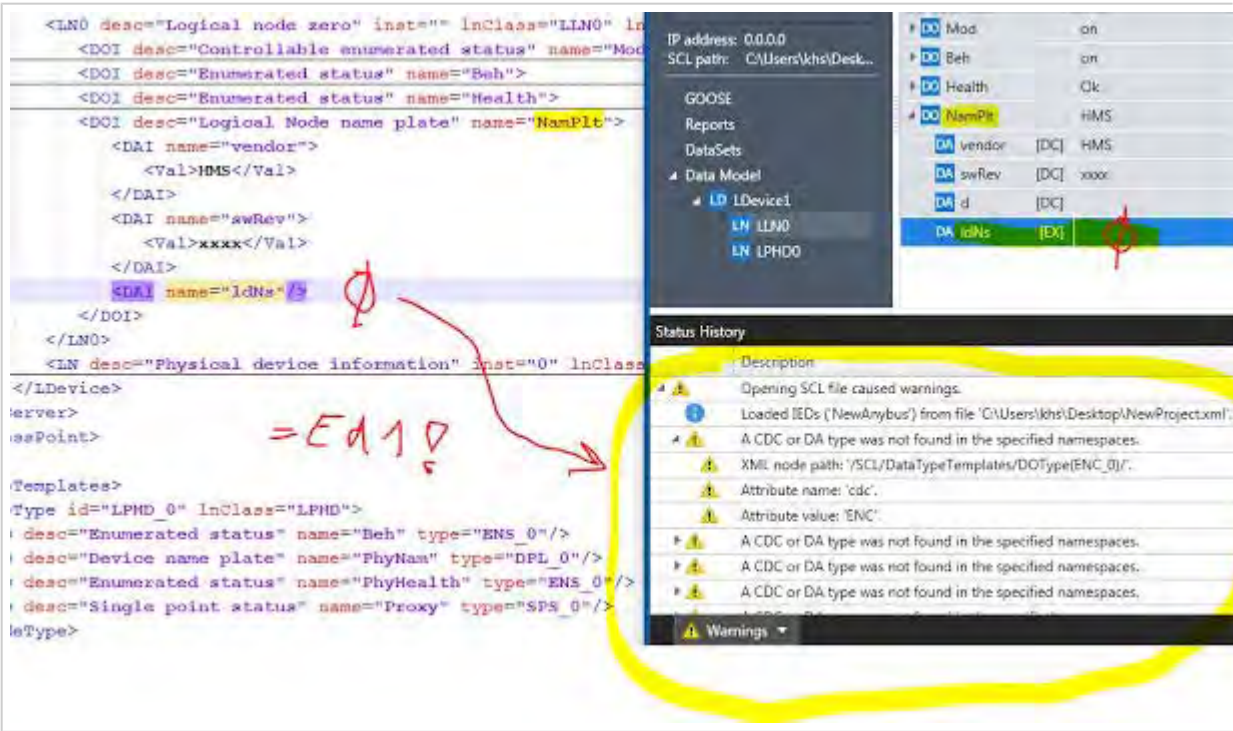
The name space for Edition 2 of the core documents is as follows:

IEC 61850-7-4:2007A

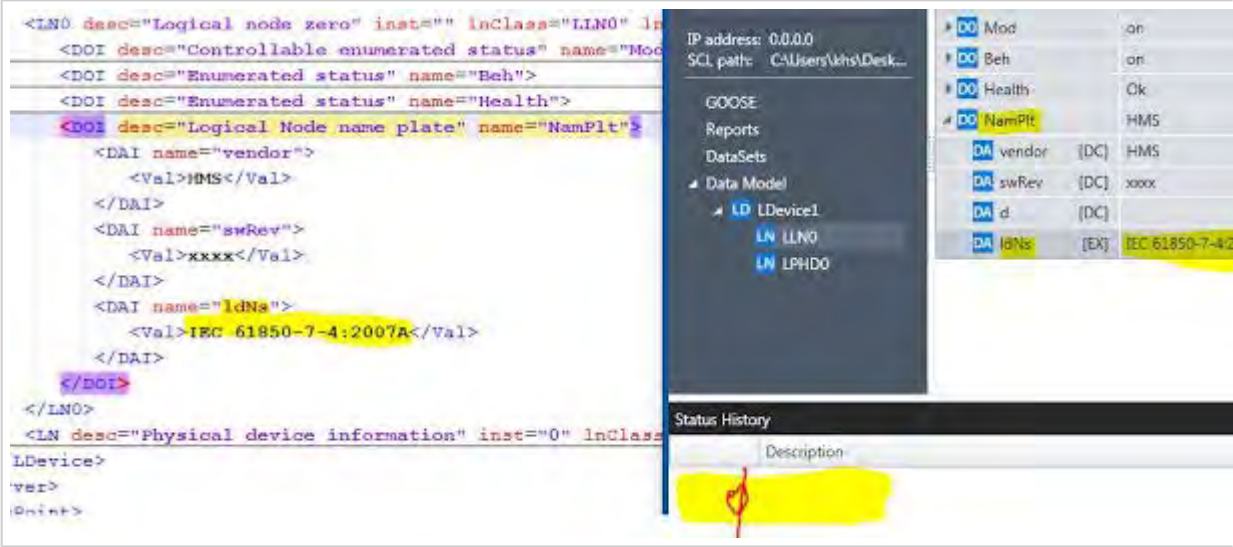
The **Omicron IEDScout V4.1** analyzes this Logical Device name space and acts according to the name space configured. Let's see how that works.

If the LD name space is missing then the default value will be used: this means Edition 1 of the core documents).

The following figure shows an SCL file that does not contain a value for the "IdNs". Now we open the SCL file with the IEDScout 4.1. The IEDScout figures out that the prime name space is Edition 1 of the core parts. In Edition 1 of IEC 61850-7-3 (Common Data Classes) there are no CDCs like ENS and ENC defined. This is indicated in the warning area. Edition 1 of IEC 61850-7-3 defines INS and INC instead.



The new enumerated Common Data Classes (ENS, ENC and ENG) have been added in Edition 2 of IEC 61850-7-3. The SCL File with the Edition 2 prime name space is shown next:



The IEDScout does not show any warning!

Smart!

What does that mean for all of us? We have to make sure that our IEC 61850 models configured in an SCL File are according to the prime name space we want to use!

And: The IEDScout has many other powerful (browsing, testing, ...) features build-in that help you to get your IEC 61850 based system running according to the standard series IEC 61850, IEC 61400-25, ...

I am using the IEDScout 4.1 in my training courses. Attendees learn how to model IEDs and how to test them.

Click [HERE](#) for downloading a 30 days fully functional evaluation license.

Posted by [Karlheinz Schwarz](#) at 2:10 AM No comments:

Labels: [configuration language](#), [IEC 61400-25](#), [IEC 61850](#), [IED configuration](#), [IEDScout](#), [network analyzer](#), [Omicron](#), [SCL](#), [system configuration](#), [testing](#)

Thursday, July 7, 2016

Should Power Grids Put Their Critical Digital Systems Off?

Power delivery systems worldwide are under heavy stress: physical stress and stress caused by shareholders and hackers and ... The stress is heavy often due to very limited resources that hinder engineers to improve the system very much.

Some people believe that the solution may be lying in going back to the Old Days! They want to spend USD 10.000.000+ for studying to go ,Back to **analog** and **non-digital control systems, purpose-built control systems**, and **physical controls**. Who has said this? ... some 20 years ago? No: this month!

The motto of some US congress man seems to be: Get rid of state-of-the-art technology.

A corresponding bill was assigned to a congressional committee on June 6, 2016:
Click [HERE](#) for more details.

Click [HERE](#) to download the text of the bill [pdf].

Click [HERE](#) for a discussion published under nextgov.com.

Does this mean the end of digital protection and automation systems? The end of communication according to IEC 61850, IEC 60870-5, DNP3, Modbus, ...?

What is needed? More **well educated engineers** that can **use the digital technology** in a way that the **power delivery system can be managed securely** and that become able to understand how the technology can be applied in order to **re-start the power delivery system after a blackout**.

I would like to see 10 per cent of the budget (USD 1.000.000) spent into education for protection, automation, SCADA and communications engineers. Have you ever tried to get approval for attending a training course for advanced protection, automation, SCADA, and communications like IEC 61850, or ...??

My experience after I run more than 230 courses worldwide and educated more than 4.100 engineers is this: many engineers that have asked me for a quote to conduct an in-house course or attending a public course had to give up due to budget restrictions!!

The other USD 10.000.000 could be spent for improving the digital based equipment as Cris Thomas, a security expert (see link to nextgov.com above), said: "Instead of spending two years and \$10 million exploring ways to downgrade critical systems with even more outdated tech, we should instead invest that time and money into transforming security for the technology currently in place, and into building next-generation security features directly into future technology."


If utilities want to change the way the run their assets the management and stake holders

should listen to the engineers!! And follow their recommendations! This is even more crucial in case of implementing more physical control done by human beings!

Badly educated engineers could do more harm than well operating machines.

Whatever we want to do to "ruggedize" our power delivery system, we need more well educated and experienced engineers. Retiring senior engineers with 52 years (to reduce costs) is not a real option! Or? We need you all! And we need young people to study electric power systems and information technology.

Click [HERE](#) for some additional discussion by myself ([German version](#)).

Posted by [Karlheinz Schwarz](#) at 1:42 AM [No comments:](#) 

Labels: [Automation](#), [blackout](#), [IEC 61850](#), [IEC 62351](#), [peopleware](#), [reliable power delivery](#), [security](#), [smart people](#), [USA](#)

Saturday, July 2, 2016

FMTP and NettedAutomation announce Seminar Dates for 2017

Due to the request from power engineers FMTP and NettedAutomation have scheduled several dates for public training courses in 2017:

2016

19-23 September 2016 in Stockholm, Sweden [EN]

10-13 Oktober 2016 in Karlsruhe, Germany [EN]

07-09 Dezember 2016 in Karlsruhe, Germany [DE]

2017

30 January 2017 in San Diego, CA USA (just prior to the DistribuTECH 2017) [EN]

14-17 March 2017 in Stockholm, Sweden [EN]

04-07 April 2017 in Karlsruhe, Germany [EN]

19-22 September 2017 in Stockholm, Sweden [EN]

10-13 Oktober 2017 in Karlsruhe, Germany [EN]


Keep tuned to this blog to receive the latest in the domain power system protection and automation. Tap the experience of more than 230 training courses:



Plan your training for Fall 2016 and 2017 now!

Click [HERE](#) for further details.

Click [HERE](#) to contact us per email in case you have any question.

Posted by [Karlheinz Schwarz](#) at 5:36 AM [No comments:](#) 

Labels: [DNP3](#), [FMTP](#), [Gateway](#), [GOOSE](#), [IEC 60870-5-104](#), [IEC 61131-3](#), [IEC 61850](#), [Modbus](#), [NettedAutomation](#), [Profibus](#), [Profinet](#), [protection](#), [sampled value](#), [seminar](#), [Training](#)


Tuesday, June 28, 2016

IEC 60870-5-104 AND IEC 61850 in all Training Courses of NettedAutomation

Due to the increasing importance of IEC 60870-5-104 in many new projects (e.g., in VHPready) NettedAutomation incorporates a new training module into the standard 3 days and 4 days training courses.

Usually we will spent a half day on IEC 60870-5-104 during our 3 days course and a full day in our 4 days course.

In-house courses may vary. We also offer 2 days special courses on IEC 60870-5-104 including practical exercises, e.g., to understand the VHPready solution and how to build gateways for many well known industrial fieldbusses like Profibus, Profinet, Ethernet/IP, etc. Click [HERE](#) if you are interested in training for IEC 60870-5-104.

Posted by [Karlheinz Schwarz](#) at 1:43 AM [No comments:](#) 

Labels: [EthernNet/IP](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Profinet](#), [seminar](#), [Training](#), [VHPready](#)

VHPready - Offener Industriestandard auf dem Vormarsch

Die Versorgungssicherheit in der Energiewende soll durch innovative Applikationen wie Lastmanagement und virtuelle Kraftwerke gewährleistet werden. Ihre Aufgabe ist es, die natürlichen Schwankungen der erneuerbaren Energien auszugleichen. Der offene Industriestandard VHPready fördert dabei auch die Einbindung industrieller Anlagen und Lasten in die Leitwarte und die notwendige Kommunikation (Profibus, ProfiNet, Ethernet/IP, Modbus, ...). Für den Informationsaustausch werden die beiden Lösungen angeboten: IEC 60870-5-104 (klassische Fernwirktechnik) und IEC 61850-7-420 (moderne Informationsmodelle und Austauschmechanismen). Im SPS-Magazin finden Sie einen aktuellen Artikel von HMS. [HIER](#) klicken, um den Artikel zu lesen.

Eine kostenlose Evaluierungssoftware unter Windows ist verfügbar (C#-Anwendung unter Verwendung des SystemCorp IEC 61850 Stack/API; Server und Client; C#-Anwendung mit Sourcecode). [HIER](#) klicken, um zum Download zu gelangen.

Client-Anwendung (links) und Server-Anwendung (rechts) unter Localhost (auch mittels SCL-File konfigurierbar für PC-PC-Kommunikation mit Nachrichten auf TCP/IP):



Die HMS-Gateways unterstützen sowohl Server- als auch Client-Rollen (für IEC 60870-5-104 als auch für IEC 61850).

Posted by [Karlheinz Schwarz](#) at 1:30 AM No comments:

Labels: [Beck IPC](#), [Energiewende](#), [EthernNet/IP](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 61850-7-420](#), [Profibus](#), [Profinet](#), [SystemCorp](#), [VHPready](#), [Windows](#)

Thursday, June 23, 2016

Beck IPC Offers New Very Powerful Embedded Platforms for Realtime Applications

Beck IPC (Wetzlas/Germany) is very successful in offering embedded platforms for many applications - including IEC 61850, IEC 60870-5-104, DNP3, ... In order to offer a very powerful platform Beck IPC has developed two new SoM (System on Module): IPC@CHIP® SC1x5 and SC1x8 SoM

Some features:

Hardware

IPC@CHIP® SC1x5 and SC1x8 SoM features:

- Freescale iMX 6UltraLite or iMX28 CPU
- up to 528 MHz Clock frequency
- integrated MMU and FPU
- integrated Crypto Engine
- 128MByte RAM, 64 MByte NOR Flash or 4GB e-MMC Flash
- 8kByte F-RAM (SC1x5)
- 2 x 10/100 Mbps Ethernet Ports (parts, external PHY required)
- 2 x USB Port (1 x OTG)
- up to 5 x TTL UART
- up to 2 x SDIO/MMC interface
- up to 2 x SPI interface
- up to 2 x I²C interface
- up to 2 x CAN port
- several GPIO / ADC / PWM / TFT interfaces
- -25°C to +85°C operating temperature
- single power supply

SC1x5
1.5MB/200MHz
128MB DORS RAM
64MB NOR Flash

SC1x8
1.5MB/200MHz
128MB DORS RAM
64MB NOR Flash

SC1x8
1.5MB/200MHz
128MB DORS RAM
64MB NOR Flash

Software

RTOS-LNX:
RTOS-Linux is the realtime multitasking operating system adapted for the IPC@CHIP® SoM based on Linux and @CHIP-RTOS extensions:

- extensive hardware independence, slight effort required for porting to new platforms
- realtime behaviour (context change and interrupts), Kernel has been extended with the Preempt RT patch
- @CHIP-RTOS specific RTX-API adds missing typical realtime functionalities like killing and canceling of threads, prioritized semaphores and disabling of task scheduler
- the RTX-API is compatible over all current and future variants of @CHIP-RTOS
- small memory footprint for RAM and Flash
- web server, Telnet, SSH, FTP etc. are fully integrated
- complete separation from GPL restrictions, full copyright protection guaranteed
- IoT communications interface based on Kolibri technology

Due to the compatible API, applications available for the SC143: IEC 61850, IEC 60870-5-101, (soon: DNP3), ... and many other applications, can easily be ported to the new powerful platform!

Click [HERE](#) for a two page brochure.
Click [HERE](#) for the latest documentation - search, e.g., for SC145

Posted by [Karlheinz Schwarz](#) at [1:13 AM](#) [No comments:](#) 

Labels: [Beck Chip](#), [DNP3](#), [embedded system](#), [IEC 60870-5-104](#), [IEC 61850](#), [real-time](#), [RTOS](#)

Saturday, June 18, 2016

New part IEC 61850-90-19: Using Role Based Access Control (RBAC) and IEC 61850

IEC TC 57 has just proposed a new part of the series IEC 61850: 57/1740/DC:
IEC TR 61850-90-19: Communication networks and systems for power utility automation – Part 90-19: Using Role Based Access Control (RBAC) and IEC 61850
This document is intended to extent IEC TS 62351-8 and provide configuration and maintenance or RBAC for IEC 61850 devices and applications.

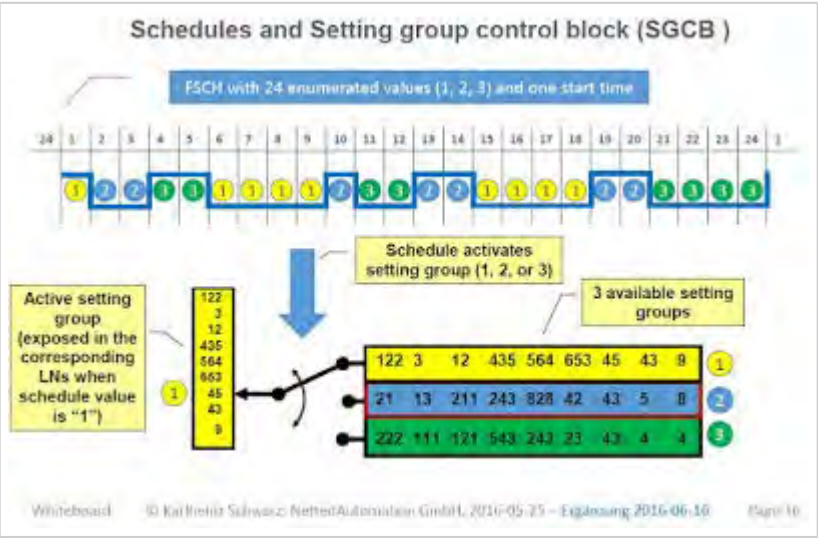
Posted by [Karlheinz Schwarz](#) at [12:35 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-90-18](#), [RBA](#), [security](#)

Wednesday, June 15, 2016

Schedule Model combined with Setting Group Control Model

Schedules (LN FSCH) and Schedule Controller (LN FSCC) operate on a single Data Object (controllable entity) only. In case you want to set several or even many values with the Schedule Model - you will fail to do so.
Is there a work-around? Yes!
You can control Setting Group Control Blocks through Schedules as shown in the following picture:



Nachtrag-zur-Sitzung_2016-06-15-Frankfurt.pptx

The example shows a schedule with 24 enumerated values (1, 2, 3). These values control the

Setting Group Control. That way allows to schedule many values (in the example 9 values) with a single schedule! The Schedule Controller LN FSCC is not shown.
This example shows the flexibility of IEC 61850!
Enjoy!
More to come!

Posted by [Karlheinz Schwarz](#) at [12:57 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [Schedule](#), [Setting Group Control](#), [smart solution](#)

Monday, June 13, 2016

Neues IEC-61850-Seminar in Deutsch – Karlsruhe (7.-9.12.2016)

Sie haben jetzt wieder die Möglichkeit, ein dreitägiges (deutschsprachiges!) Intensivseminar mit Theorie und viel Praxis in Karlsruhe zu einem
unschlagbar günstigen Preis von NUR 790,- Euro (netto) zu buchen!
07.-09. Dezember 2016 (Karlsruhe)

Die NettedAutomation GmbH hat seit 2003 weltweit über 200 Seminare (mit mehr als 4.000 Teilnehmern) für IEC 61850 und IEC 60870-5-104 durchgeführt.
Das Interesse an Seminaren und Trainingskursen im deutschsprachigen Raum ist so groß, dass NettedAutomation im Dezember 2016 einen weiteren Trainingskurs in Deutsch anbietet. Am ersten Tag wird ein Überblick über das Normungsumfeld und die einzelnen Normen gegeben (Edition 1, 2, 2.1). Im Mittelpunkt stehen dabei die grundlegenden Eigenschaften und Bedeutung der Normenreihe IEC 61850 für Engineering, Datenmodellierung, Datenmodelle, Kommunikationsmöglichkeiten, Sicherheitslösungen sowie deren internationale Umsetzung und Akzeptanz.
Am zweiten und dritten Tag werden Details behandelt und mit praktischen Übungen an realen Geräten begleitet. Ein Teil der eingesetzten Lösungen und Werkzeuge können auch nach dem Training weiter verwendet werden. Es wird vor allem die Frage behandelt: Was bedeutet der Einsatz dieser Normen für Hersteller von Geräten und Systemen, für die Systemintegratoren und für die Anwender?

Hier [CLICKEN](#) (Email schreiben), wenn Sie Interesse haben.

Posted by [Karlheinz Schwarz](#) at [9:14 AM](#) [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [Gateway](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61850](#), [seminar](#), [Training](#)

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Monday, June 13, 2016

Training offers by FMTP and NettedAutomation in fall 2016

Upcoming Open Seminars in English for SMART GRID, IEC 61850, PAC, Protection Automation Control:

Stockholm, SE Sept 19-22 2016
Karlsruhe, DE Oct 10-13 2016

Click [HERE](#) for more details and registration information.

Posted by [Karlheinz Schwarz](#) at 9:07 AM No comments: 

Labels: [hands-on Training](#), [IEC 61850](#), [protection](#), [seminar](#)

Sunday, June 12, 2016

Three New CDVs of IEC 61850 Edition 2 Amendments published

IEC TC 57 just published three new CDVs for Edition 2 documents:

57/1707/CDV
IEC 61850-7-2 A1 Ed.2: Amendment 1 to IEC 61850-7-2 Ed.2: Communication networks and systems for power utility automation - Part 7-2: Basic information and communication structure - Abstract communication service interface (ACSI)
The Amendment solves issues that have been reported and discussed in recent years. Some 50 of them are documented in the [Tissue Database for part 7-2](#).

57/1708/CDV
IEC 61850-7-3 A1 Ed.2: Amendment 1 to IEC 61850-7-3 Ed.2: Communication networks and systems for power utility automation - Part 7-3: Basic communication structure - Common data classes
The Amendment solves issues that have been reported and discussed in recent years. Some 45 of them are documented in the [Tissue Database for part 7-3](#).

57/1709/CDV
IEC 61850-9-2 A1 Ed.2: Amendment 1 to IEC 61850-9-2 Ed.2: Communication networks and systems for power utility automation - Part 9-2: Specific communication service mapping (SCSM) - Sampled values over ISO/IEC 8802-3
The Amendment solves issues that have been reported and discussed in recent years.

All three documents can be accessed publicly.

Please take some time to review both documents.
The documents should be available online for reading and for comments.
Check [HERE](#) for the access and for providing comments.

Posted by [Karlheinz Schwarz](#) at 9:20 AM No comments: 

Labels: [ACSI](#), [CDC](#), [common data classes](#), [IEC 61850](#), [sampled value](#), [services](#)

Thursday, June 9, 2016

New Seminar "Protection and Control with IEC 61850" in Stockholm


FMTP is pleased to announce their newly designed **Seminar "Protection and Control with IEC 61850"** in cooperation between FMTP Power, NettedAutomation and KTH, conducted by the well know experts: Mr Andrea Bonetti, Mr Karlheinz Schwarz and Prof. Lars Nordström.

We have added one extra day, with group practical exercises and guest speakers from a well-known Power utility and **OPAL RT** real time testing of power systems for IEC 61850 environment.

Stockholm, Sweden – at KTH (Royal Technical Institute)

Sept. 19-23, 2016

Click [HERE](#) for the program and registration

Posted by [Karlheinz Schwarz](#) at 11:11 AM No comments: 

Labels: [control](#), [FMTP](#), [hands-on Training](#), [IEC 61850](#), [OPAL RT](#), [protection](#), [seminar](#), [testing](#)

Training by NettedAutomation

[Seminare in Deutsch in 2017](#)

[New Flyer for Training with crucial topics](#)

[Training Opportunities 2016/2017: IEC 61850, IEC 60870-5-104, DNP3, ... - 2016-07-07](#)

For your Convenience

[Personal experience and capabilities of Karlheinz Schwarz \[PDF 3.5 MB\]](#)

[New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[Blog as single PDF until 08 April 2016 \[14 MB\]](#)

[Some videos explaining basics ... Gateway applications](#)

Largest Training Course ever



3 day IEC 61850 Training 2006 in Bangalore (India)

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PAC World Conference (13-16 June 2016) at the University of Ljubljana

The **Seventh Protection, Automation and Control (PAC) World Conference will take place from 13 June to 16 June 2016 at the University of Ljubljana in Slovenia.**

Members of the PAC World community, professionals from utilities and universities, manufacturers and consultants, are invited to take part in a unique event that will help us build better understanding and knowledge in our industry.

The conference format is unique not only in bringing experts from different domains of the PAC space together in the same room. The conference will be held in six half-day sessions. More than 100 papers from 33 countries will be presented during the three full days of the conference in oral and poster sessions.

This format will allow us to capture the pulse of our industry and to provide to the participants at the conference and the members of the PAC World community around the globe a snapshot of the state of technology, challenges, experience and future developments that will shape protection, automation and control systems as part of the Smart Grid of the future.

Click [HERE](#) for the details, program, registration, etc.


One crucial topic will be IEC 61850. Many or even most of the 60 presentations are linked to IEC 61850 - one way or the other.

SystemCorp, SISCO, Triangle Microworks, and other companies will present their stacks, API, applications, ... and how to build IEC 61850 Gateways like HMS:

Click [HERE](#) for more details on the HMS Gateways.

Detlef Raddatz (SystemCorp) will present a paper on:
IEC 61850 Communication / IEC 61131 Programmable Logic Control Application Integration Methods

Enjoy!

Posted by [Karlheinz Schwarz](#) at 3:06 AM [No comments:](#) 

Labels: [API](#), [conference](#), [control](#), [exhibition](#), [fieldbus](#), [IEC 61131-3](#), [IEC 61850](#), [protection](#), [SISCO](#), [stack](#), [SystemCorp](#), [Triangle Microworks](#)

IEC 61850 Europe 2016 takes place 18-20 October 2016 in Amsterdam

The 3rd annual **IEC 61850 Europe 2016 conference, exhibition and networking forum** will draw together 150+ IEC 61850 experts and implementation leaders for 3 intensive days of discussions around multi-vendor multi-edition system architectures to support the smart grid. Placing Edition 2 at the heart of discussions, this year’s agenda provides a clear plan for optimising the system design, engineering, testing, operation and maintenance procedures of next generation systems.

“There has been tremendous progress in the take-up of IEC 61850 enabled systems in the last 3 years since the conference first launched” says Mandana White, Programme Director of IEC 61850 Europe 2016, organised by Phoenix Forums. “With utility commitment to IEC 61850 at an all-time high, IEC 61850 workforces expanding at a rapid rate, and the application of the standard going beyond the substation, the opportunities and challenges facing the IEC 61850 end-user community are now significant. And it is with these important shifts in mind that we have shaped this year’s agenda.”

Click [HERE](#) for details.

Posted by [Karlheinz Schwarz](#) at 2:48 AM [No comments:](#) 

Labels: [conference](#), [education](#), [exhibition](#), [IEC 61850](#), [testing](#)

Tuesday, June 7, 2016

1,500 IEC 61850 Tissues posted since 2004

One of the crucial tools to help improving the quality of the Standard Series IEC 61850 is the so-called **Tissue Database** (Technical Issues):

tissues.iec61850.com

Currently **1,500 Tissues** have been posted, discussed, answered, solved, ...

The [Tissue #1,500](#) has been posted by TÜV SÜD on June 06, 2016.

The Tissue Database is open for every expert in the domain of IEC 61850. To post a tissue you need to register.

Posted by [Karlheinz Schwarz](#) at 3:15 AM [No comments:](#) 

Labels: [IEC 61850](#), [quality](#), [tissues](#), [TÜV SÜD](#)

► [2013](#) (130)

► [2012](#) (188)

► [2011](#) (159)

► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

CDV of IEC 61850-6 Amendment 1 and IEC 62351-9 available for comments

IEC TC 57 has published the following documents for review:

57/1697/CDV

IEC 61850-6 A1: Amendment 1 to IEC 61850-6 Ed.2:Communication networks and systems for power utility automation -
Part 6: Configuration description language for communication in electrical substations related to IEDs

The Amendment incorporates 60 [Tissues](#) - listed in the CDV document. You can find easily what has been revised.

57/1699/CDV

IEC 62351-9: Power systems management and associated information exchange - Data and communications security -
Part 9: Cyber security key management for power system equipment

Please take some time to review both documents.
The documents should be available online for reading and for comments.
Check [HERE](#) for the access and for providing comments.

Posted by [Karlheinz Schwarz](#) at [3:02 AM](#) [No comments:](#) 

Labels: [CDV](#), [configuration language](#), [IEC 61850](#), [IEC 61850-6](#), [IEC 62351-9](#), [key management](#), [SCL](#), [security](#), [system configuration](#), [tissues](#)

Many Open Positions in the U.S. linked to IEC 61850

An indication that IEC 61850 is used more often in the U.S. can be found when you search for an position with Simplyhired:

<http://www.simplyhired.com/search?q=IEC+61850&l=>

Today the search engine found 59 links ... Wow.

Several links are shown for France and Germany:

<http://www.simplyhired.fr/search?q=IEC+61850>
<http://www.simplyhired.de/search?q=IEC+61850>

Good luck.

Posted by [Karlheinz Schwarz](#) at [2:12 AM](#) [No comments:](#) 

Labels: [engineer](#), [IEC 61850](#), [Job](#), [programming](#)

Friday, May 27, 2016

GridEx Tool Launched to Support Smart Grid IEC 61850 Networks

How many times have you struggled with the stream of IEC 61850 GOOSE and Sampled Value messages and SCL configuration files? Is there any help to get your hands on these streams?

Yes, there is help: GridEx®

GridEx® sets you in control of your IEC 61850 networks. Designed to support you when performing commissioning, troubleshooting and maintenance.



GridEx® is a **digital multimeter** and **analyzer for Smart Grid applications**; it bridges the gap between the traditional power technology and the digital communication. Network digital data is translated into upfront and intuitive information to support decisions for increased reliability and improved system utilization.

Entirely embedded stand-alone solution for secure connection to your IEC 61850 network, easy to use, versatile connections, instant start-up, error and inconsistencies detection, warning explanation, proactive analysis.

The evolutionary tool in IEC 61850 testing. Click [HERE](#) for more details.

For any question please contact our technical manager Mr Andrea Bonetti at gridex@fmtppower.com

In short terms:

- **GridEx®** is a Smart Grid Multimeter
- **GridEx®** is *Bridging the gap* between IEC 61850 digital communication and Power system applications: Complex data shown in understandable information
- **GridEx®** is *not a relay test set*
- **GridEx®** has *Secure* connection in the station
- **GridEx®** shows live measurements with it's versatile connections (ETH/FO)

An animated video is worth more than 1000 words: <https://youtu.be/BMfbGZThAk4>

Posted by [Karlheinz Schwarz](#) at [3:17 AM](#) [No comments:](#) 

Labels: [GOOSE](#), [GridEx](#), [IEC 61850](#), [protection](#), [sampled value](#), [SCL](#), [testing](#), [tools](#), [trouble shooting](#)

Monday, April 25, 2016

IEC is about to prepare the "Use of IEC 61850 for electrical energy storage systems"

IEC TC 57 has just sent a 75+ pages draft document for comments by the national committees:

Draft IEC TR 61850-90-9 – Communication networks and systems for power utility automation – Part 90-9: Use of IEC 61850 for electrical energy storage systems

See: 57/1715/DC

The document is a very comprehensive document that provides a list of use-cases and solutions on how to use and extend the IEC 61850 models for electrical energy storage systems.

The

Annex A.....

Proposed new data objects belong to logical node other than DSTO

Annex B.....

B.1 YSCP(Yokohama Smart City Project) DER MS (Battery SCADA) System Use Case #1

Online Power System Control with Aggregated Battery based EESS (Virtual Energy Storage)

B.1.1 Descriptions of Function

B.1.2 Step by Step Analysis of Function

B.1.3 Auxiliary Issues

B.2 YSCP(Yokohama Smart City Project) DER MS (Battery SCADA) System Use Case #2

Active Power Schedule Updating by Using Aggregated Battery-based EES

B.2.1 Descriptions of Function

B.2.2 Step by Step Analysis of Function

B.2.3 Auxiliary Issues

Annex C DER Functions to Meet EESS Energy Application Requirements

It is recommended for the various stakeholders to get more deeply involved into the further steps to get a standard information model for electrical storage systems!!

Sample use-case:

EESS Energy Applications (Use Cases)	DER Functions to Meet Use Case Requirements
4. Area Regulation	<ul style="list-style-type: none">• Provide DER nameplate information, and operational characteristics at initial interconnection and upon changes• Provide status, measurements, and (short term) forecast of real and reactive power output/charging• Set actual real power charging and discharging• Frequency-watt: Emergency counteract high/low frequency by changing watt output• Frequency smoothing: Smooth frequency variations by rapidly changing watt output• Participate in Automatic Generation Control (AGC)• Provide operational reserves• Default and emergency ramp rates as well as high and low limits f charging and discharging• Volt-var control: Counteract voltage variations by changing var output• Volt-watt: Counteract voltage variations by changing watt output• Watt-power factor function: change power factor based on watt output• “Soft-start” reconnection by ramping and/or random time within window• Schedule actual or maximum real power output, charging, or modes

This document fits well into the set of drafts that are needed for power distribution systems.

More to come!

Posted by [Karlheinz Schwarz](#) at [10:37 AM](#) [No comments:](#) 

Labels: [active power control](#), [batteries](#), [DER](#), [energy storage](#), [IEC 61850](#), [logical node](#), [Smart Grid](#), [use cases](#), [voltage control](#)

Friday, April 15, 2016

HMS exhibits IEC 60870-5-104 and IEC 61850 Anybus SG Gateways at Hannover Fair and SPS IPC Drives

Anybus SG-gateways - solving Smart Grid communication challenges!
The Anybus® SG-gateway™ family is designed to specifically target Demand Response (networking of **industrial electric loads**) and Virtual Power Plants (networking of **energy resources** like biogas plants or combined heat and power units) applications.

The gateways will be shown in action at the following two events in 2016:

Hannover Messe
Hannover, Deutschland
25. - 29. April 2016
Halle 8, Stand D11

SPS IPC Drives
Nürnberg, Deutschland
22. - 24. November 2016
Halle 2, Stand 2-438

Protocols supported so far:

IEC61850 client/server, IEC60870-5-104 client/server, Modbus RTU master/ slave, Modbus TCP client/server, EtherNet/IP, PROFINET and PROFIBUS.

Click [HERE](#) for more information about the Anybus SG Gateways.

Posted by [Karlheinz Schwarz](#) at [12:03 AM](#) [No comments:](#) 

Labels: [EthernNet/IP](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [logic](#), [Modbus](#), [Profibus](#), [Profinet](#), [Smart Grid](#)

Saturday, April 9, 2016

The Complete Content of the IEC 61850 News Blog is now Available as Single PDF Document

For those readers of this IEC 61850, IEC 60870-5/6, DNP3, ... news blog that want to get the complete content as a single pdf document, it is just a click away ... it contains 1120+ posts from 2008 until 2016-04-09. Once you have downloaded the file you can easily browse the content ... search ... mark ... copy ... You will find useful information about the standards, vendors like ABB, HMS, Siemens, or utilities ...

Click [HERE](#) to download all posts of the IEC 61850 blog in a single pdf [14 MB, 823 pages DIN A4]

Enjoy!

In case you have a question, drop us an [EMAIL](#).

Posted by [Karlheinz Schwarz](#) at [10:33 AM](#) [No comments:](#) 

Labels: [ABB](#), [Beck](#), [CIM](#), [DNP3](#), [HMS](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [SCADA](#), [Siemens](#), [SystemCorp](#)

Check the Latest in IEC 61850 Testing Tools during the IEC IEEE PES T&D in Dallas (TX)

Mingle at the **GridEx®** Smart Grid Product Release- IEEE T&D 2016

[FMTP \(Sweden\)](#) welcomes YOU to meet with their experts in the casual atmosphere of the [Rustic](#) (just a few miles away from IEEE PES T&D in Huston (TX)) for food, drinks and the reveal of FMTP Power latest product **GridEx®** on Wednesday, May 4, 2016, at 8:00 p.m.

GridEx®, a digital multimeter for Smart Grids, bridges the gap between traditional power technology and new digital communication (models, GOOSE, Sampled Values, SCL, ...). Complex data is translated into easily understandable information to support decisions for increased reliability and improved system utilization.

Click [HERE](#) to register for the product presentation of **GridEx®**.

Posted by [Karlheinz Schwarz](#) at [12:26 AM](#) [No comments:](#) 

Labels: [FMTP](#), [GOOSE](#), [IEC 61850](#), [IEEE](#), [IEEE T&D](#), [maintenance](#), [sampled value](#), [Smart Grid](#), [testing](#)

Friday, April 8, 2016

New Draft IEC TR 61850-7-500 Just Published - Typical Use Cases

IEC TC 57 has just published a very interesting document (75+ page Draft Report) - 57/1701/DC:

IEC TR 61850-7-500 – **Use of logical nodes for modelling applications and related concepts and guidelines for substations**

The draft provides examples and hints on how to use IEC 61850 for substation automation, protection and SCADA. Sample excerpt of content:

News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Saturday, April 9, 2016


Check the Latest in IEC 61850 Testing Tools during the IEC IEEE PES T&D in Dallas (TX)

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Posted by [Karlheinz Schwarz](#) at [12:26 AM](#) [No comments:](#) 

Labels: [FMTP](#), [GOOSE](#), [IEC 61850](#), [IEEE](#), [IEEE T&D](#), [maintenance](#), [sampled value](#), [Smart Grid](#), [testing](#)

Friday, April 8, 2016

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IEC TR 61850-7-500 – **Use of logical nodes for modelling applications and related concepts and guidelines for substations**

The draft provides examples and hints on how to use IEC 61850 for substation automation, protection and SCADA. Sample excerpt of content:

This PDF Document contains all 1127 blog posts from 2008 to 2016-04-09

Enjoy!

Best Regards, Karlheinz Schwarz

schwarz@scc-online.de

For your Convenience

[New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[Training Opportunities: IEC 61850, IEC 60870-5-104, DNP3, ... - 2015-06-12](#)



[Blog as single PDF until 28 April 2015 \[11 MB\]](#)



Training by NettedAutomation



3 day IEC 61850 Training 2006 in Bangalore (India)

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[New Draft IEC TR 61850-7-500 Just Published - Typi...](#)

[Government R&D Funding for German "Energiewende": ...](#)

[Again On Security - A Summary for Managers](#)

[Just Published: CDV IEC 62351-7 -- Network and Sys...](#)

[IEC 61850 for CLS -- Seems to be the natural solut...](#)
- March (4)

► February (11)

► January (8)
- 2015 (94)

► 2014 (129)

► 2013 (130)

► 2012 (188)

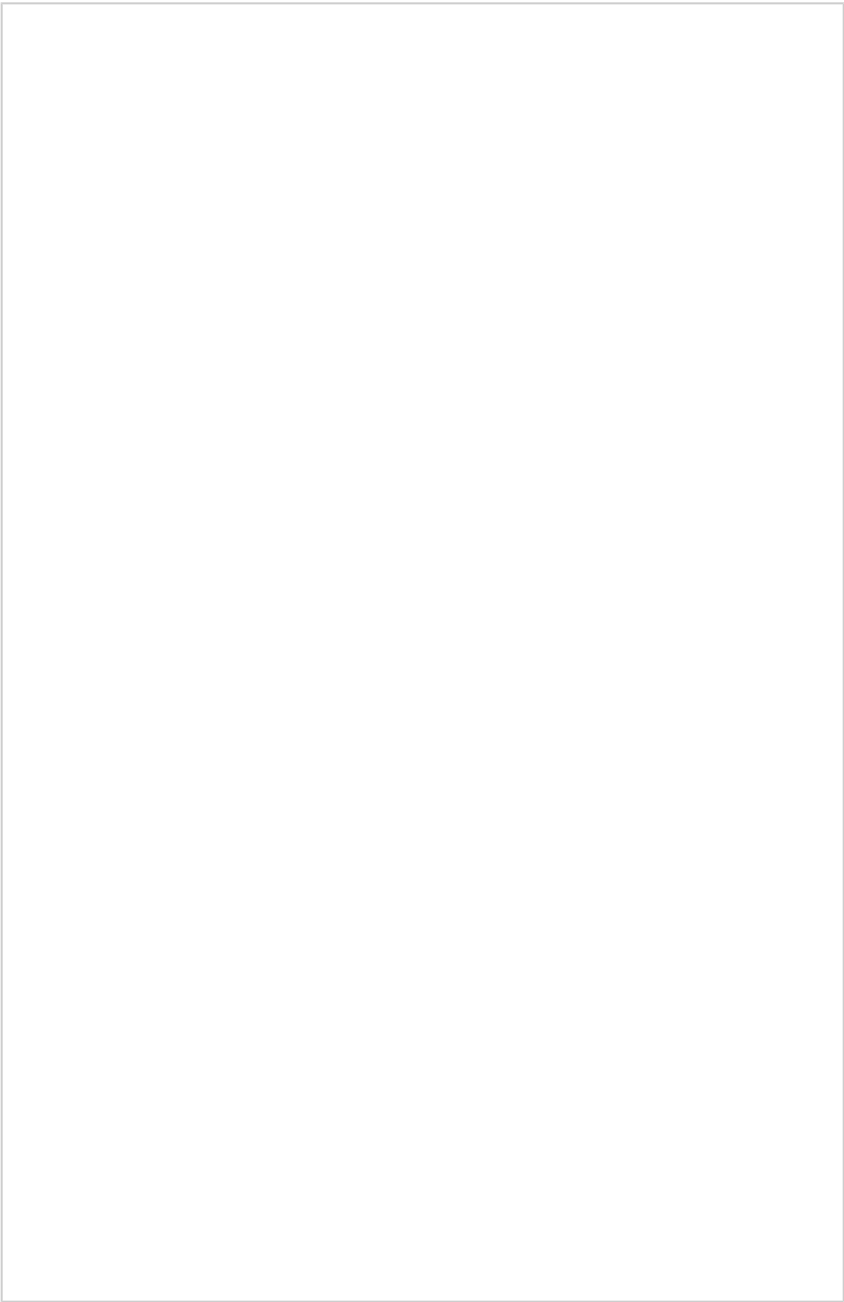
► 2011 (159)

► 2010 (153)

► 2009 (162)

► 2008 (82)

11	Basic modeling principles
11.1	Protection, measurement and control
11.2	Supervision
12	General modelling issues in substations
12.1	Basic modelling of three-phase systems
12.1.1	Acquisition of position indication
12.1.1.1	Phase and general position
12.1.1.2	Position filtering
12.1.2	Acquisition of currents and voltages and the trips
12.2	Considering transmission times for GOOSE messages
13	Control
13.1	Bay control without process bus
13.1.1	Basic diagram
13.1.2	General modeling rules
13.1.3	Modeling with process interface nodes and the role of GGIO and GAPC
13.2	Bay control with process bus
13.2.1	Basic diagram
13.3	Control in the three-phase system
13.3.1	Interconnection of Logical Nodes
13.4	Interlocking, Synchrocheck and Blocking
13.4.1	General remarks
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13.4.2.1	Basics
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13.4.2.3	Performance of GOOSE based interlocking
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13.4.4	Recommendation
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13.5	Control Authority
13.5.1	Operation 1 out of n
13.5.1.1	Basics
13.5.1.2	Restricted selectivity
13.5.1.3	Considering operation and transmission times
13.5.2	Control authority management
13.5.2.1	Functional description
13.5.3	Logical Node representation
13.5.4	Switching control authority at station level
13.6	Operation of switchgear with process bus
13.6.1	The control service
13.6.2	Extension of the control model by GOOSE messages in tabular form



This document is crucial to understand use cases of the standard for substation applications. Note that the examples given are showing just some possible applications. In practice there will be other use cases - depending on the philosophy of a specific utility. The use cases are not standardized!

In case a utility is looking for exchangeability of IEDs from different vendors, it has to specify the SCD file to a very high degree!

Recently I had a meeting with experts from a big transmission utility: They have reached a level of system specification in order to allow **interoperability AND exchangeability** of IEDs from multiple vendors! To get there: You need to request something more than just "IEC 61850".

Posted by [Karlheinz Schwarz](#) at [1:26 AM](#) [No comments:](#) 

Labels: [example](#), [exchangeability](#), [IEC 61850](#), [iec 61850-7-500](#), [interoperability](#), [models](#), [SCADA](#), [use cases](#)

Thursday, April 7, 2016

Government R&D Funding for German "Energiewende": 400 Million Euro until 2025

The German government has decided recently to fund four (4) huge R&D Energiewende-Projects!

The government published a news report describing the objectives of the Kopernikus projects.

More than 1000 organizations came up with 41 project proposals - four (4) proposals have been awarded to get the funding!

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

- 1. Neue Netzstrukturen (new network structures)** - Project name: [ENSURE](#).
Leading organization: KIT (Karlsruher Institut für Technologie)
Other main organizations: RWTH Aachen, E.ON, Tennet, Siemens and ABB
Number of partners: 21
- 2. Speicherung von Überschussstrom (power storage)** - Project name: Power-to-X
Leading organization: RWTH Aachen
Other main organization: Forschungszentrum Jülich und die DECHEMA
Number of partners:62
- 3. Industrieprozesse (industrial processes):** - Project name: SynErgie
Leading organization: Technischen Universität Darmstadt
Other main organizations: Universität Stuttgart
Number of partners: 83
- 4. Systemintegration (system integration)** - Project name: ENavi

Leading organization: Institute for Advanced Sustainability Studies (IASS) Potsdam
Other main organizations:
Number of partners: 64

The projects are organized into three (3) phases and run until 2025.
Funding for the first phase (2016-2018) = 120 Million Euro.
Funding for the phase 2 and 3 (2019-2015) = 280 Million Euro.

Click [HERE](#) for the government press release [de].
Click [HERE](#) for the Kopernikus projects [de].

Posted by [Karlheinz Schwarz](#) at [6:30 AM](#) [No comments:](#) 

Labels: [Energiewende](#), [Germany](#), [renewables](#), [Smart Grid](#)

Again On Security - A Summary for Managers

Always everything has been said on industrial control system (ICS) security - but still a lot of managers have not paid enough attention to it.
Are you a manager responsible for ICS security? You should read the one page well written memo. If you are not a manager: forward the link to your management.
Click [HERE](#) for the one page well written memo.

Two of the most crucial sentences in the memo are:

"... everyone knows there is a problem - but for the moment it is largely a potential problem."

" ... warns, "My biggest fear right now is that someone will put a critical infrastructure on lockdown with ransomware. ..."

The next problem may be just round the corner ... somebody saying: "Stehen bleiben und Geld her!" (Stand and deliver!).

Posted by [Karlheinz Schwarz](#) at [3:59 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [ICS](#), [security](#)

Tuesday, April 5, 2016

Just Published: CDV IEC 62351-7 -- Network and System Management (NSM) Data Object Models

IEC TC 57 has just published the first CDV of
IEC 62351-7 comprising 208 pages:
Power systems management and associated information exchange - Data and communications security - Part 7: Network and system management (NSM) data object models
The ballot closes 2016-06-17
This draft STANDARD will (when released) supersede the Technical Specification "IEC TS 62351-7:2010".

The NSM objects will provide monitoring data for TC57 protocols used for power systems (IEC 61850, IEC 60870-5-104) and device specific environmental and security status. Also IEEE 1815 DNP3 is included in the list of monitored protocols. The NSM data objects use the naming conventions developed for IEC 61850, expanded to address NSM issues. For sake of generality these data objects, and the data types of which they are comprised, are defined as abstract models of data objects.
In order to allow the integration of the monitoring of power system devices within the NSM environment in this standard a mapping of objects towards the SNMP protocol is provided.

110 pages contain the SNMP MIB Mapping.
Excerpt of some objects related to MMS:



Please take some time to comment.
The document should be available online for comments by end of this week or so.
Check [HERE](#).

Posted by [Karlheinz Schwarz](#) at [10:58 AM](#) [No comments:](#)

Labels: [CDV](#), [IEC 61850](#), [IEC 62351-7](#), [MIB](#), [MMS](#), [Network Management](#)

IEC 61850 for CLS -- Seems to be the natural solution as discussed in Germany

Controllable Local Systems (CLS) is understood by many experts as a useful tool to communicate with loads and generators. The roll-out of smart meters seems to be blocked (at least in Germany to some extent) by the missing decision: Which information and information exchange standard should be used?
The latest issue of the famous VDI-Nachrichten reported last week Friday that there is an immediate need to come to a decision in Germany. Professor Hilscher (Hochschule Ulm) is suggesting to apply IEC 61850.
Click [HERE](#) for the report (Digitale Energiewende braucht Standards) [de].

Posted by [Karlheinz Schwarz](#) at [10:40 AM](#) [No comments:](#)

Labels: [BSI](#), [CLS](#), [Energiewende](#), [IEC 61850](#), [load shifting](#)

Tuesday, March 22, 2016

Ukrainian Power Grid -- Cyber Attack is a Wake-Up Call for All of us

"On December 23, 2015, the Ukrainian Kyivoblenergo, a regional electricity distribution company, reported service outages due to a **third party's illegal entry into the company's computer and SCADA systems**. ... the strongest capability of the attackers was not in their choice of tools or in their expertise, but in their capability to perform **long term reconnaissance operations required to learn the environment and execute a highly synchronized, multistage, multisite attack**. ..."

Click [HERE](#) for an interesting Report that provides "important details surrounding the attack, offering lessons learned, and recommending approaches to help the ICS community repel similar attacks."

This and other attacks are Wake-Up Calls for Everybody! We should be aware that to some extent this trend will impact us all one way or the other - sooner or later.

One thing is sure: The future secure delivery of electric power will require more resources and smart people!!

Posted by [Karlheinz Schwarz](#) at [3:25 AM](#) [No comments:](#)

Labels: [blackout](#), [Cyber Attack](#), [Cyber Security](#), [SCADA](#), [smart people](#)

Friday, March 11, 2016

RWE sieht in Steuerungsboxen eine Chance Geld zu verdienen

Im aktuellen Beitrag "*Klassische Vollversorger sind chancenlos*" in den VDI-Nachrichten (Seite 21) vom 11.03.2016 wird berichtet:

"... Teriums aktuelle Erkenntnis lautet: „Klassische Vollversorger sind chancenlos auf dem

Energiemarkt.“ Die Stromversorgung werde dezentraler und komplexer. So will RWE vom reinen **Versorger** zum **Umsorger** werden. Angebote wie **Steuerungsboxen** für das Energie erzeugende Eigenheim sollen Gewinne bescheren. ..."

Click [HIER](#) um den gesamten Beitrag zu lesen.

Eine wesentliche Voraussetzung dazu wäre, dass alle Steuerungsboxen (oder Steuerboxen) eine einheitliche Sprache sprechen und IEC 61850 anwenden.

Posted by [Karlheinz Schwarz](#) at [11:26 AM](#) [No comments:](#) 

Labels: [erneuerbare Energien](#), [IEC 61850](#), [RWE](#), [Steuerbox](#)

Stromnetz Berlin - Goes Digital with various approaches

The distribution operator "Stromnetz Berlin" with some 2.4 Million customers and 350.000 house service connections operates the following networks and applies various communication solutions:

110 kV Network:

- 80 Substations with 600 switch gears
- all switch gears remote controllable
- communication infrastructure: **fiber optic**

10 kV Network:

- 10,700 Distribution stations with 23,000 switch gears
- 10 per cent of switchgears remote controllable
- expandable to 100 per cent
- communication infrastructure: **land line, TETRA Radio**


0,4 kV Network:

- 15,000 cable distributor boxes
- 96,000 feeders
- 1 per cent of switch gears remote controllable
- expandable to 100 per cent
- communication infrastructure: **pager ([e*nergy - based on e*message](#))**

The protocols used are likely quite different - I guess.

Click [HERE](#) to download a presentation from "Stromnetz Berlin" [German only]

Click [HERE](#) for the presentation material (14 slide presentations) of a recent conference [German only]

Posted by [Karlheinz Schwarz](#) at [12:49 AM](#) [No comments:](#) 

Labels: [meter](#), [monitoring](#), [power distribution](#), [remote control](#), [Smart Grid](#), [smart metering](#)

Smart Meter Rollout UND intelligentes Einspeisemanagement

"Der vorliegende Entwurf eines Gesetzes zur Digitalisierung der Energiewende greift nach Expertenmeinung zu kurz. Bevor ein Smart Meter Rollout gestartet wird, muss ein einheitlicher Schnittstellenstandard festgelegt werden, um beispielsweise flächendeckend Wechselrichter und Speicher ansteuern und vernetzen zu können.

So lautet das Fazit des 23. Fachgesprächs der Clearingstelle EEG zu „Technische Einrichtungen

zur Einspeiseregulung – Einspeisemanagement und Direktvermarktung“ am 8. März in Berlin.

Branchenvertreter und Experten wiesen darauf hin, dass das Gesetz zur Digitalisierung der Energiewende, das derzeit im parlamentarischen Verfahren ist, deutlich zu kurz greift. **„Es darf**

nicht nur darum gehen die Zähler auszuwechseln, was wir brauchen ist eine echte Digitalisierung mit Standards, die ein intelligentes Einspeisemanagement erlauben“, unterstrich Professor Gerd Heilscher von der Hochschule Ulm. ...

Als positives Beispiel verwies Heilscher auf die USA, wo seit kurzem nur noch PV-Wechselrichter mit dem Kommunikationsstandard Sunspec in öffentliche Gebäude eingebaut werden dürfen.

Entsprechend müsse auch hierzulande ein einheitliches Übertragungsprotokoll beispielsweise auf Basis des IEC 61850 eingeführt werden."

Click [HIER](#) für den kompletten Beitrag.

Posted by [Karlheinz Schwarz](#) at [12:00 AM](#) [No comments:](#) 

Labels: [Energiewende](#), [IEC 61850](#), [PV](#), [smart metering](#), [Sunspec](#)

Saturday, February 27, 2016

Several new CDVs (related to power systems) available for public commenting

IEC TC 118 has just published the following two CDV documents:

118/55/CDVIEC 62746-10-1 Ed.1: Systems interface between customer energy management system and the power management system -
Part 10-1: Open automated demand response

118/56/CDVIEC 62939-3 Ed.1: Smart grid user interface -
Part 3: Energy interoperation services


The system committee Smart Energy has published:

SyCSmartEnergy/28/CDV
IEC 62559-3/Ed1: Use case methodology -
Part 3: Definition of use case template artefacts into an XML serialized format

These CDVs are [available for public comments according to IEC](#).

The published documents are really very interesting - I hope that especially the users community will study these documents in due time and provide comments through the public commenting process or through their national committees.

Please take some time to dig into the documents to some degree!

Posted by [Karlheinz Schwarz](#) at [10:29 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 62559-3](#), [IEC 62746-10-1](#), [IEC 62939-3](#), [interoperability](#), [Open ADR](#), [Smart Grid](#), [SmartEnergy](#), [sustainable interoperability](#)

Monday, February 22, 2016

Training in Montreal (Canada): Mastering the complexity of IEC 61850

[OPAL-RT TECHNOLOGIES](#)

invites you to the very crucial Training:

Mastering the complexity of IEC 61850

Adoption of the IEC 61850 standard in North America is slowly emerging for Transmission and Distribution markets, but an increasing number of implementations is expected, either through new installations or following cost-benefit assessments in modernization projects. Now is a good time to get in touch with the state-of-the-art technologies and standard that will guide present and future SAS design.




During this seminar, truly experienced, vendor independent engineers will help you see and understand how to use the core parts of the IEC 61850 standard applied in substation design, monitoring, protection and control applications. You will learn from senior protection engineers, how the protection system will improve and understand the crucial lessons learned since the first projects with IEC 61850 in 2004, all through interactive training, live demos and hands-on exercises.

Monday, 25 April 2016 at 9:00 AM - Friday, 29 April 2016 at 5:00 PM (EDT)

Le Nordelec - 1751 rue Richardson, Suite 4312 Montréal, QC H3K 1G6 CA

Click [HERE](#) for more details and registration information.

See you there.

Posted by [Karlheinz Schwarz](#) at [10:29 PM](#) [No comments:](#) 

Labels: [Canada](#), [IEC 61850](#), [power distribution](#), [real-time](#), [seminar](#), [smart people](#), [Substation Automation](#), [Training](#), [Transmission Grid](#)

Saturday, February 20, 2016

Draft IEC 62351-13 TR - Guidelines on what security topics should be covered in standards and specifications

IEC TC 57 just published a very interesting draft technical report (57/1678/DTR):
IEC 62351-13 TR: Power systems management and associated information exchange -
Data and communications security -
Part 13: Guidelines on what security topics should be covered in standards and specifications
Voting terminates on 2016-04-15

The draft covers the following topics:

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Excerpt from the document:
"1.2 Purpose of this Document
The security requirements for human users and software applications are different from the purely technical security requirements found in many communication and device standards. For user security standards, **more emphasis must be on “policy and procedures” and “roles and authorization”** rather than “bits and bytes” cryptographic technologies that should be included in Information and Communications Technology (ICT). In addition, engineering practices and system configurations must be taken into account, since no cryptography can compensate for poor design."

As an excerpt not this single bullet: **"Validation of information input** for format and reasonability, including that the input is in the **correct format, that values are within limits, that the values are not beyond the capabilities of the automation system."**

There is always something to better understand!

Posted by [Karlheinz Schwarz](#) at [9:17 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 62351](#), [reliable power delivery](#), [security](#)

NEW: 80 Page Report on Centralized Substation Protection And Control

Centralized Substation Protection and Control is quite new compared to the age of the a.c. power system. A couple of experts have published recently a very comprehensive IEEE report on the subject. They are going back into the history and provide an outlook into the advantages that come, e.g., with IEC 61850. IEC 61850 is mentioned almost 50 times ... Many details are discussed - recommended to be read by non-protection engineers. Click [HERE](#) for downloading the report [pdf].

Click [HERE](#) for other related papers for free access at IEEE..

Posted by [Karlheinz Schwarz](#) at [7:53 AM](#) [No comments:](#) 

Labels: [control](#), [IEC 61850](#), [IEEE](#), [protection](#)

Saturday, February 13, 2016

SystemCorp Provides New Release of their famous IEC 61850 DLL

SystemCorp has published a New Release of their famous IEC 61850 DLL (Stack version

V2.06.28).
Click [HERE](#) for the webpage.
Click [HERE](#) for the direct download.


Click [HERE](#) for the full release notes.

New Features of the Release V2.06.28

- Added new API IEC61850_ControlTerminateCommand() to manually trigger command termination for the active control the server
- Added support for Integer Controls with Enhanced Security, **NOTE:** Command Termination for INC controls is the responsibility of the user using the IEC61850_ControlTerminateCommand() API
- Added new API IEC61850_SetOriginator() to set the originator orCat and orIdent for controls on the client
- Added VLAN Tag to the Ethernet Headers for GOOSE and SV on Linux
- Client and servers with GOOSE Subscription can now be recreated without restarting an executable
- Edition 2 mode supports Domain names of length 64 bytes
- Added Support for SCL Type ObjRef

The new DLL could be used with the current C# client and server demo and evaluation applications:

Click [HERE](#) for the demo and evaluation.

Posted by [Karlheinz Schwarz](#) at [7:51 AM](#) [No comments:](#) 

Labels: [API](#), [Demo Kit](#), [DLL](#), [Evaluation](#), [IEC 61850](#), [stack](#), [SystemCorp](#)

Just published: Draft Technical Report IEC 61850-90-17 (Using IEC 61850 to transmit power quality data)

IEC TC 57 just published the Draft Technical report (57/1676/DTR):
IEC 61850-90-17 TR: Communication networks and systems for power utility automation –
Part 90-17: Using IEC 61850 to transmit power quality data
Voting terminates on 2016-04-08

This document provides

- **Guidelines** for using of IEC 61850 in the power quality application domain,
- Name space extensions required for power quality function assessment,
- **Profile** for using IEC 61850 in the specific context of **IEC 61000-4-30**.

Specific Power Quality requirements that are not 100 % covered by existing Logical Nodes (LN) or Common Data Classes (CDC) (e.g. LN for continuous power quality recorders, LN for RVC...) are defined here.
The document defines a lot of configuration values for specific applications. This document helps to increase the interoperability to a high degree.

This document will serve as a very helpful Guideline in the Power Quality Domain.
Power Quality devices produce huge amounts of values .. these must be communicated with a variety of services: Read, Report, Log, or Files like COMTRADE, PQDIF, or COMFEDE. This TR discusses these for the various applications.

Posted by [Karlheinz Schwarz](#) at [7:39 AM](#) [No comments:](#) 

Labels: [Guideline](#), [IEC 61850](#), [IEC 61850-90-17](#), [power quality](#), [profile](#)

Tuesday, February 9, 2016

New Version of IED Model Designer: IDCDesigner from SystemCorp

Please note that SystemCorp has released Version 2.0.24 of their ICDDesigner.
The version that can be downloaded runs for six (6) month.

Installer / update:

<http://licenses.systemcorp.com.au/downloads/ICDDesignerSetupV2.00.024.exe>

Standalone version:

<http://licenses.systemcorp.com.au/downloads/ICDDesignerStandaloneV2.00.024.zip>

Enjoy.

Posted by [Karlheinz Schwarz](#) at [7:49 AM](#) [No comments:](#) 

Labels: [CID](#), [ICD](#), [IEC 61850](#), [IED configuration](#), [SCL](#), [SystemCorp](#)

Thursday, February 4, 2016

Communication Network Interdependencies in Smart Grids: A comprehensive Study

Communication network interdependencies in smart grids is a crucial issue to be discussed in the context of the European Market. The European Union Agency for Network and Information Security (ENISA) has just published a comprehensive report on the above issue.

The main concerns that were expressed by the 20+ experts involved can be sorted into two main categories, technical recommendations (1./2.) and organizational recommendations (3.):

1. Regarding **smart grid devices**, these devices are now exposed to different networks, and therefore their **periodic update** becomes essential in order to ensure that they are protected against the latest threats that appear. Furthermore, these devices should also implement by **default security measures** to protect them (such as authentication, encryption or frame counters), as implementing such measures in the deployment phase is much more costly and does not reach the same level of security.
2. **Regarding the communications interdependencies, the main concern is with the protocols used on the smart grids.** There is an **urgent need to harmonize the current situation by establishing common interconnection protocols to be used by all devices**, and ensure that these protocols implement by default enough security measures to protect the data whilst it is in transit (such as encryption or mutual authentication).
3. Finally there is the need to **align policies, standards and regulations across EU Member States** to ensure the overall security of smart grids. This is now even more important due to the risk that cascading failures can cause; as smart grid communication networks are no longer limited by physical or geographical barriers, and an attack on one country could translate into another.

Recommendation 2 states: Manufacturers and vendors should foster intercommunication **protocol compatibility** between devices from different manufacturers and vendors. Currently, **many manufacturers and vendors, due to the lack of standards, make use of their own proprietary protocols and communication systems for the intercommunication between their devices.**

The experts state: There are several common technologies and protocols that are used for the intercommunication between these devices and the rest of the transmission grid network. **One of the most relevant ones is the IEC 61850 protocol family, which is applicable to this grid section.**

Ok! I fully agree with these statements!

Click [HERE](#) for the full report [pdf, 50+ pages].

Posted by [Karlheinz Schwarz](#) at [2:58 AM](#) [No comments:](#) 

Labels: [conformance](#), [Cyber Security](#), [Europe](#), [IEC 61850](#), [interoperability](#), [protocol](#), [security](#), [Smart Grid](#)

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WEITERE INFORMATIONEN OK

Wednesday, February 3, 2016

XML Documents and Pretty Print with Notepad++

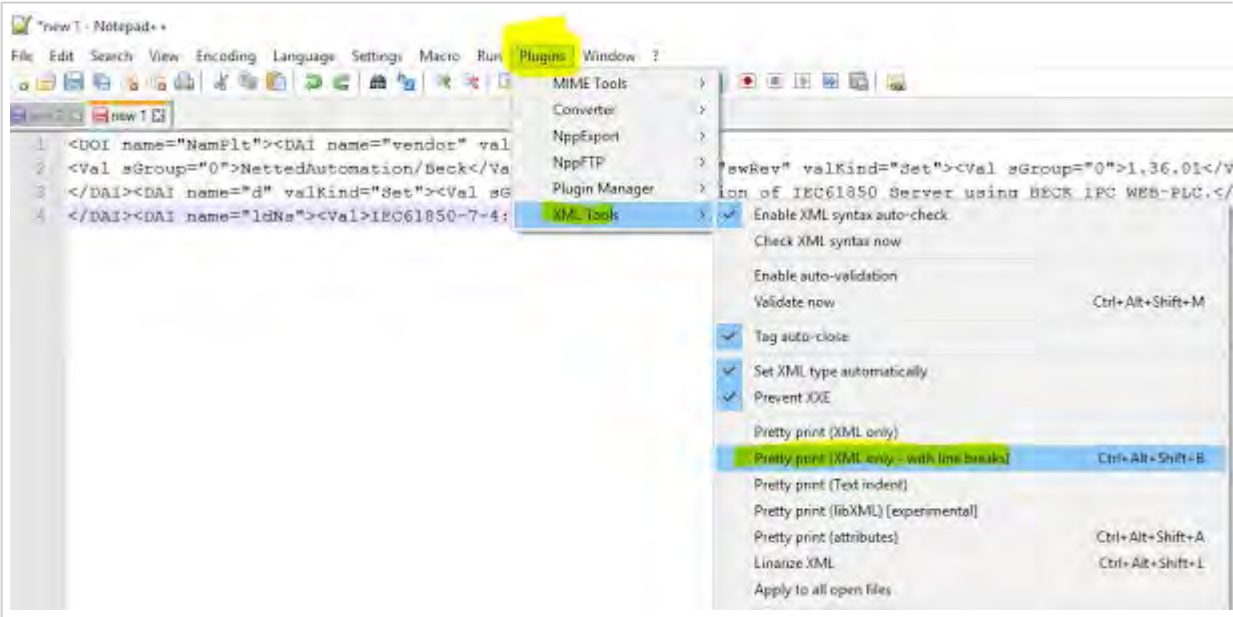
Dear All,

I guess you have seen this kind of XML documents quite often in conjunction with SCL Documents:

```
<DOI name="NamPit"><DAI name="vendor" valKind="Set">
<Val sGroup="0">NettedAutomation/Beck</Val> </DAI><DAI name="swRev" valKind="Set"><Val sGroup="0">1.36.01</Val>
</DAI><DAI name="d" valKind="Set"><Val sGroup="0">Demonstration of IEC61850 Server using BECK IPC WEB-PLC.</Val>
</DAI><DAI name="ldNs"><Val>IEC61850-7-4:2010</Val></DAI></DOI>
```

One way is to use the online tool "Pretty Print".

There is a more convenient way: Use the "Pretty Print" Plugin tool that comes with Notepad++ (you have to install it with the Plugin Manager):



This will result in a Pretty Clean XML Document:

```
1 <DOI name="NamPit">
2   <DAI name="vendor" valKind="Set">
3     <Val sGroup="0">NettedAutomation/Beck</Val>
4   </DAI>
5   <DAI name="swRev" valKind="Set">
6     <Val sGroup="0">1.36.01</Val>
7   </DAI>
8   <DAI name="d" valKind="Set">
9     <Val sGroup="0">Demonstration of IEC61850 Server using BECK IPC WEB-PLC.</Val>
10  </DAI>
11  <DAI name="ldNs">
12    <Val>IEC61850-7-4:2010</Val>
13  </DAI>
14 </DOI>
15
```

Wow!
Enjoy the plugin!

Posted by [Karlheinz Schwarz](#) at [4:45 AM](#) [No comments:](#)

Labels: [IEC 61850-6](#), [SCL](#), [XML](#)

For your Convenience

- [New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)
- [Training Opportunities: IEC 61850, IEC 60870-5-104, DNP3, ... - 2015-06-12](#)
- [Blog as single PDF until 28 April 2015 \[11 MB\]](#)

Training by NettedAutomation



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Mapping of IEC 61850-7-x to XMPP: Nice Paper in PACWorld Magazine


The XMPP technology (Extensible Messaging and Presence Protocol) has been selected as the communication solution to address the Smart Grid specific challenges and use cases, which deviate from a typical substation automation use case.

The additional mapping will be published as IEC 61850-8-2.

A nice overview can be found in a paper published recently in the PACWorld magazine:

Click [HERE](#) for the full paper.

Note that from a message encoding point of view the MMS-ASN.1-BER messages are mapped directly to ASN.1-XER coded messages. The ASN.1 Tag numbers are mapped to XML Element names. The whole message schema is the same in both mappings.

Posted by [Karlheinz Schwarz](#) at [1:13 AM](#) [No comments:](#) 

Labels: [ASN.1](#), [Encoding](#), [iec 61850-8-2](#), [MMS](#), [SCSM](#), [XML](#), [XMPP](#)

Tuesday, February 2, 2016

HMS Updated their Web Pages for IEC 61850, IEC 60870-5-104, ... Anybus SG-gateways

The **Anybus® SG-gateway™ family** is designed to specifically target Demand Response (networking of industrial electric loads) and Virtual Power Plants (networking of energy resources like biogas plants or combined heat and power units) applications.

Remote Terminal Unit

The SG-gateways support the communication protocols used in the energy sector, e.g. **IEC 60870-5-104**, **DNP3** and **IEC 61850**; as well as protocols supported by the electric equipment in the field, e.g. **Modbus** or **M-Bus**. In addition, thanks to the built-in [Anybus CompactCom](#) interface, they can also communicate with fieldbus or industrial Ethernet networks such as **Profibus**, **Profinet**, **EtherNet/IP** or **any other industrial network**.




The new Web pages provide all information needed to build a information infrastructure for Smart Grid for a smarter power network for the future.

Click [HERE](#) to visit the Anybus Web site.

Click [HERE](#) for a great news post at the Anybus Web site.

HMS will demonstrate VHPready products during the E-World Exhibition.

Click [HERE](#) for more information.

Posted by [Karlheinz Schwarz](#) at [5:52 AM](#) [No comments:](#) 

Labels: [Anybus](#), [DNP3](#), [E-World](#), [fieldbus](#), [Gateway](#), [GOOSE](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Profinet](#), [proxy gateway](#)

Sunday, January 31, 2016

Discrepancy in GPS Timing of 13 Microseconds

Power Delivery systems rely to some degree on Time Synchronization based on global positioning system (GPS).

A time spike in the global positioning system which rippled through the world on January 28, 2016 was caused by a satellite launched in 1990 failing and triggering a software bug!

Although the timing anomaly measured just microseconds, it could have caused significant navigation errors, Richard Easter, head of the University of Auckland's physics department said.


"The rule of thumb is that for every nanosecond of error, you could be out by as much as a foot," Easter said.

"An error of 13 microseconds or 13,000 nanoseconds works out as just under **four**

kilometres."

What would that error mean for Sampled Values? The 13 microseconds are equivalent to a difference in the angle of 0.234 degrees in a 50 Hz AC system. This seems not to be very critical. But who knows what happens next.

Be aware that our future power system will rely more and more on GPS or other central time sources. So, the power infrastructure does rely on the GPS (or other means) - which by nature does on the power infrastructure. Everything seems to be highly interconnected.

Posted by [Karlheinz Schwarz](#) at [11:09 AM](#) [1 comment:](#) 

Labels: [GPS](#), [real-time](#), [time stamp](#), [time synchronization](#)

Thursday, January 28, 2016

IEC Committee Draft (CD) 61850-7-420 Ed. 2.0 just published

IEC TC 57 has just published the 57/1655/CD:

IEC CD 61850-7-420 Ed. 2.0: Communication networks and systems for power utility automation -

Part 7-420: Basic communication structure - Distributed energy resources logical nodes

Commenting closes 2016-04-08.

Attention is drawn to document 57/1658/DC which is circulated in parallel and which reflects a draft IEC TR 61850-7-520 and which contains the main guidelines on how to use the data models contained in the present CD.

Since both documents are closely linked IEC national committees are invited to develop their comments in parallel on the present CD and on 57/1658/DC.

The major technical changes with regard to the previous edition are as follows:

- Corrections and clarifications according to information letter "IEC 61850-technical issues by the IEC TC 57" (see document 57/963/INF, 2008-07-18);
- Extensions regarding IEC 61850-90-7 (object models for converters in distributed energy resources (DER) systems);
- Some logical nodes in IEC 61850-7-420:2009 that were not specific to distributed energy resources have been transferred to IEC 61850-7-4 Ed. 2.1 and have been removed from this edition of IEC 61850-7-420 (see also Annex A);
- The definitions of logical nodes in this edition of IEC 61850-7-420 have been updated using the table format introduced in IEC 61850-7-4 Ed. 2.1;
- Most of the modelling examples and background information that was included in IEC 61850-7-420:2009 has been transferred to IEC 61850-7-520

This CD is not available publicly as a CDV. The CDV may be available later this year.

Stay tuned to this blog.

Posted by [Karlheinz Schwarz](#) at [7:53 AM](#) [No comments:](#) 

Labels: [DER](#), [Edition 2](#), [IEC 61850-7-420](#), [Information Model](#), [power distribution](#), [PV](#)

IEC CDV 61850-7-4 Ed.2.0 Amendment 1 just pulished

IEC TC 57 has just published a 269 page CDV that reflects the **first amendment to IEC 61850-7-4 Ed.2.0**:

IEC 61850-7-4 Ed.2.0 Amd.1: Communication networks and systems for power utility automation -

Part 7-4: Basic communication structure – Compatible logical node classes and data object classes

Everybody can read the CDV and comment online (see details below).

The commenting period closes 2016-04-15.

Compared to the second edition, this first revision of the second edition:

- Provides clarifications and corrections to the second edition of IEC 61850-7-4, based on the tissues = { 650, 671, 672, 674, 675, 676, 677, 679, 680, 682, 683, 685, 686, 689, 693, 694, 695, 696, 712, 713, 714, 715, 716, 722, 724, 725, 726, 727, 732, 734, 735, 736, 742, 743, 744, 748, 749, 772, 773, 774, 775, 776, 800, 802, 808, 819, 830, 831, 835, 838, 842, 843, 844, 849, 871, 877, 878, 879, 881, 882, 902, 908, 909, 910, 911, 912, 913, 920, 928, 932, 933, 937, 939, 940, 952, 967, 991, 1007, 1029, 1044, 1046, 1071, 1075, 1076, 1077, 1081, 1086, 1117, 1119, 1128, 1137, 1139, 1176, 1177, 1190, 1191, 1203, 1205, 1229, 1235, 1236, 1244, 1250, 1256, 1258, 1259, ... }

Adds to each functional LN group a parent abstract Logical node where the functional nodes are children from (full object oriented model). Since all abstract LNs are in together in a common clause, the relative position of the functional LNs is not changed within their clause

- Adds new abbreviated terms
- Has extension of the list of abbreviate terms to be used for object names
- Has more precise combination rules for abbreviated terms to object names
- Has extensions by new logical nodes mainly from power quality domains and others
- Has corrections of editorial errors.

Please note that this CDV is available to the public for comments (yes: everybody can sign in and get access for personal comments!!):

Click [HERE](#) to register for public access and comments.

This allows everybody to ready the content and comment online.

Click [HERE](#) to visit the Tissue Database.

This CDV is the result of several years of key editors to reach a very high level of completeness and consistency of the information models throughout the various domains.

Note that the final result will be a new edition of 7-4: Edition 2.1 !! (not 3.0).

Congratulation to the editors for this great work!!

Posted by [Karlheinz Schwarz](#) at [7:39 AM](#) [No comments:](#) 

Labels: [Edition 2](#), [Edition 2.1](#), [IEC 61850](#), [IEC 61850-7-2](#), [logical node](#), [tissue process](#)

Wednesday, January 27, 2016

Training offers by FMTP and NettedAutomation in 2016

Upcoming Open Seminars in English for SMART GRID, IEC 61850, PAC, Protection Automation Control:

Dammam, KSA Feb 2016

Stockholm, SE Mar 14-17 2016

Hong Kong, Mar 22-24 2016

Karlsruhe, DE Apr 5-8 2016

Stockholm, SE Sept 19-22 2016

Karlsruhe, DE Oct 10-13 2016

Click [HERE](#) for more details and registration information.

The seminars are a must for protection and substation engineers. We train you with real market devices - not just theory.

Posted by [Karlheinz Schwarz](#) at [10:46 AM](#) [No comments:](#) 

Labels: [education](#), [en](#), [FMTP](#), [hands-on Training](#), [IEC 61850](#), [protection](#), [Substation Automation](#)

Take five minutes for a Survey on "Smart Grid IEC 61850 Maintenance and Training"

[FMTP](#) (Sweden) asks you to take a few minutes for a Survey on "Power 2016 Smart Grid IEC 61850 Maintenance and Training Study".

The Survey is intended to serve our valuable customers even better than today.

Click [HERE](#) to get to the survey.

Please note that FMTP and NettedAutomation cooperate in Trainings.

Posted by [Karlheinz Schwarz](#) at [10:37 AM](#) [No comments:](#) 

Labels: [education](#), [FMTP](#), [hands-on Training](#), [IEC 61850](#), [Smart Grid](#)

Friday, January 8, 2016

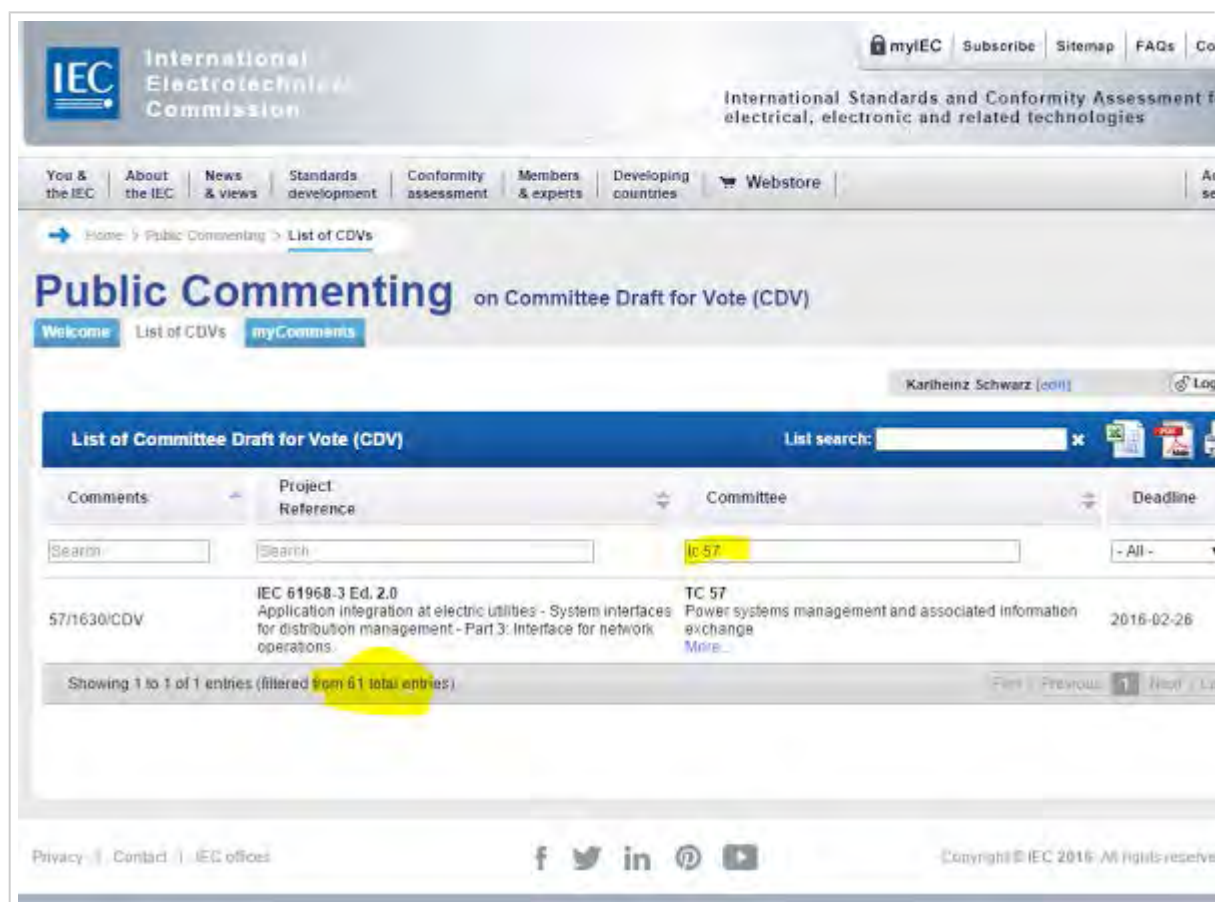
IEC Opens Access to and Commenting of CDVs to the Public

Access to the publication of IEC CDVs (Committee Draft for Vote) was restricted to a very limited number of experts usually active in the standardization work.

IEC has **opened this process to be used by the public** - allowing you to register free of charge, **access the document and provide comments online**.

Click [HERE](#) to the corresponding website to register or login.

Example:



This is a major step forward! Many people interested in IEC 61850, IEC 61400-25, IEC 62351, IEC 61158, ... have complained that they have no chance to review the draft documents.

Enjoy the new possibility!

Posted by [Karlheinz Schwarz](#) at [12:33 AM](#) [No comments:](#)

Labels: [IEC 61158](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#)

Wednesday, January 6, 2016

Want to Understand one of the Largest Machines - The Interconnected European Electric Power Grid?

The Interconnected European Electric Power Grid is one of the biggest machines built by humans. It has been developed over a period of about some 130 years. It is a miracle that it is still working very stable and more or less uninterrupted form many years.

The challenge for the future is this: How to keep the power flowing, the grass green and the sky blue. I met with a retired - but still very active - power engineer yesterday. We discussed how more information technologies can be used to support a very reliable automation system to provide 24x7 power flow all over in Europe. We have figured out that one of the key challenges in the discussions is to find the correct language in our discussions. I mean: When I talk about preventing any "remote control command", what does the recipient of that term understand? We figured out that we have discussed this term for years - but did have a different understanding in mind!

Fortunately we solved our disconnect and were happy that we have the same understanding. We will use a new (or just another) terms to make sure that other people will understand what we want to say.

A "remote control command" an mean:

1. **Switch on** the electric heater of heat storage system or
2. **Allow** the local controller of the heat storage system **to draw electric power** when the local controller sees a need to heat the storage.

In the first case the electric power will immediately flow. In the second, it may or may not - depending on the local situation. Not all heater will start immediately at the same time to heat.

In case we use the term "remote control command" for the first application only, we will not


be understood by many people. Because - I guess - most people would say: In both use cases we send a "remote control command" to the remote system.

What is the real underlying difference of the two use cases? The first one has a direct impact on the power flow, while in the second there is a local control system involved to decide what to do. Let 's assume we have 1000 heaters of a total power of 10 MW. In the first use case we have an immediate power flow rate of 10 MW per a few seconds. In the second case it is a stochastic situation where some may immediately draw the power others may draw power one hour later ...

Finally: If we would have smart systems, then the local controller would be situationell aware of the condition of the power system: if the frequency or voltage would be below specific set-points, then they would not draw power at all ...

If you would like to learn more about the huge machine "Interconnected Electric Power Delivery System":

Click [HERE](#) to watch a video [with English translation] which discusses some basics of the complexity ... enjoy.
Click [HERE](#) for the version in German.
Click [HERE](#) for more options.

Posted by [Karlheinz Schwarz](#) at 2:03 AM No comments: 

Labels: [blackout](#), [command](#), [electric power system](#), [reliable power delivery](#), [remote control](#), [RTU](#)

Saturday, January 2, 2016

Started the Year 2016 successfully with the Omicron IEDScout 4.10

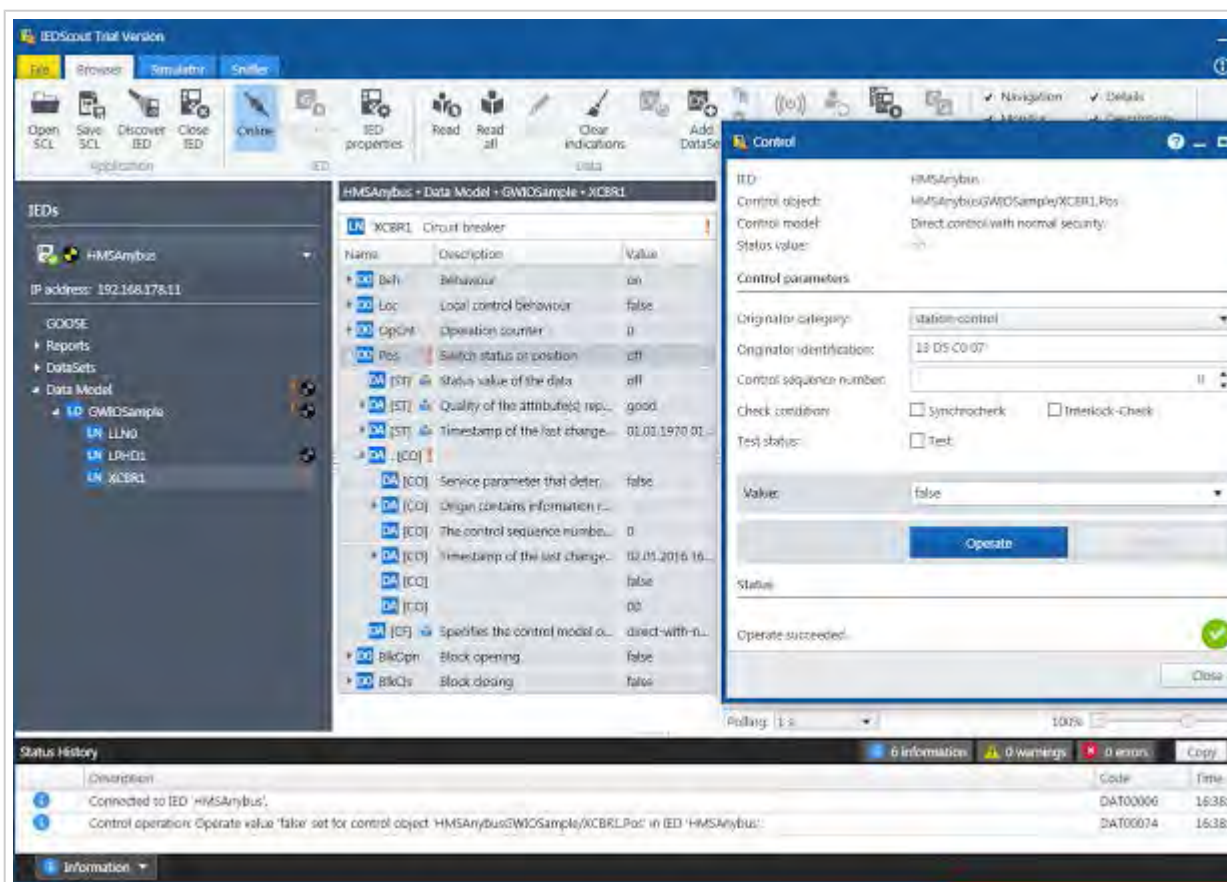
I hope you had a good start into the year 2016!

During the last days of 2015 and the first days of 2016 I have set up a new notebook and upgraded to Windows 10, Office 2013, ... and Omicron's IEDScout 4.10.

I had to test a control model with operate services. The version 3.0 was very confusing in getting me the information I was looking for. So I decided to upgrade immediately to version 4.10.

This was one of the best decisions of the "young" year 2016!

The version 4.10 is way easier and less confusing to be used for testing real products! The model shows exactly what is crucial for the tester:



This version is an IEC 61850 tool - not just a MMS browser with some flavor of IEC 61850.


Here is the link to the page for free downloading of the fully functional demo version:

<https://www.omicronenergy.com/en/products/all/secondary-testing-calibration/iedscout/noc/1/#Description>

If you are looking for a professional IEC 61850 Browser and testing tool: The IEDScout is exactly what should test and consider to purchase.

So, the second day of 2016 was already a successful day here in my office. More to come.

I look forward to helping you to get the right education and tools.

Posted by [Karlheinz Schwarz](#) at [7:59 AM](#) [No comments:](#) 

Labels: [control](#), [education](#), [HMS](#), [IEC 61850](#), [IEDScout](#), [Omicron](#), [tools](#)

Thursday, December 31, 2015

What if Remote Control Fails?

The year 2015 is almost over ... here in Karlsruhe (Germany) we are just 13 h and 13 min away from 2016. Have you looked back to the many lucky and bad situations you have experienced or you have seen during the year 2015?

I guess we all understand that we need more serious engineers that take care of the many processes and systems we need in our modern life. Our generation sees a lot of good solutions going away ... replaced by modern technologies. There is a need to use more communication systems to keep the lights on, the grass green and the sky blue.

Volkswagen has demonstrated that adaptive closed loop control can take the situation (in which a car is) into account and react in different directions - to the good of the company and share holders ... not to the good of the environment.

I have just seen what happens, when a control system does not take the situation into account: The **locomotive at the end** of a long multiple unit train **did not stop pushing** when the driver of the **leading locomotive decided to stop**. The wireless communication to carry the stop-command via a radio channel **failed to reach the control system** of the locomotive at the end of train.

Click [HERE](#) to see how the spinning wheel dug into the tracks ... for hours I guess. The control system did not check the speed which was zero for hours and did not automatically stop the wheels spinning. Obviously there was a use-case that was not taken into account: What to do when the stop command does not make it through to the locomotive at the end of the train?

At the door steps to 2016 I wish everybody reading this post a successful year 2016 ... helping to keep the power flowing.

Posted by [Karlheinz Schwarz](#) at [2:35 AM](#) [No comments:](#) 

Labels: [power systems](#), [reliable power delivery](#), [security](#)

Friday, December 25, 2015

Approved by IEC TC 57 -- IEC 61850-90-8: Object model for electric mobility

IEC TC 57 has approved the draft TR IEC 61850-90-8: **Object model for electric mobility**

All member countries have voted: Yes!

Congratulations to the IEC TC57 WG17

Check some details of the draft [HERE](#).

Posted by [Karlheinz Schwarz](#) at [3:46 AM](#) [No comments:](#) 

The Year 2015 Comes to an End Soon

I wish every visitor of this blog a very nice rest of the year and the best for 2016 – health, peace, success, and a safe place to live and work ...and 24x7 electric power!

To anyone that is not feeling well I hope that you get well very soon. To those enjoying good health good conditions may you continue to do so.

May next year bring plenty of IEC 61850 work: in the standardization, during implementation, in applications, and in education.

Please let me know if you have anything you want me to publish here.

Posted by [Karlheinz Schwarz](#) at [3:39 AM](#) [No comments:](#) 

Labels: [education](#), [IEC 61850](#), [Training](#)

Tuesday, December 15, 2015

IEC 61850 and DNP3 linked together

IEEE approved: 1815.1-2015 - IEEE Standard for Exchanging Information between networks Implementing **IEC 61850** and IEEE Std 1815(TM) (Distributed Network Protocol - **DNP3**)

The objective of this Standard is to document and make available requirements for **exchanging data between IEEE Std™ 1815 and IEC 61850 protocols using a gateway**. While a primary focus of this Standard is for the electric utility industry, other industries that deliver energy and water could also use this document if they also plan to use both IEEE Std 1815 and IEC 61850 in their systems...

Click [HERE](#) for more information.

Gateways between IEC 61850 and other protocols are [provided by HMS](#):

Supporting: IEC60870-5-104 client/server and **Modbus** TCP client/server & RTU master/slave protocol stacks. Additional industrial automation standards like **Profinet**, **Profibus**, **EtherNet/IP** or metering protocols like **M-Bus**.

DNP3 is coming soon.

Posted by [Karlheinz Schwarz](#) at [8:14 PM](#) [No comments:](#) 

Labels: [Anybus](#), [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Profinet](#)

Friday, December 11, 2015

IEC 61850: THE crucial standard for Power Delivery System at EDF

PennWell Corporation reported earlier this year:
French utility giant EDF uses **IEC 61850 for more than the standard's usual communication applications**. Working with Schneider Electric, EDF has embraced a new approach for application modeling with **IEC 61850 at its core**.

For designing wind farms and photovoltaic (PV) systems, EDF employs this approach as early as the requirements-gathering level. The approach echoes one encouraged by Schneider Electric for using IEC 61850, an ambition the company translated into software engineering tools.


With its new approach to engineering smart substation automation systems, EDF places information flow at the center of **project engineering**. ...

Any person or machine at EDF can read and understand that common language. The language enables information exchange among devices, people, departments, organizations, generations of stakeholders and the components and people involved in projects and systems.

... EDF's approach, **based completely on the IEC 61850 standard**, allows the capture of unambiguous requirements in a formal way.

Click [HERE](#) to read the full article.

More to come.

Posted by [Karlheinz Schwarz](#) at [10:43 PM](#) [No comments:](#) 

Labels: [EDF](#), [engineering](#), [IEC 61400-25](#), [IEC 61850](#), [photo voltaic](#), [SCL](#), [Substation Automation](#), [wind power](#)

Monday, December 7, 2015

LAT (Lab Acceptance Tests): Open Systems in Automation – Quo Vadis?

Open Systems in Automation are more than a hype. Since the early 80s we have seen a lot of activities to define Open Systems for Automation. The first major project was the MAP project initialized by General Motors: Manufacturing Automation Protocols. One of the crucial standards developed in this context was MMS: Manufacturing Message Specification (ISO 9506).

When people were struggling with the implementation of 7-Layer or 3-Layer solutions including MMS some other groups believed that Fieldbusses would be the better approach. The standardization of fieldbusses come up with tens (or even tons) of different solutions under one IEC standard series: IEC 61158 with 50+ solutions.

How to build Open Systems in Automation based on this many solution? There are too many islands of very specific open systems based on special fieldbus solutions. This was one of the real reasons why people developed OPC to bridge the gap between these many islands. OPC has helped to share information between islands.

There was another issue that causes increasingly headaches: the **System Configuration and Engineering**. How to solve this challenge? The next wave was to standardize incompatible **“integration” support solutions**: FDT (Field Device Tool), EDD (Electronic

Device Description) or FDI (Field Device Integration). So: What now?

Endress+Hauser has started recently a very interesting approach:

Open Integration Partner program for practical testing of multi-vendor automation topologies

The focus is on Hart, Profibus, Foundation Fieldbus, Ethernet/IP, and Profinet, as well as on FDT, EDD or FDI.

What are they proposing: “**Open Integration** validates the interplay of all products in a reference topology by **mutual integration tests**.” in a permanent lab environment.

Click [HERE](#) for a brief description in English.
Click [HERE](#) for a brief description in German.

That means: To run a comprehensive permanent “**LAT**” (**Lab Acceptance Tests**). This is something prior to “**FAT**” (Factory Acceptance Tests) and “**SAT**” (Site Acceptance Tests). Vendors involved are: Endress+Hauser, Auma Riester, Hima Paul Hildebrandt, Honeywell Process Solutions, Mitsubishi Electric, Pepperl+Fuchs, Rockwell Automation, R. Stahl und Schneider Electric.

What about “Open Systems” and IEC 61850? The power industry has understood that Interoperation Tests are very crucial to improve the standards and products. Several IOPs (Interoperability tests) – or better “**LAT**” (**Lab Acceptance tests**) – have been conducted. The last one in October 2015 in Brussels.

I hope that some companies and organizations in the Power Industry will also implement such **permanently available “LAT” (Lab Acceptance Tests)** that would offer 24x7 support services to the power industry.

The challenges in the power industry are lower than in the industrial automation: Because we have (luckily) a **single standard** series that comprises:

1. **Device communication** (real-time and SCADA protocols)
2. **Device Information Models** (e.g. MMXU for electrical measurements)
3. **System Configuration Language** (SCL) for engineering of Systems, Models, Device, Communication ... and their Configuration

In case you would be interested to join such an effort related to IEC 61850, IEC 61400-25, and IEC 60870-5-104, let us know:

[Contact us](#) if you have something to contribute.

Posted by [Karlheinz Schwarz](#) at [10:05 PM](#) [No comments:](#) 

Labels: [FAT](#), [fieldbus](#), [HART](#), [IEC 61158](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [LAT](#), [Profibus](#), [Profinet](#), [SAT](#), [test lab](#), [testing](#)

Thursday, November 26, 2015

Vorträge des Workshops "Common Information Model (CIM) in der Praxis"

Die DKE hat am 14. Oktober 2015 einen Workshop zum Thema "CIM in der Praxis" durchgeführt. Die Beiträge (alle in Deutsch) stehen jetzt zum Download bereit:

- [Einleitung und Übersicht](#) (Dr. Heiko Englert, Siemens)
- [Herausforderungen im Alltag des Netzbetriebes I](#) (Jörg Brand, Westnetz)
- [Herausforderungen im Alltag des Netzbetriebes II](#) (Stephan Siegler, Amprion)
- [Lösungen aus CIM-Sicht: ein Überblick der konkreten Anwendungen](#) (Dr. Tatjana Kostic, ABB)
- [Was ist CIM?](#) (Rainer Rüdiger, Siemens)
- [CIM-Modellierungsbeispiel](#) (Henriette Zöller, Siemens)
- [Normung und Lifecycle von CIM](#) (Dr. Mathias Uslar, OFFIS)
- [Positionierung von CIM im Vergleich zu IEC 61850](#) (Thomas Rudolph, Schneider Electric)
- [Tiefer in die Materie – die CIM-User Group](#) (Rainer Rüdiger, Siemens)
- [Der Weg zu CIM: Datenmodellierung Leittechnik](#), (Dr. Mathias Uslar, OFFIS)

Viel Spaß beim Studieren.

Posted by [Karlheinz Schwarz](#) at [1:27 AM](#) [No comments:](#) 

Labels: [CIM](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [Netzleittechnik](#)

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Thursday, November 26, 2015

IEC 61850 DLL Demo with Looging and Log-File

The [DLL Demo based on SystemCorp’s IEC 61850 Stack/API](#) can very easily be configured with the corresponding CID-File for the Server to log data attributes listed in a DataSet. The log entries are stored in an XML file.

All you need to do is: **Add the following 3 lines in the configuration file** (after line 52):

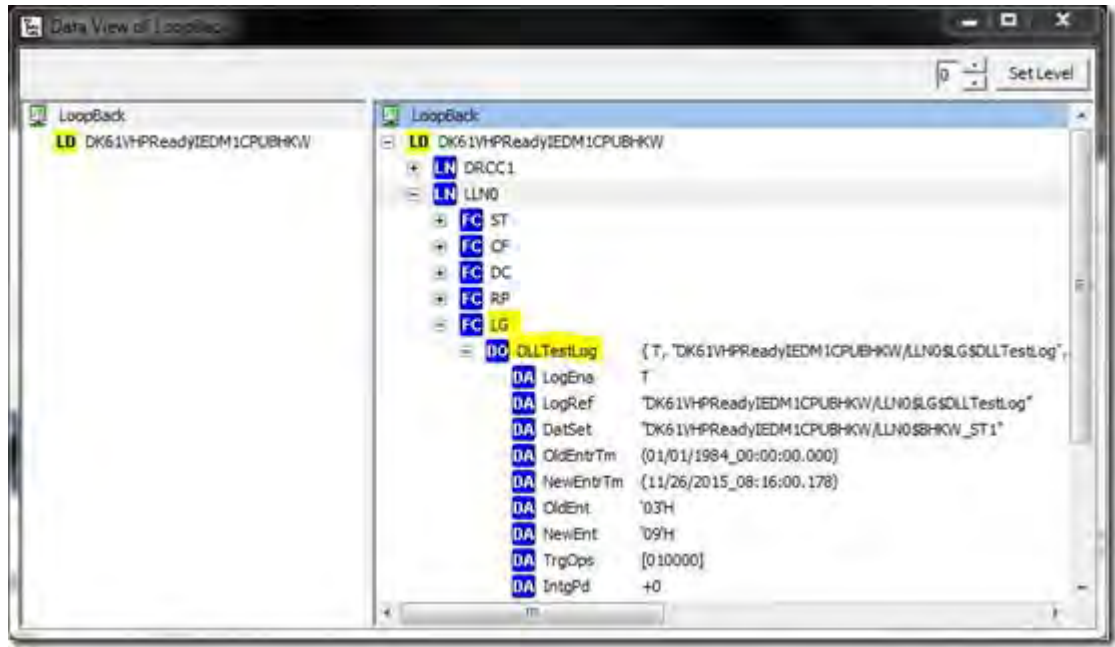
Directory: /Resources_localhost (/Resources_2machines)
File: /VHPServer_localhost.icd (/VHPServer_2machines.icd)

```
<DataSet name="BHKW_ST1" desc="Status values for event-driven reports">
  <FCDA ldInst="IEDM1CPUBHKGW" lnClass="STMP" lnInst="1" doName="Alm" fc="ST"/>
  <FCDA ldInst="IEDM1CPUBHKGW" lnClass="DRCC" lnInst="1" doName="DERStr" fc="ST"/>
</DataSet>
<LogControl datSet="BHKW_ST1" intgPd="0" logEna="true" logName="DLLDemo" name="DLLTestLog">
  <TrgOps dchg="true"/>
</LogControl>
```

```
<LogControl datSet="BHKW_ST1" intgPd="0" logEna="true" logName="DLLDemo"
name="DLLTestLog">
  <TrgOps dchg="true"/>
</LogControl>
```

Restart the Serer and you have a log that is filled with events coming through the DataSet "BHKW_ST1".

Model as seen by an IEC 61850 Client (Browser):



The file format (DLLDemo.Xml) is vendor-specific:

de	16.06.2015 20:11	Dateiordner	
Resources_2machines	13.06.2015 07:18	Dateiordner	
Resources_localhost	13.06.2015 07:18	Dateiordner	
DLLDemo.Xml	26.11.2015 09:16	XML-Datei	4 KB
Library.dll	13.06.2015 14:27	Anwendungserwe...	138 KB
NettedAutomation.exe	13.06.2015 14:27	Anwendung	1.330 KB
PIS10V2.dll	16.06.2014 15:05	Anwendungserwe...	392 KB
VHPReadyClient_2machines.bat	11.01.2015 19:21	Windows-Batchda...	1 KB
VHPReadyClient_localhost.bat	16.01.2015 14:12	Windows-Batchda...	1 KB
VHPReadyServer_2machines.bat	14.01.2015 10:48	Windows-Batchda...	1 KB
VHPReadyServer_localhost.bat	16.01.2015 14:13	Windows-Batchda...	1 KB
ZedGraph.dll	13.06.2015 06:34	Anwendungserwe...	300 KB

Two Log Entries (4 and 5):

For your Convenience

- [New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)
- [Training Opportunities: IEC 61850, IEC 60870-5-104, DNP3, ... - 2015-06-12](#)
- [Blog as single PDF until 28 April 2015 \[11 MB\]](#)

Training by NettedAutomation



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- 2009 (162)
- 2008 (82)

```
<JournalEntry Entry="4" Day="11652" ms="29704978" Order="0"><Variable Tag=
"DK61VHFPReadyIEDM1CFUBHKW/STMP1$ST$Alm"><Structure><Data Domain=
"DK61VHFPReadyIEDM1CFUBHKW" Name="stVal"><Boolean>1</Boolean></Data><Data Domain=
"DK61VHFPReadyIEDM1CFUBHKW" Name="q"><BitString>0000</BitString></Data><Data Domain=
"DK61VHFPReadyIEDM1CFUBHKW" Name="t"><UTCTime>0000000000000000
</UTCTime></Data></Structure></Variable><Variable Tag=
"DK61VHFPReadyIEDM1CFUBHKW/STMP1$ST$Alm|ReasonCode"><BitString>40
</BitString></Variable></JournalEntry>

<JournalEntry Entry="5" Day="11652" ms="29707448" Order="0"><Variable Tag=
"DK61VHFPReadyIEDM1CFUBHKW/STMP1$ST$Alm"><Structure><Data Domain=
"DK61VHFPReadyIEDM1CFUBHKW" Name="stVal"><Boolean>1</Boolean></Data><Data Domain=
"DK61VHFPReadyIEDM1CFUBHKW" Name="q"><BitString>0000</BitString></Data><Data Domain=
"DK61VHFPReadyIEDM1CFUBHKW" Name="t"><UTCTime>0000000000000000
</UTCTime></Data></Structure></Variable><Variable Tag=
"DK61VHFPReadyIEDM1CFUBHKW/STMP1$ST$Alm|ReasonCode"><BitString>40
</BitString></Variable></JournalEntry>
```

Note: The time stamp "t" is "000...0" because the Server application program is not providing it to the Stack ... this could be done by extending the C# application source code that comes with the Demo package ... if you are familiar with C# programming.

The services QueryLogByTime and QueryLogAfter will be available in the future.

The Log Model is available in the SystemCorp Library. It means, e.g., it is available in devices like the [HMS SG line](#). The log file may grow very fast ... be careful not to consume all memory resources. In the future the file will represent a circular buffer so that it will never overflow (by overwriting the oldest entries – as defined in IEC 61850-7-2).

There is a possibility to convert the XML coded Log file into another XML based file: COMFEDE („Common Format for Event Data Exchange") published by IEEE.

Click [HERE](#) for Information on COMFEDE (DE).
Click [HERE](#) for Information on COMFEDE (EN).

Click [HERE](#) if you are interested to download the DLL Demo.

Posted by [Karlheinz Schwarz](#) at [1:00 AM](#) [No comments:](#) 

Labels: [COMFEDE](#), [configuration](#), [configuration language](#), [HMS](#), [IEC 61850](#), [IEEE](#), [Log File](#), [logging](#), [SCL](#)

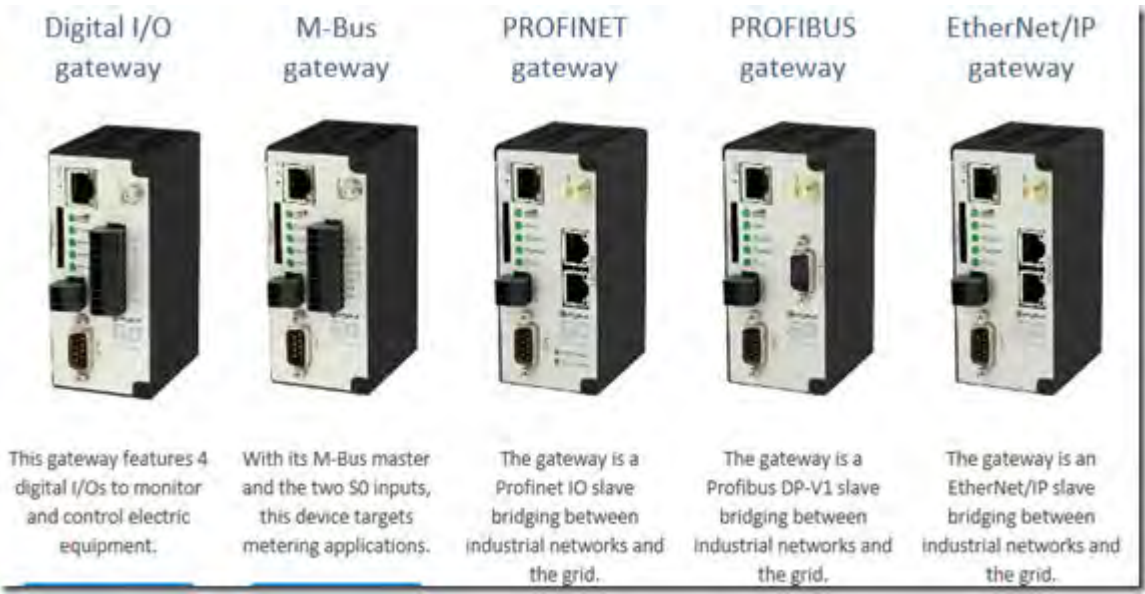
Tuesday, November 24, 2015

HMS offers also Gateways from Profibus and EtherNet/IP to IEC 61850 an IEC 60870-5-104

The Anybus SG-gateway family is designed for use with Smart Grid applications such as, control of electrical equipment, metering applications and with the bridging of Industrial Networks with the Power Grid.

The Anybus SG-gateways were originally developed under the HMS's Labs Initiative, known as "Labline". **Now that the gateways have been finalized they are currently under the transition of moving under the "Anybus" brand name.** The product remains unchanged - just labels and product color and web interface are in the process of update. Until Jan 2016 they are available as the "Labline" brand.

The SG-gateways support **IEC61850** client/server, **IEC60870-5-104** client/server and **Modbus** TCP client/server & RTU master/slave protocol stacks. Additional industrial automation standards like **Profinet**, **Profibus**, **EtherNet/IP** or metering protocols like **M-Bus** are also available in some models.





Click [HERE](#) for more details.

Posted by [Karlheinz Schwarz](#) at [11:54 AM](#) [No comments:](#) 

Labels: [EthernNet/IP](#), [Gateway](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Profinet](#), [Smart Grid](#), [smart solution](#)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

Monday, November 23, 2015

ENTSO-E publishes November 2015 news on IEC 61850

ENTSO-E seems to be quite happy with:


1. the **level of interoperability** many different vendors’ subsystems to be applied within the TSO system management architecture.
2. the **status of the standardization** within IEC TC 57 WG 10, WG 17 and WG 18.

ENTSO-E just published a brief report on the

IOP 2015, organized by UCA International User Group (Iug) in Brussels, Hotel Crowne Plaza, 26.9-2.10

IEC TC57 WG10(-17-18) meetings, hosted by and at ENTSO-E premises, Brussels , 5.-9.10.

Click [HERE](#) to read the summary on the two events.

Posted by [Karlheinz Schwarz](#) at [10:36 PM](#) [No comments:](#) 

Labels: [ENTSO-E](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Transmission Grid](#), [TSO](#)

Question & Answer: What is the IEC 61850 EntryTime?

EntryTime is, e.g., used for IEC 61850 Log Entries to identify when a log entry has been stored.

Here is a Log Entry (encoded as an XML document):

```
<JournalEntry Entry="26" Day="11647" ms="19228670" Order="0">
  <Variable Tag="ServerIEDEExample/CSWIO$ST$Pos$stVal">
    <BitString>00</BitString>
  </Variable>
  <Variable Tag="ServerIEDEExample/CSWIO$ST$Pos$stVal|ReasonCode">
    <BitString>08</BitString>
  </Variable>
  <Variable Tag="ServerIEDEExample/CSWIO$ST$Pos$q">
    <BitString>0000</BitString>
  </Variable>
```

The IEC 61850 EntryTime is mapped to MMS TimeOfDay:

The MMS TimeOfDay epoch began at 0 hours on **1 January 1984** (MJD 40 587). Times measured are designated in this standard as MMS TimeOfDay **milli-seconds** GMT and TimeOfDay **days** GMT, and represent offsets from the epoch.

How to translate the above time to date and time?

Day translates:

<http://www.convertunits.com/dates/from/Jan+1,+1984/to/Nov+21,+2015>

Date difference from Jan 1, 1984 to Nov 21, 2015

The total number of days between Sunday, January 1st, 1984 and **Saturday, November 21st, 2015** is 11,647 days.

Milli-second translates:

<https://www.unitjuggler.com/convert-time-from-ms-to-day.html?val=19228670>

~= 5 hr. 20 min. 28 sec. 670 ms


Saturday, 21st November 2015 05:20:28:670

It is that easy.

By the way, the above log is generated by the SystemCorp Stack/API by simply adding three (3) lines in an CID File (in this case for the [Smart Grid Gateway of HMS](#) supporting **Modbus, M-Bus, Profibus, Profinet, EtherNet/IP...**):

```
<LogControl datSet="GooseDS" intgPd="0" logEna="true" logName="ServerIED"
name="TestLog">
  <TrgOps dchg="true"/>
</LogControl>
```

Stay tuned for more features.

Posted by [Karlheinz Schwarz](#) at [11:59 AM](#) [No comments:](#) 

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [logging](#), [M-Bus](#), [Modbus](#), [Profibus](#), [Profinet](#)

Saturday, November 21, 2015

Coordinated Universal Time (UTC) to retain “leap second”

For some time experts discuss the need of “leap seconds” that require very smart time

management services to follow the number of leap seconds added from time to time. Leap seconds are added periodically to adjust to irregularities in the earth's rotation in relation to Coordinated Universal Time (UTC), the current reference for measuring time, in order to remain close to mean solar time (UT1). A leap second was added most recently on 30 June 2015 at 23:59:60 UTC.

Do you know how many leap seconds have been added since UTC became a standard? Hm, your IEC 61850, IEC 60870-5-104, DNP3 devices and SCADA systems need to know it. Otherwise the time synchronization is more or less useless. 26 leap seconds have been added ... and nobody knows when the next will be added.

Several experts have requested to get rid of the leap seconds ... ITU decided to study the issue in more detail and come back to discuss the issue in 2013.

Click [HERE](#) for a report from ITU.

Click [HERE](#) for background information.

Posted by [Karlheinz Schwarz](#) at [9:31 AM](#) [No comments:](#) 

Labels: [DNP3](#), [IEC 60870-5-104](#), [IEC 61850](#), [time stamp](#), [time synchronization](#), [utc](#)

Thursday, November 12, 2015

Question & Answer: Are “valKind” and “valImport” related?

The configuration of systems and IEDs with IEC 61850 tools (system tools, IED tools, protocol stacks) is a challenge for people involved in power system protection, monitoring, and automation.

I guess that you have some experience with the many rules and the underlying philosophy that are crucial for the correct operation of interconnected IEDs.

Quite often it is obvious how to apply a given rule in the configuration language (IEC 61850-6 SCL). First of all: You have to take into account the standard **document AND the green tissues!**

Example on the relation between “valKind” and “valImport”. Tissue 804 introduces the new attribute “valImport” in an SCL document:

<http://tissue.iec61850.com/tissue/804>

The need for that “valImport” attribute is discussed at the bottom of the tissue 804. The solution is well defined.

The two attributes can be applied for **data attributes** configured in an SCL file. There are two different categories of data attributes:

1. Models of **“process” related information**, e.g., scale factor of an Integer modeled measurement.
2. Models of **“communication service” related information**, e.g., Trigger options or integrity period of a report control block.

If in a SCL document (SCD) the process related values (e.g., scale) **SHALL be fixed**, these values must be set and declared as fixed. It is not allowed by an IED tool nor online to change these (fixed) values: Here are the corresponding attribute settings (**valKind=RO AND valImport=false**).

We have to be careful with rules (not defined in the standards) like the following:

If valKind=Set THEN valImport=true (if I can overwrite a value with a service, it makes sense to allow to configure a value at tool level; it may be useful for communication service related information of a control block, but not for process related information).

Be careful with the combinations of these two attributes ... they are independent of each other. And: Not all tools may understand the philosophy below.

Posted by [Karlheinz Schwarz](#) at [2:59 AM](#) [No comments:](#) 

Labels: [configuration](#), [configuration change](#), [configuration language](#), [IEC 61850-6](#), [SCL](#)

Sunday, November 8, 2015

Viertes IEC-61850-Seminar in Deutsch – Karlsruhe (02.12.-04.12.2015)

Sie haben jetzt wieder die Möglichkeit, ein dreitägiges (deutschsprachiges!) Intensivseminar mit Theorie und viel Praxis in Karlsruhe zu einem

*****unschlagbar günstigen Preis*** von NUR 790,- Euro (netto) zu buchen!**

02.-04. Dezember 2015 (Karlsruhe)

11.-13. Januar 2016 (Karlsruhe)

07.-09. März 2016 (Karlsruhe)

Die NettedAutomation GmbH hat seit 2003 weltweit über 200 Seminare (mit nahezu 4.000

Teilnehmern) für IEC 61850 und IEC 60870-5-104 durchgeführt.

Das Interesse an Seminaren und Trainingskursen im deutschsprachigen Raum ist so groß, dass NettedAutomation im Dezember 2015 den vierten Trainingskurs in Deutsch anbietet.

Am ersten Tag wird ein Überblick über das Normungsumfeld und die einzelnen Normen gegeben. Im Mittelpunkt stehen dabei die grundlegenden Eigenschaften und Bedeutung der Normenreihe IEC 61850 für Engineering, Datenmodellierung, Datenmodelle, Kommunikationsmöglichkeiten, Sicherheitslösungen sowie deren internationale Umsetzung und Akzeptanz.

Am zweiten und dritten Tag werden Details behandelt und mit praktischen Übungen an realen Geräten begleitet. Ein Teil der eingesetzten Lösungen und Werkzeuge können auch nach dem Training weiter verwendet werden. Es wird vor allem die Frage behandelt: Was bedeutet der Einsatz dieser Normen für Hersteller von Geräten und Systemen, für die Systemintegratoren und für die Anwender?

Anmeldeunterlagen:

http://www.nettedautomation.com/download/Sem/ka15/Public-Seminars_Netted_R0-4_2015-08-17_DE.pdf

Posted by [Karlheinz Schwarz](#) at [8:18 AM](#) [No comments:](#) 

Labels: [de](#), [IEC 60870-5-104](#), [IEC 61850](#), [Schulung](#), [seminar](#), [Training](#)

Saturday, November 7, 2015

Proxy and Gateway Approach of IEC 61850

A Proxy Server in the sense of IEC 61850 exposes the very same information models of many IEDs through a Server that uses the same Logical Device/Logical Node names (references) as in the IEDs that are “mirrored” or “proxied”.

There is no difference in the meaning and syntax between the models in the various IED Servers and the Proxy Server.

The **general gateway approach** is quite different. In a gateway we are free to manage information like:

1. **Translate** data from legacy protocols such as IEC 60870-5-103, IEC 60870-5-104, IEEE 1815 (DNP3), IEC 61158-6 (Modbus), etc. into IEC 61850 data model
2. **Add** data local to the IED hosting the Proxy/Gateway
3. **Rename** logical devices coming from IED level into logical device server
4. **Rearrange/Rename** logical nodes coming from IED level into logical device of the Proxy/Gateway server
5. **Merge** of two or more information objects coming from two or more different logical nodes at IED level into one logical node of the Proxy/Gateway server
6. **Split** of information objects coming from one logical node at IED level into two or more logical nodes of the Proxy/Gateway server where each logical node contains a subset of the information objects of the original logical node
7. **Transform** a generic information object (e.g. GGIO, GAPC, etc.) at IED level into a semantically defined information object of the Proxy/Gateway server
8. **Convert** a specific information object (e.g. MMTN) at IED level into another semantically defined information object (e.g. MMXU) of the Proxy/Gateway server
9. **Adapt** the scale, information encoding and dead band configuration between the IED data object and the data object in the Proxy/Gateway server
10. **Logical** (e.g. and, or, if/else, grouping of indications, etc.) and **arithmetic** (e.g. multiplication, division, addition, subtraction, etc.) transformations between one or more data objects at IED level and one or more data objects of the Proxy/Gateway server

Real IEDs may have gateway and proxy functions.

Click [HERE](#) for very simple and easy to use proxies and/or gateways for IEC 61850, IEC 60870-5-104, Modbus, Profibus, Profinet, ... offered by HMS. These can be understood as Micro-RTU ...

Posted by [Karlheinz Schwarz](#) at [12:41 AM](#) [No comments:](#) 

Labels: [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [Profibus](#), [Profinet](#), [proxy gateway](#), [RTU](#)

Substation to Control Center Communication: IEC 61850-90-2 TR Approved

The draft Technical Report for Substation to Control Center Communication has been approved by 100 %:

IEC 61850-90-2 TR:

Communication networks and systems for power utility automation - Part 90-2: Using IEC 61850 for the communication between substations and control centres

The final Technical Report will be published in December 2015. It provides a comprehensive overview of the different aspects that need to be considered while using IEC 61850 for information exchange between substations and control or maintenance centres or other

system level applications. In particular, this technical report:

- defines use cases and communication requirements that require an information exchange between substations and control or maintenance centres
- describes the usage of the configuration language of IEC 61850 6
- gives guidelines for the selection of communication services and architectures compatible with IEC 61850
- describes the engineering workflow
- introduces the use of a Proxy/Gateway concept
- describes the links regarding the Specific Communication Service Mapping (SCSM)

The wait for the application of IEC 61850 for information exchange between substations and control centers is over – starting in 2016, there is no excuse any more.

The scope of the TR is quite limited: Substation (only!) to control centers. The future energy delivery system (in which power is one aspect only) will build a hierarchy of aggregated information systems. There will be several layers of information management systems. This is required because of the use of IEC 61850 from power distribution all the way up to the transmission system operator. Information needs to be aggregated because of the sheer unlimited amount of information generated and consumed in the system.

It is likely that the TR 90-2 will be used for other vertical information flows between aggregation points and higher level systems. A subset of the TR 90-2 may be used for information exchange between a control center and a wind power plant.

The restricted scope in the TR 61850-90-2 is just toner on paper – like in almost all IEC 61850 parts. A server in the sense of IEC 61850 can **expose any data from any application**. IEC 61850 relies on ISO 9506 (MMS – Manufacturing Message Specification). As the name says: MMS (and IEC 61850) can be used for **manufacturing and many other domains**.

The main scope of IEC 61850 is constrained by the title: “... for power utility automation”. From a technical point of view we could leave only “... automation”:

“Communication networks and systems for automation” – BUT this would never be accepted by the IEC officials. Automation as such is not the scope of IEC TC 57.

MMS is not restricted to “Manufacturing” and IEC 61850 is not restricted to “power utility automation”.

Posted by [Karlheinz Schwarz](#) at [12:27 AM](#) [No comments:](#) 

Labels: [control center](#), [Gateway](#), [IEC 61850](#), [iec 61850-90-2](#), [MMS](#), [proxy gateway](#), [RTU](#), [Substation](#)

Wednesday, November 4, 2015

German Standardization Roadmap Industrie 4.0 (Version 2)

Several groups within Germany have written a 70+ page Standardization Roadmap Industrie 4.0 (Version 2, Oct 2015). The document lists a lot of topics relevant for standardization related to the future industrial automation. It contains a lot of issues that “should” or “must” be considered in the standardization of the future.

I was a bit surprised that the industrial automation world seems to lack of many basic standards that would support interoperability and inter-workability. Guess the authors have understood that the myriad of fieldbusses seems not to solve the needs for the future automation process – fieldbusses lead to many islands that can not talk together.

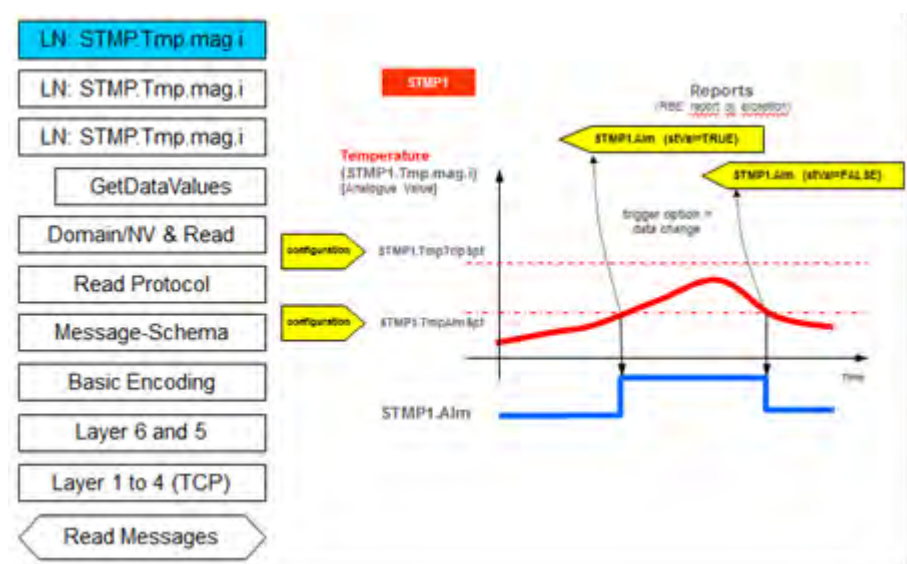
The power world has decided already some 20 years ago to build the foundation of interoperable systems based on a well defined huge “dictionary” of semantic terms (the hundreds of logical nodes for almost all power domains).

With IEC 61850 we change from “bits” to “well defined terms and messages”:



All the messages exchanged could be based on a well standardized semantic, like the temperature supervision model “STMP”: Trip = “STMP1.Trip.stVal” or the current temperature = “STMP1.Tmp.mag.i”.

The various layers are shown in the following figure:



These values can be reported by a DataSet and a GOOSE message (in real-time ... in some 3 to 5 msec):

```
<!Device inst="MONITOR" desc="Demo of models and services on DK61">
  <LN0 lnClass="LLN0" inst="" lnType="LLN0_0">
    <DataSet name="Indicate DataSet">
      <DataSet name="Tmp Alarm Trip GradAlarm DS">
        <DataSet name="Tmp GOOSE Trip DataSet">
          <FCDA ldInst="MONITOR" lnClass="STMP" lnInst="1" doName="Trip" daName="stVal" fc="ST"/>
          <FCDA ldInst="MONITOR" lnClass="STMP" lnInst="1" doName="Tmp" daName="mag.1" fc="MX"/>
        </DataSet>
      <DataSet name="Tmp Quality DataSet">
      <DataSet name="Tmp Value DataSet">
      <DataSet name="Goose Alarm DataSet">
      <ReportControl rptID="MyRep/RCB ID" confRev="1" buffered="false" intgPd="0" dataSet="Indicate DataSet" name="Unbuf RCB"
      <ReportControl rptID="Tmp Value" confRev="1" buffered="false" intgPd="2000" dataSet="Tmp Value DataSet" name="Unbuf RCB"
      <ReportControl rptID="Tmp Alarm Trip" confRev="1" buffered="false" intgPd="0" dataSet="Tmp Alarm Trip GradAlarm DS" name="Unbuf RCB"
      <ReportControl rptID="Tmp Quality" confRev="1" buffered="false" intgPd="0" dataSet="Tmp Quality DataSet" name="Unbuf RCB"
      <GOOSEControl type="GOOSE" appID="GSE CB ID" confRev="1" dataSet="Goose Alarm DataSet" name="GSE CB GOOSE" desc="For Alarm"
      <GOOSEControl type="GOOSE" appID="Tmp Trip CB ID" confRev="1" dataSet="Tmp GOOSE Trip DataSet" name="Tmp Trip CB GOOSE" desc="For Alarm"
    </LN0>
  </Device>
```

According to GOOSE message syntax in IEC 61850-8-1

```
GOOSE
  APPID: 0x0000 (0)
  Length: 148
  Reserved 1: 0x0000 (0)
  Reserved 2: 0x0000 (0)
  gosePdu
    gocbRef: DK61MONITOR/LLN0SGO$Tmp_Trip_CB_GOOSE
    timeAllowedToLive: 4000
    dataSet: DK61MONITOR/LLN0$Tmp_GOOSE_Trip_DataSet
    goID: Tmp_Trip_CB_ID
    t: Jan 1, 2006 12:23:12.344860970 UTC
    stNum: 3452
    sqNum: 36
    test: False
    confRev: 1
    ndsCom: False
    numDataSetEntries: 2
    allData: 2 items
      Data: boolean (3)
        boolean: False
      Data: integer (5)
        integer: 21
```

Tag=0	Length=25h	GOOSE message
0000	01 0c cd 01 00 37 00 30 56 a0 76 14 88 b8 00 007.0 V.v....
0010	00 94 00 00 00 00 61 81 89 80 25 44 4b 36 31 4da. ...%DK61
0020	41 4e 49 54 41 52 21 4c 4c 4e 30 24 47 4f 24 54	ONITOR/L LN0\$GO\$
0030	6d 70 5f 54 72 69 70 5f 43 42 5f 47 4f 4f 53 45	mp_Trip_CB_GOOS
0040	81 82 01 a0 82 27 44 4b 4b 31 4d 41 4e 49 54 4f'DK 61MONIT
0050	52 2f 4c 4c 4e 30 24 54 6d 70 5f 47 4f 4f 53 45	R/LLN0\$T mp_GOOS
0060	5f 54 72 69 70 5f 44 61 74 61 53 63 74 83 0e 54	_Trip_Da taSet..
0070	6d 70 5f 54 72 69 70 5f 43 42 5f 49 44 84 08 43	mp_Trip_CB_ID..
0080	87 c9 b0 58 48 cf 8a 85 02 0d 7c 86 01 24 87 01	...XH...\$.
0090	00 88 01 01 89 01 00 8a 01 02 ab 06 83 01 00 85
00a0	01 15	..

The smart grid efforts within IEC are tremendously supported by IEC TC 57 ... especially with the standards series IEC 61850. This series is part of the "IEC smart grid standards roadmap".

This roadmap has really attracted the Industrie 4.0 supporters! They write in their roadmap:

"Empfehlung, eine Normenlandkarte (standardisation map) für Industrie 4.0/Smart manufacturing elektronisch zu beschreiben. Die Normenlandkarte wird ein im Vergleich zum Smart Grid Mapping Tool (<http://smartgridstandardsmap.com>) äquivalentes elektronisches Werkzeug darstellen."

They recommend to "copy" the "IEC smart grid standards roadmap" and name it "IEC Industry 4.0 / Smart Manufacturing Roadmap".

Click [HERE](#) to see the IEC smart grid standards roadmap.

Click [HERE](#) to access the Standardization Roadmap Industrie 4.0 (Version 2, Oct 2015, German only).

I hope that they will "copy" more than just a roadmap ... refer to IEC 61850 some time down the road.

By the way: HMS is bridging the semantic-less fieldbusses to the semantic defined in IEC 61850 ...

<http://www.hms-networks.com/about/labs/smart-grid/labline-sg>

Posted by [Karlheinz Schwarz](#) at 11:32 AM No comments:

Labels: [Gateway](#), [HMS](#), [IEC 61850](#), [IEC TC 57](#), [IEC TC 65](#), [Industrie 4.0](#), [power systems](#)

Wednesday, October 28, 2015

The Energy Lab 2.0 in Karlsruhe (Germany)

Karlsruhe (Germany, the hometown of Karlheinz Schwarz) is known (among others) for supporting the German Energiewende: The KIT and NettedAutomation GmbH

NettedAutomation is deeply involved in the dissemination of IEC 61850 all over the world. Now I see big investments in Energy related R&D projects in Germany. One of the most crucial activities is the new “Energy Lab 2.0” in Karlsruhe.

Energy Lab 2.0 – The Smart Energiewende Platform


New Research Facility Links Producers with Storage Systems and Consumers – Investment Totaling EUR 22 Million

“ ... The project is embedded in the overall energy strategy of the Helmholtz Association. For the Energy Lab 2.0, the partners plan to build a **simulation and control center and a network of energy technology facilities** on KIT Campus North, an electrolysis test center at Forschungszentrum Jülich, and a facility for testing power-to-heat concepts at the German Aerospace Center, Stuttgart, by 2018.

The energy platform will link characteristic components for **power, heat, and synthesis gas production** with various **energy storage technologies and consumers**. For this purpose, large facilities existing at KIT will be integrated into the Energy Lab 2.0: The solar power storage park, the bioliq pilot facility, and selected energy consumers on KIT Campus North. Electrical, electrochemical, and chemical storage systems as well as a load- and fuel-flexible gas turbine with current generator will be newly constructed and are planned to complement the network. A simulation and control center at KIT will integrate all network components of KIT and the partners in a smart energy system using **information and communication technologies**. **This infrastructure facility is the first of its type in Europe. ...”**

More to come. Stay tuned.

Click [HERE](#) for a more comprehensive description [pdf].

Posted by [Karlheinz Schwarz](#) at [11:05 PM](#) [No comments:](#) 

Labels: [communication](#), [Energiewende](#), [information exchange](#), [KIT](#), [renewables](#), [Smart Grid](#)


IEC 61850 Testlabs Accredited by the UCAIUG

As per October 2015 the following tester are offering Conformance Tests for products implementing IEC 61850:

Tester	Level
ABB Switzerland Ltd	Level B: Server Ed1 And GOOSE Performance
ALSTOM GRID UK LTD Substation Automation Solutions	Level B: Server Ed1/Ed2
Central Power Research Institute (CPRI), Bangalore, India	Level A: Server Ed1
DNVGL Nederland	Level A: Server/Client Ed1/Ed2, GOOSE Perf. And 9-2LE
Korea Electrotechnology Research Institute (KERI)	Level A: Server Ed1/Ed2 And Client Ed1
Korea Testing Laboratory (KTL) Seoul, Korea	Level A: Client Ed1
NARI-RELAYS Electric Co., Ltd. Nanjing, China	Level B: Server Ed1
Schneider Electric Shanghai, China	Level B: Server Ed1/Ed2
TUV Rheinland Industrie Service GmbH, Cologne	Level B: Server Ed1
TUV SÜD Munich, Germany	Level A: Server/Client Ed1/Ed2 And 9-2LE
Xuchang KETOP Testing Technology Co., Ltd, Henan, China	Level A: Server Ed1 And 9-2LE

For further details on the companies or on IEC 61850 testing capability visit:
www.ucaiug.org Testing/ UCAIug Testing Quality Assurance Program.
The approved testers are listed in the directory: UCAIug IEC 61850 Approved Testers

Almost 600 Certificates have been issued by the UCAIUG Users Group.

Posted by [Karlheinz Schwarz](#) at [10:49 PM](#) [No comments:](#) 

Labels: [certificate](#), [IEC 61850](#), [quality](#), [test lab](#), [testing](#), [UCAIUG](#), [Users Group](#)

Tuesday, October 27, 2015

IEC 62351-12: Resilience and security recommendations for power systems with DER systems

IEC TC 57 has published an important 100+ pages document that cares about the **resilience and recovery** of power system build on a high penetration of DER systems.

IEC 62351-12 TR (57/1637/DTR):

Power systems management and associated information exchange –

Data and communications security –

Part 12: Resilience and security recommendations for power systems with Distributed Energy Resources (DER) cyber-physical systems

Voting closes 2015-12-25


“ ... This document discusses cyber security recommendations and engineering/operational strategies for **improving the resilience** of power systems with interconnected Distributed Energy Resources (DER) systems. It covers the **resilience requirements** for the many different stakeholders of these dispersed cyber-physical generation and storage devices, with the goal of enhancing the safety, reliability, power quality, and other operational aspects of power systems, particularly those with high penetrations of DER systems.

In the energy sector, two key phrases are becoming the focus of international and national policies: “**grid resilience**” and “**cyber security of the cyber-physical grid**”. Grid resilience responds to the overarching concern: "The critical infrastructure, the Smart Electric Grid, must be resilient - to be protected against both physical and cyber problems when possible, but also to cope with and **recover from the inevitable disruptive event**, no matter what the cause of that problem is - cyber, physical, malicious, or inadvertent."

“Grid resilience ... **includes hardening, advanced capabilities, and recovery/reconstitution**. Although most attention is placed on best practices for hardening, resilience strategies must also consider options to improve grid flexibility and control.” Resilience of the grid is often associated with making the grid able to **withstand** and **recover** from severe weather and other physical events, but resilience should also include the ability of the cyber-physical grid to withstand and recover from malicious and inadvertent cyber events. ...”

Two of the most crucial challenges of the future of our power systems (electric, gas, and heat) are the understanding of (1) the power system AND (2) the automation and communication infrastructure. This requires solid and comprehensive education of the engineers – junior and senior. Unfortunately a lot of engineers show a lag in understanding new and existing technologies.

The good news is that – at least in the electric world – we have globally a single standard (IEC 61850) that meets almost all needs and that is accepted and used all over!

Posted by [Karlheinz Schwarz](#) at [10:39 PM](#) [No comments:](#) 

Labels: [DER](#), [education](#), [IEC 61850](#), [IEC 62351-12](#), [recovery](#), [security](#), [Training](#)

Thursday, October 22, 2015

Saudi Arabia to Build 50 MW PV Plant

Several companies announced to establish a solar photovoltaic (PV) power plant with a capacity of 50 MW in the city of Saudi Aflaj, which will be the first utility-scale PV plant in the Kingdom of Saudi Arabia.

Quite interesting that Saudi Arabia is expecting a growth of energy demand rising by 8 percent annually and is expected to be 120 GW by 2030.

Click [HERE](#) for a news report.

During my visit of Dammam (Kingdom of Saudi Arabia) this week (training on IEC 61850) I was (by chance) contacted by a senior engineer (involved in gas related automation) who walked by outside our meeting room, stopped, and asked what we were doing. We talked about this and that.

Then he asked me how we can store PV power ... this led us to the situation in Germany where we have several MW scale projects that convert PV or Wind Power into gas. He was very impressed that this is happening in big scale.

Sure, we [have a lot of renewable power in Germany](#).

What to do with all the power? Convert to gas! Yes!


Click [HERE](#) to a report on the largest system today in Hamburg (1.5 MW).

Click [HERE](#) for some explanations of the basics of power-to-gas.

The gas and heat/cooling domains will find that the IEC 61850 can be used for many applications in these areas – to benefit from the standards used in electric power systems.

Click [HERE](#) for some discussion of using IEC 61850 (UCA 2.0) for the gas industry.

More to come. Keep tuned to the IEC 61850 blog.

Posted by [Karlheinz Schwarz](#) at [11:09 PM](#) [No comments:](#) 

Labels: [gas](#), [IEC 61850](#), [power-to-gas](#), [PV](#), [solar gas](#)

Comprehensive Alarm Model for IEC 61850 to be developed

IEC 61850 defines many Data Objects that could be used as alarm status points. These points can be easily reported (reporting) and stored in a local store (logging). The alarm information can be sent spontaneously to a SCADA system or any other IEC 61850 client. The need of an alarm management system (alarm needs to be confirmed by one or two or all clients, retrieve a list of all active alarms ...) was excluded in the first years of the IEC TC 57 WG 10 work (late 90's). We have decided to come up with some proposals later ... the "later" is here (2015).

A new Task Force is proposed to look at the needs and to harmonize the requirements of IEC TC 88 (wind power) with the requirements of alarm handling from other domains to produce a generic solution within the suite of IEC 61850 specifications.

IEC TC 57 invites experts to join the new Task Force (57/1631/DC):

IEC TR 61850-90-18: Communication networks and systems for power utility automation – Part 90-18: Alarm handling in IEC 61850 based systems

If you are interested in supporting that work contact your national TC 57 committee.

Posted by [Karlheinz Schwarz](#) at [9:42 PM](#) [No comments:](#) 

Labels: [alarm](#), [IEC 61400-25](#), [IEC 61850](#)

Friday, October 9, 2015


The German Energiewende Needs Communication – Government Pushes for Metering Infrastructure

The German government has published a draft that comprises several proposals for new (to be modified existing) laws:

Digitalisierung Energiewende: BMWi eröffnet Konsultation zu intelligenten Messsystemen

Click [HERE](#) for the current draft and related information.

The draft talks a lot about remote monitoring and control. E.g., "Zur **Gewährleistung der Fernsteuerbarkeit** von Anlagen im Sinne des Absatz 1 Nummer 1 Buchstabe b) ist es insbesondere erforderlich, dass neben der **Abrufung der Ist-Einspeisung** gemäß Absatz 1 Nummer 1 Buchstabe c) auch eine **ferngesteuerte Reduzierung der Einspeiseleistung der Anlage** über das intelligente Messsystem erfolgen kann ..."

Posted by [Karlheinz Schwarz](#) at [9:39 PM](#) [No comments:](#) 

Labels: [communication](#), [Energiewende](#), [security](#), [smart metering](#)

IEC 60870-5-104 for Smart Grids by Efen

Data Exchange According to IEC Standards Data communication is the key to long-term grid stability. To this end, **EFEN applies IEC standards** to ensure the functionality of its products across borders. **The Smart Grid Interface complies with IEC 60870-5-104** to ensure that it is not only state-of-the-art today but also in the future.

Click [HERE](#) for the brochure by Efen [English]:

Smart Grid Interface: Intelligent energy distribution for smart energy supply

Click [HERE](#) für die Broschüre von Efen [Deutsch]:

Smart Grid Interface: Intelligenz im Energieverteilnetz für die smarte Energieversorgung

More to come on the IEC TC 57 standards IEC 60870-5-104 and IEC 61850.

If you need to get your information coming from or going to Modbus, Profibus, Profinet, ... being communicated through IEC 60870-5-105 and/or IEC 61850 and vice versa – check [HERE](#).

Posted by [Karlheinz Schwarz](#) at [12:54 AM](#) [No comments:](#) 

Labels: [Efen](#), [IEC 60870-5-104](#), [IEC 61850](#), [Smart Grid](#)

Thursday, October 8, 2015


IEC 61400-25-41 Project Finally Approved

Document 88/567/RVN
Wind turbines - Part 25-41: Communications for monitoring and control of wind power plants
- Mapping to communication profile based on IEC 62541 (**OPC UA**)

This New Work Proposal was finally accepted due to a late appointment of two additional exerts from two additional countries.
Project title: IEC 61400-25-41 TS Ed.1 (Technical Specification)

The focus is intended to be strictly on IEC 61400-25. It will **replace** the obsolete **OPC-XML-DA mapping**. No impact on the work on IEC 61850 web technology ([Project IEC 61850-8-2](#)) is intended by this NP.

Click [HERE](#) for an overview on the IEC 61400-25 series.

Posted by [Karlheinz Schwarz](#) at [10:07 PM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [mapping](#), [OPC](#), [OPC UA](#), [wind power](#)

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Thursday, October 8, 2015

IEC 61850 Interoperability Test in Brussels Was a Big Success

The IEC 61850 Interoperability Test in Brussels (Belgium, at ENTSO-E) last week was a big success. The plenary meeting of the IEC TC 57 WG 10, 17 and 18 was informed about the results on Monday, October 05, 2015.

Compared to the previous IOPs in 2011 and 2013 there were more companies attending in 2015: 19/43/49. Total number of vendors that provided products to test was: 14/20/29. The number of people participating grew from 37/93 to 130 !!

Tests covered: SCL, Client/Server, GOOSE, SV, HSR/PRP, and IEEE 1588

For Client/Server 15 issues were found in 2013, in 2015 just 4. No issue was found on GOOSE.

A total of 32 issues need some attention. The issues will be posted to the tissue database if required.

The first tissues have already been posted:

<http://tissue.iec61850.com/tissue.aspx?issueid=1445>

<http://tissue.iec61850.com/tissue.aspx?issueid=1446>

<http://tissue.iec61850.com/tissue.aspx?issueid=1447>

<http://tissue.iec61850.com/tissue.aspx?issueid=1448>

The IOP at ENTSO-E has shown that IEC 61850 standard parts and products are very stable ... there is no need to wait for applying IEC 61850.

Posted by [Karlheinz Schwarz](#) at [4:19 AM](#) [No comments:](#) 

Labels: [ENTSO-E](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [tissue process](#), [tissues](#), [UCAIUG](#)

Wednesday, September 30, 2015

The First Official IEC 61850 Edition 2 Client Certificate Goes to? - Siemens

Siemens is the first company in the world to receive an **IEC 61850 Edition 2 client certificate**, issued by DNV GL on behalf of the UCA International User Group (UCA), for their SICAM PAS/PQS system (basically a PC application that acts as a 61850 client).

Click [HERE](#) for the news.

There are other vendors underway to get an **IEC 61850 Edition 2 client certificate**. TÜV SÜD (Munich) has also been accredited for testing conformance of Edition 2 clients.

More to come. Stay tuned.

Posted by [Karlheinz Schwarz](#) at [7:41 AM](#) [No comments:](#) 

Labels: [conformance](#), [conformance test](#), [Edition 2](#), [IEC 61850](#), [KEMA](#), [Siemens](#), [SIPROTEC 5](#), [test lab](#), [testing](#), [TÜV SÜD](#)

Tuesday, September 22, 2015

Siemens Protection IEDs for DC Traction Power Supply with IEC 61850

Sitras PRO (DC protective unit and controller for DC traction power supply) from Siemens offer a set of well known functions and communication solutions:

Features:

- Complete functionality in a single unit
- Protection
- Measurement
- Control
- Automation
- Flexible adaptation to system requirements
- Standard communication interfaces

For your Convenience

[New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[Training Opportunities: IEC 61850, IEC 60870-5-104, DNP3, ... - 2015-06-12](#)



[Blog as single PDF until 28 April 2015 \[11 MB\]](#)



Training by NettedAutomation



3 day IEC 61850 Training 2006 in Bangalore (India)

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[New Draft IEC TR 61850-7-500 Just Published - Typi...](#)

[Government R&D Funding for German "Energiewende": ...](#)

[Again On Security - A Summary for Managers](#)

[Just Published: CDV IEC 62351-7 -- Network and Sys...](#)

[IEC 61850 for CLS -- Seems to be the natural solut...](#)
- March (4)

► February (11)

► January (8)

- 2015 (94)

► 2014 (129)

► 2013 (130)

► 2012 (188)

► 2011 (159)

► 2010 (153)

► 2009 (162)

► 2008 (82)

- High-performance diagnostics, comprehensive event, alarm and measured value memory

Protocols:

- PROFIBUS DP
- PROFINET IO
- **IEC 61850**
- SNTp

Click [HERE](#) for more information on Siemens Rail Electrification.

In a press release Siemens announced to use these devices with IEC 61850 for the modernization of traction power supplies for rail rapid transit lines in São Paulo: Click [HERE](#) for a press release (2012).

Posted by [Karlheinz Schwarz](#) at [3:34 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [Profibus](#), [Profinet](#), [protection](#), [railways](#), [Siemens](#)

Monday, September 21, 2015

Status of IEC 61400-25 Communications for Wind Turbines

The IEC TC 88 JWG 25 has published several draft documents for the second edition of IEC 61400-25:

- Part 25-1: Communications for monitoring and control of wind power plants -Overall description of principles and models
- Part 25-2: Communications for monitoring and control of wind power plants - Information models
- Part 25-3: Communications for monitoring and control of wind power plants - Information exchange models
- Part 25-4: Communications for monitoring and control of wind power plants -Mapping to communication profile
- Part 25-5: Communications for monitoring and control of wind power plants - Conformance testing
- Part 25-6: Communications for monitoring and control of wind power plants -Logical node classes and data classes for condition monitoring

Here are the latest news on IEC 61400-25:

1. New Convenor

Dr Nicholas Etherden from Vattenfall, Sweden is the new Convenor of IEC TC 88 JWG 25 (following Anders Johnsson, Vattenfall).

2. Status of Edition 2 of the different parts

IEC 61400-25-1 CDV in November 2015.

88/539/**FDIS**

IEC 61400-25-2 Ed.2: Wind turbines - Part 25-2: Communications for monitoring and control of wind power plants - Information models
Approved

88/540/**FDIS**

IEC 61400-25-3 Ed.2: Wind turbines - Part 25-3: Communications for monitoring and control of wind power plants - Information exchange models
Approved

88/536/**CDV**

IEC 61400-25-4 Ed.2: Wind turbines - Part 25-4: Communications for monitoring and control of wind power plants - Mapping to communication profile
Approved

IEC 61400-25-5 CDV End of 2015.

IEC 61400-25-6 CDV End of 2015.

88/549/**NP**(Mai 2015)

Wind turbines - Part 25-41: Communications for monitoring and control of wind power plants - Mapping to communication profile based on IEC 62541 (**OPC UA**) (proposed IEC TS 61400-25-41)
Rejected

2015-10-09: The NP was finally accepted due to a late appointment of two additional exerts from two additional countries.
Project title: IEC 61400-25-41 TS Ed.1

The standard series IEC 61400-25 offers five different Mappings. The Mapping according to IEC 61850-8-1 (MMS) is the most important mapping when it comes to implementations and applications.

Posted by [Karlheinz Schwarz](#) at [7:04 AM](#) [No comments:](#) 

Labels: [Edition 2](#), [IEC 61400-25](#), [mapping](#), [OPC UA](#), [wind power](#), [wind turbine controller](#)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

Sunday, September 20, 2015

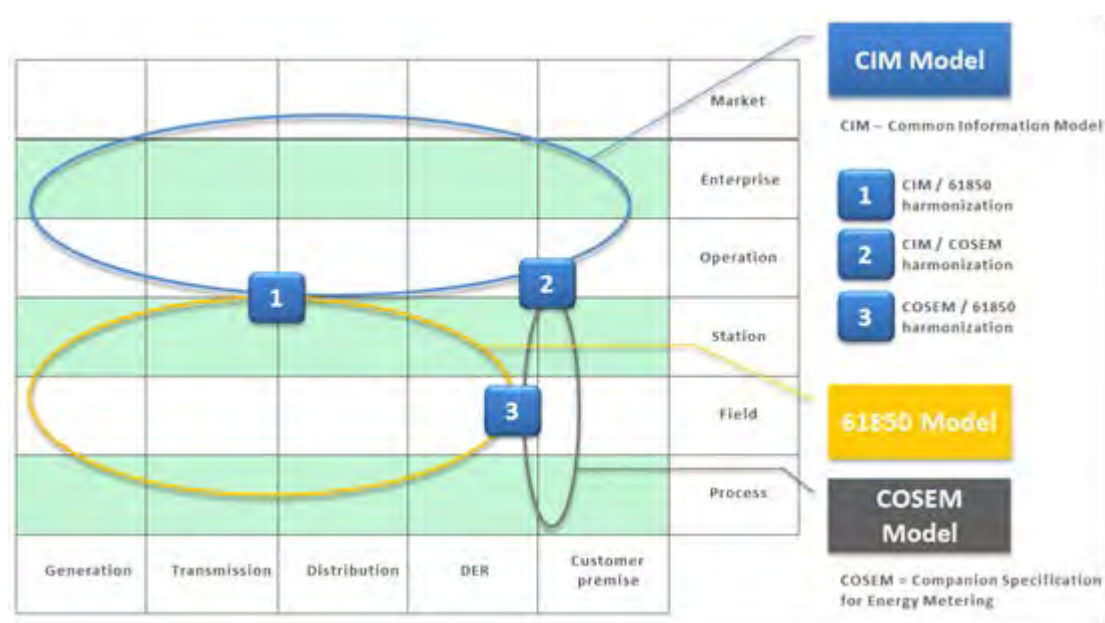
IEC TC 57 Reference Architecture For Power Systems Management And Associated Information Exchange

IEC TC 57 just published a new draft for IEC TR 62357-1 Ed. 2 "Power systems management and associated information exchange – Part 1: **Reference architecture**" (57/1621/DC)

"The new edition provides updates and defines **layered Reference Architecture** to help direct longer term goals and activities, specifically to ensure compatibility of all new standards developed in TC57 by **benefitting from lessons learned** during development of the current standards and their application on actual utility projects as well as through application of other internationally recognized architecture standards.

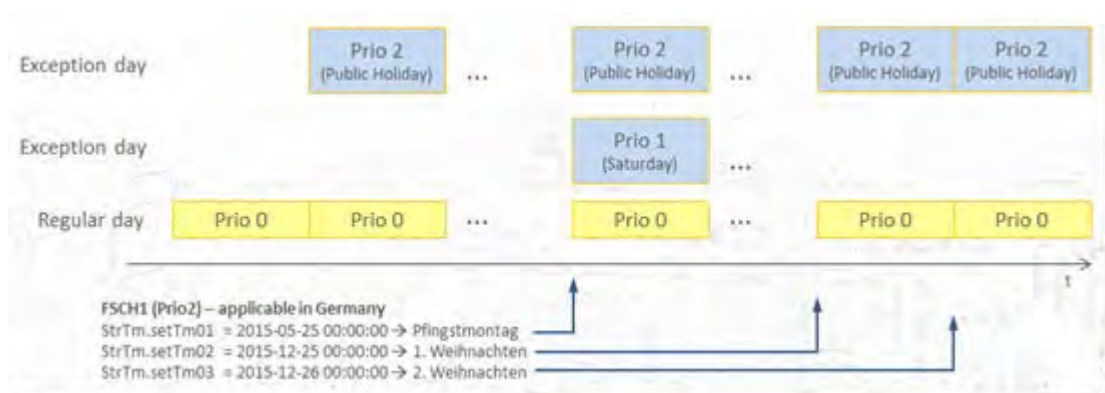
This edition reflects the progress recently achieved from the international Smart Grids (SG) initiatives and the CIGRE D2.24 large system architecture vision. It also leverage the work done by NIST-SGIP, CEN-CELELEC-ETSI SGCG M490, IEC TC8 Smart Grids Roadmap, and IEC TC8 WG5, WG6, The edition also reflects the most recent editions of the TC 57 standards including IEC 61850 Edition 2 and the IEC 61968, 61970, and 62325 Common Information Model (CIM) standards."

One of the lessons learned is that the three information models (CIM, IEC 61850 and COSEM) need some additional harmonization – a reasonable level has already be reached.



IEC 61850 has a very broad application domain and has defined many useful information models that can (and will) be "tapped" by COSEM and CIM applications.

One example that shows that IEC 61850 can be used even for schedules (de: Fahrpläne):



These schedules can be mapped from COSEM directly to IEC 61840 logical node FSCH. COSEM may be used for flexible tariffs while IEC 61850 could be used for tariffs as well as for control of switchable equipment like circuit breakers or change settings for loads or generation. The schedule LN is applied in the [VHPready](#) 4.0 specification.

More to come soon.

Posted by [Karlheinz Schwarz](#) at [11:43 AM](#) [No comments:](#) [✉](#)

Labels: [CIM](#), [COSEM](#), [harmonization](#), [IEC 61850](#), [Schedule](#), [VHPready](#)

Wednesday, September 16, 2015

IEC 61850 in VHPready 4.0

The Industry Alliance VHPready e.V. publishes version 4.0 of the industry standard **VHPready** for controlling and interconnecting decentralized energy systems to virtual power plants.

A manufacturer-independent standard, which ensures the interoperability and controllability of system components of virtual power plants, is now available for the first time. 35 member

corporations [including NettedAutomation GmbH] are currently actively engaged in the industry alliance to promote the advancement of the international industry standard VHPready. The participation in the open industry alliance "Industrieforum VHPready e.V." is based on the certainty that only a common standard will allow for a reliable, seamless and economic collaboration of all controllable components as well as their compatibility. The specification VHPready 4.0 is now available to all member corporations.

An extensive data point list constitutes the functional core of VHPready 4.0 and helps integrate different energy systems into virtual power plants using the telecontrol protocols **IEC 60870-5-104 or IEC 61850-7-420**. In addition to a plant park with a set of different energy systems, this data point list facilitates the integration of combined heat and power units (CHPs), wind and solar plants, heat pumps, batteries, electric heating, boilers and buffer tanks. Data points for meters and external signal contacts are also available.

At the forthcoming [VHPready symposium](#) on 12 November 2015 industry alliance members will present the first systems adapted to VHPready 4.0.

Click [HERE](#) for the press release.

Click [HERE](#) for a **Windows Evaluation Version of the VHPready 3.0 Model**; with the new icd file specifying the version 4.0 model you can re-use the application. By the way: Most of the Data Objects used in the Evaluation version 3.0 are the same in version 4.0.

[The VHPready model and services \(IEC 60870-5-104 AND IEC 61850\) are also supported by gateways offered by HMS \(the company that is one of the very big gateway companies ... offering ANYBus ...](#)

Posted by [Karlheinz Schwarz](#) at [10:34 AM](#) [No comments:](#) 

Labels: [Anybus](#), [DNP3](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Profinet](#), [VHP Ready](#), [VHPready](#), [virtual power plant](#), [virtuelle Kraftwerke](#)

IT Staff Needs Education in IEC 61850 and Related Standards

Information Technology (IT) is quite well understood by many (often young) experts. Operations Technology (OT) in the power industry is quite well understood by many (often older) experts with some tens of years experience in the use of hardware, automation and information exchange software.

These days we see the **integration of Information Technology into the Operation Technology**. The migration happens quite fast ... and more and more experienced OP engineers are part of the "aging workforce". This requires that new staff (IT experts and engineers) in the IT and in the OP world to learn two technologies: "IT", "OT", and very crucial: "More IT in OT".

I found a very nice publication that discusses some of these issues in detail:

Click [HERE](#) for the paper "Information Technology (IT) vs Operations Technology (OT): What the C-Suite Needs to Know"

Based on my long-term experience since the early 80s with "More IT in OT" I fully agree with the need of **Cross-Department Training** and other needs listed in the paper:

"... considerations to improve the IT/OT rift:

- Annual Staff Surveys – to measure cooperation between IT and OT and look at utilization of resources, trust/conflict, clarity of goals and objectives, etc.
- **Cross-Department Training** – for both technical training but also support values and behaviors expected to foster cooperation and communications
- **Cross-Functional Teams** – to develop policies, standards, projects, etc. with both IT and OT perspectives
- **Reach Over the Wall** – encourage the IT and OT teams to reach out to the other technology team and be willing to walk in their shoes. This is also supported by the executive team taking the same actions."

In some cases of big utilities I see this already happen!

IT and OP people would benefit from our training in IEC 61850 and related standards. Be aware that even a small embedded device could support TCP/IP, higher level protocols like ftp and http(s), IEC 6070-5-104 and IEC 61850, and ... it is "IT in OT".

How do we reach more IT and OT people? Please forward this information to them ...

Posted by [Karlheinz Schwarz](#) at [6:56 AM](#) [No comments:](#) 

Labels: [aging infrastructue](#), [education](#), [IT](#), [OP](#), [security](#), [Training](#), [workforce](#)

Friday, September 11, 2015

IEC 61850: Five Weeks Left to Register For One Of The Most Crucial Relay and SCADA Training in Karlsruhe (Germany)


Recent courses and discussions with experts reveal that education is THE most crucial activity to securely and reliably apply the Standard Series IEC 61850 in Power Automation Systems.

The training being conducted from 13-16 October 2015 in Karlsruhe (Germany) is just five (5) weeks away. Karlsruhe is a lovely town one hour train trip from Frankfurt International Airport, 30 minutes away from France, 45 minutes to the Black Forest, ...

Note that this is much more than introducing IEC 61850 concepts and details – here you learn from two senior protection, automation and communication experts HOW IEC 61850 compliant devices can provide a plus of functionality and reliability. Don't believe that? Come and see! You will be surprised after the course.

We have several seats available – the course details and registration information can be found [HERE](#).

Click [HERE](#) for other courses in English and German.

Posted by [Karlheinz Schwarz](#) at [11:40 AM](#) [No comments:](#) 

Labels: [de](#), [en](#), [GOOSE](#), [IEC 61850](#), [process bus](#), [protection](#), [schutztechnik](#), [seminar](#), [Training](#)

Sunday, August 23, 2015

IEC 61850 Seminar for Protection and SCADA Engineers in Dammam (KSA) on 18-21 October 2015

FMTP, Al-Ojaimi Energy Services and NettedAutomation offer a public IEC 61850 Seminar with practical demonstrations:

18-21 October 2015
at Novotel Hotel, Dammam Business Park



Click [HERE](#) for the Brochure and registration information.

Posted by [Karlheinz Schwarz](#) at [10:41 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [protection](#), [SCADA](#), [seminar](#), [Training](#)

Monday, August 17, 2015

Next IEC 61850 Training Opportunities in English and German

One of the crucial issues in Understanding IEC 61850 and IEC 61400-25 is education. NettedAutomation GmbH (Karlheinz Schwarz) has trained almost 4,000 experts from all over. We offer you the best courses ever conducted.

The other day I received this feedback:

It should be a seminar for the ... partners with relation to IEC 61850 in the project (about 20 people) and hosted at xx in xxx – hopefully some time before the end of the year when the project ends.

We see you as the best candidate for providing this seminar and would therefore like to start a dialog on your conditions for this, like draft agenda, availability and price.

and:

The ultimate goal is to have ... tools for training people into using IEC61850.
Keep on the good work Karlheinz. I'm a big fan of yours.

We have scheduled several public training courses in German and English. The courses in English are conducted by Andreas Bonetti ([FMTP](#), **Senior protection engineer**) and Karlheinz Schwarz; the courses in German are conducted by Karlheinz Schwarz

Karlsruhe (Deutsch, Karlheinz Schwarz):

02-04 Dezember 2015

11-13 Januar 2016

07-09 März 2016 (neues Datum)

Karlsruhe/Germany (English, Andrea Bonetti and Karlheinz Schwarz):

13-16 October 2015
18-21 April 2016 (new date)
10-13 October 2016

Stockholm/Sweden ([English](#), Andrea Bonetti and Karlheinz Schwarz):
15-17 March 2016
19-22 September 2016

Dammam City/SA ([English](#), Andrea Bonetti and Karlheinz Schwarz):
18-21 October 2015 EN

Hong Kong ([English](#), Andrea Bonetti and Karlheinz Schwarz):
17-19 November 2015

ALL:

2015:
13-16 October 2015 EN Khe
18-21 October 2015 EN Dammam City
17-19 November 2015 EN Hong Kong
02-04 Dezember 2015 DE Khe
11-13 Januar 2016 DE Khe
2016:
07-09 März 2016 DE Khe (neues Datum)
15-17 March 2016 EN Sto
18-21 April 2016 EN Khe (new date)
19-22 September 2016 EN Sto
10-13 October 2016 EN Khe

Click [HERE](#) for more details on the courses in Deutsch.
Click [HERE](#) for more details on the courses in English.

[Contact us](#) by email in case you have any question.

Posted by [Karlheinz Schwarz](#) at [10:48 AM](#) [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [education](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [protection](#), [SCADA](#), [Schulung](#), [seminar](#), [Training](#)

What is an IEC 61850 Data Model – Come and See

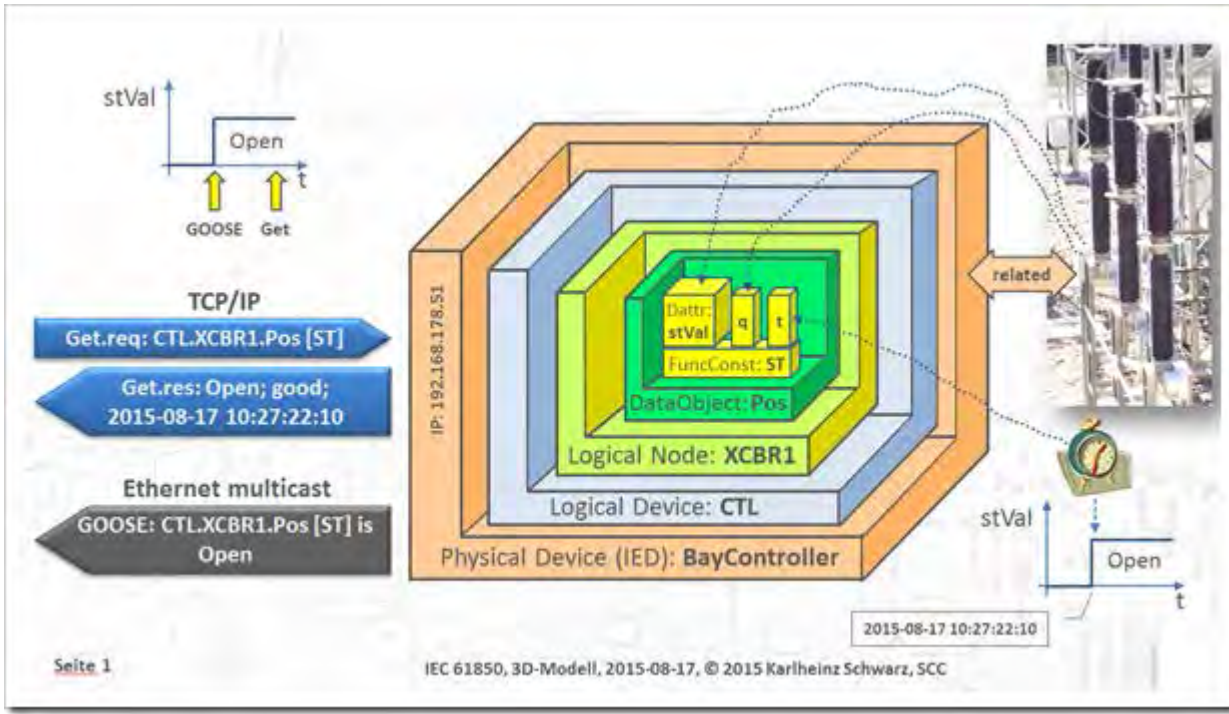
Data or device modeling is a crucial feature of IEC 61850 and IEC 61400-25. You may have seen many different approaches to explain how such a model looks like. Some five years ago I used these Russian dolls (matryoshka doll):



An IED contains a lot of “inner” objects.



Today I have thought that another approach may help you to understand the IEC 61850 approach:



What do you think? This and more will be explained in detail during my comprehensive – most liked – courses.

Posted by [Karlheinz Schwarz](#) at 7:30 AM No comments:

Labels: [data object](#), [GOOSE](#), [hierarchical model](#), [IEC 61400-25](#), [IEC 61850](#), [logical node](#), [modeling method](#), [models](#), [TCP/IP](#), [Training](#)

Friday, August 14, 2015

IEC 61850-7-410 Extended Models for Conventional Power Plants

IEC TC 57 just published a FDIS defining extensions for conventional power plants and steam turbines:

IEC 61850-7-410 A1 (57/1607/FDIS): **Amendment 1 to IEC 61850-7-410 Ed.2:**
Communication networks and systems for power utility automation –
Part 7-410: Basic communication structure – Hydro-electric power plants – Communication for monitoring and control

Voting closes 2015-10-09.

The following **new Logical Node classes** are added to the Hydro Power model standard IEC 61850-7-410 Ed2:

LN	Description
ASEQ	Generic control action sequencer
EBCF	Block control function. This LN will represent one physical device that coordinates the control of the thermal pressure of the steam generator and the electrical power regulation of turbine / generator system.
EFCV	Fuel control valve. This LN will represent the physical device of fuel control valve related to the gas turbine in a thermal power plant.

EGTU	Gas turbine production unit. This LN represents the physical device of the GT and the generator combination in a thermal power plant. It is intended as an extended rating plate that allows settings of data. It also acts as a placeholder for the current operating conditions of the unit.
ESCV	Steam control valve. This LN will represent the physical device of inlet control valve of the steam turbine in a thermal power plant.
ESPD	Speed monitoring. This LN is derived from HSPD.
ESTU	Steam turbine production unit. This LN represents the physical device of the ST and the generator combination in a thermal power plant. It is intended as an extended rating plate that allows settings of data. It also acts as a placeholder for the current operating conditions of the unit.
EUNT	Thermal unit operating mode. The present status of the production unit.
FDBF	Dead-band filter. This LN represents a settable filter for dead-band.
FMTX	Trip matrix. This LN represents a matrix for linking various trip functions to equipment that shall be tripped or controlled during a fault.
GUNT	Production unit operating mode. The present status of the production unit.
PTUR	Used for detection of under resistance, e.g. due to stator or rotor earth-faults.
SECW	Supervision of electrical conductivity in water. This logical node represents a system for monitoring of electrical conductivity in water.
TECW	Measurement of electrical conductivity in water. This logical node represents a generic device for measuring the conductivity in water.

DataObjects for settings of, e.g., the LN **ESTU** comprise:

TurTyp	Turbine type (steam, gas, oil)
SpdRtg	Turbine rated speed [s−1]
TurInert	Turbine moment of inertia J [kgm2]
TurTrsSpd	Maximum transient overspeed [s−1]
TurRwySpd	Runaway speed [s−1]
TurPwrRtg	Rated power in turbine mode [MW]
FlwRtgTurb	Rated flow in turbine mode [kg/s]
HiPresMax	High pressure inlet maximum pressure [Pa]
IpMax	Intermediate pressure inlet maximum pressure [Pa]
LoPresMax	Low pressure inlet maximum pressure [Pa]
HiPresVlv	High pressure control valve rated oil pressure [Pa]
HpVlvClsTms	High pressure control valve rated closing time [s]
IpVlvPres	Intermediate pressure control valve rated oil pressure [Pa]
MidVlvClsTms	Intermediate pressure control valve rated closing time [s]
LpVlvPres	Low pressure control valve rated oil pressure [Pa]
LpVlvClsTms	Low pressure control valve rated closing time [s]
IcpVlvPres	Intercept valve rated oil pressure [Pa]
MainStmTmpRtg	Turbine rated main steam temperature
RhStmTmp	Re-heat steam temperature
IcpVlvTms	Intercept valve rated closing time [s]

Posted by [Karlheinz Schwarz](#) at [11:29 PM](#) [No comments:](#) 

Labels: [conventional power plant](#), [hydro power](#), [IEC 61850-7-410](#), [power generation](#), [power plant control](#), [Power Plants](#)

New Work Proposal IEC 61850-9-3 approved

The new work Proposal has been approved:

IEC/IEEE 61850-9-3 Ed.1 (57/1611/RVN):
Communication networks and systems for power utility automation –
Part 9-3: Precision time protocol profile for power utility automation

Click [HERE](#) for some more information.

Posted by [Karlheinz Schwarz](#) at [11:03 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-9-3](#), [time synchronization](#)

IEC 61850-90-6: Use of IEC 61850 for Distribution Automation Systems

IEC TC 57 has published a very interesting 140 page document describing the use of IEC 61850 for distribution automation:

Draft IEC TR 61850-90-6 (57/1615/DC):
Communication networks and systems for power utility automation
Part 90-6: Use of IEC 61850 for Distribution Automation Systems

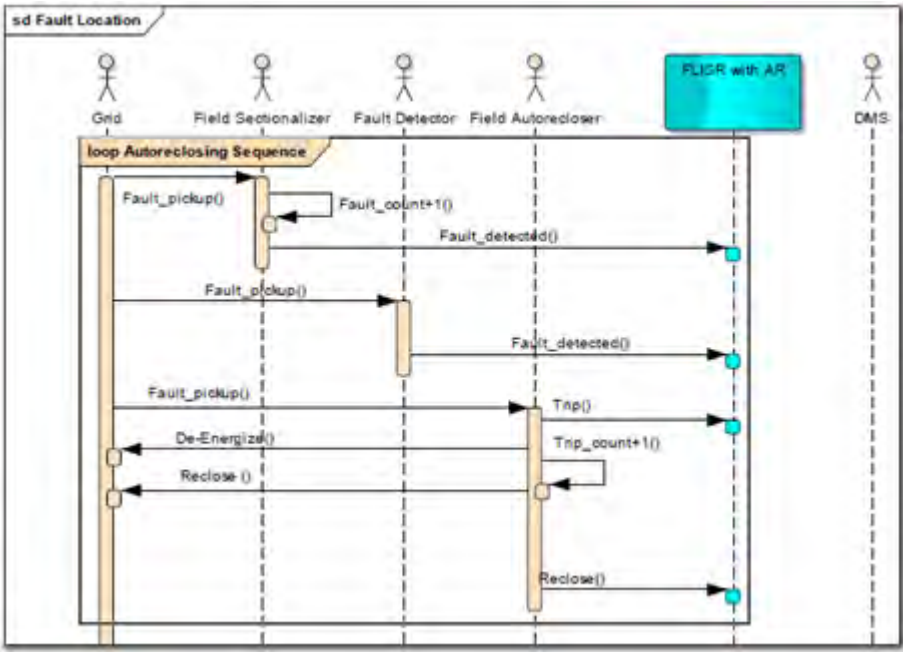
Distribution Automation and Feeder Automation Distribution Automation (DA) as a concept emerged in the 1970s to promote the application of computer and communications technologies for improving of distribution system operating performance. It is in general used as an umbrella term to describe the deployment of automation technologies for **protection, control, monitoring, and operation** of distribution systems.

The current document mainly describes the following functions of Distribution/Feeder Automation Systems:

- **DSCADA (Distribution-Supervisory Control And Data Acquisition)** This function allows the operator to monitor and control the distribution networks remotely. It is a basic function of DASS.
- **FLISR (Fault Location, Isolation and Service Restoration)** It includes the FLISR using auto reclosers and auto-sectionalizers, the FLISR based on the centralized control of the master station and the FLISR based on the distributed control scheme in which field IEDs exchange fault and control information through a peer to peer communication network. These are main typical implementation/architecture for supporting the FLISR. The reality may be the mix all these three modes.
- **VVC (Voltage and Var control)** The objective of VVC is to minimize the power losses in the network, improve the voltage profile, or both, using the settings of LTC substation transformers, bus/feeder voltage regulators and switching shunt capacitors. More advanced VVC applications may also use the active and reactive power injection by the DER units as well as distribution FACTS devices such as D-STATCOM and D-SVC. The auto-recloser function has to be blocked. Only the basic VVC scenario which only involves the control of voltage regulators and switching shunt capacitors is considered in this report.
- **Anti-Islanding Protection Based on Communications** In case of the feeder circuit breaker opens, an unintentional islanding may have been created. The involved DER in the island has to be forced to stop energizing the feeder for workers safety, system security and power quality reasons. While the islanding detection methods using local measurements at intertie may have none-detection zone, the anti-islanding protection can be improved through detecting the tripping of substation breakers and transmitting this information down to the feeder

A DA system may comprise up to **tens of thousands of IEDs** spreading over a wide area distribution network. From time to time, the new IEDs may be introduced, and the configuration of existing IEDs may need to be modified. The current configuration method for substation automation systems may need extended configuration methods. Therefore, a use case for **installing new IEDs and updating the configuration of existing IEDs** will also be described in this section.

In order to precise the various use-cases, the document contains sequence diagrams, e.g., for Fault Location:



The standard series IEC 61850 is THE standard for power systems.

Posted by [Karlheinz Schwarz](#) at 10:54 PM 2 comments:

Labels: [distribution automation](#), [fault passage indication \(FPI\)](#), [feeder automation](#), [IEC 61850](#), [IEC 61850-90-6](#)

Wednesday, August 5, 2015

ENTSO-E Strongly Supports IEC 61850 for Substation Automation

ENTSO-E (European Network of Transmission System Operators for Electricity) wants to become “an important stakeholder in the IEC 61850 improvement process and will actively contribute, **mainly through the profiling work of the IEC 61850 standard.**”

ENTSO-E has just published an update on their current and future support of IEC 61850.

I very much appreciate the efforts of the European Transmission System Operators!

Click [HERE](#) for the latest news.

The electrical power delivery system is composed of many other domains that are beyond the substations in transmission systems:

- Conventional Power Generation
- Wind Power Plants
- Hydro Power Plants
- Distribution systems
- Renewable Energy Resources
- Load centers (like factories, petro chemical plant, ...)
- Power quality monitoring
- Virtual Power Plants
- Primary, secondary, and tertiary control
- Load shedding
- ...

IEC 61850 is about to be used in all of these application domains – to become a Seamless Information Exchange System.

Many pilot implementations and tests are underway in these domains. Usually using proprietary Information Exchange System, because the main objectives of these projects are mainly related to power system dynamics and stability – one way or the other. Later they figure out: Hey, we have a very successful project ... but created many proprietary, non-interoperable Information Exchange Systems.

It is highly recommended to use IEC 61850 from the scratch! Because this is THE standard. There is usually no need to spend money and time to develop something specific for one use case.

On my radar screen I see many people starting to use IEC 61850 – users and vendors ... and system integrators. All over.

Resume: ENTSO-E is just ONE of MANY efforts to apply IEC 61850.

Posted by [Karlheinz Schwarz](#) at 12:28 AM No comments:

Labels: [ENTSO-E](#), [hydro power](#), [IEC 61850](#), [power distribution](#), [power generation](#), [power management](#), [Power Plants](#), [power quality](#), [wind power](#)

Tuesday, August 4, 2015

SCL Schema Accessibility in the near future


The SCL schema is published as part of the delivery of edition 1 and edition 2 of part 6. The publication of a Technical Corrigendum to IEC 61850-6 Ed. 1 and Ed. 2 is under way.

To provide an easier way to retrieve the latest version of the Schema a new possibility to access the Schema from the IEC Website is proposed in the document (57/1604/DC): Latest version of SCL schema and planned publication of a Technical Corrigendum to IEC 61850-6 Ed. 1 and Ed. 2.

This process is already proposed for the first corrigenda of part 6 and from Edition 2.1 onwards.

Please note: Currently the following valid schema files are currently used for conformance testing of IEC 61850:

- For Edition 1 of IEC 61850-6: **SCL 1.7**
- For Edition 2 of IEC 61850-6: **SCL.2007B**

Posted by [Karlheinz Schwarz](#) at [1:38 AM](#) [No comments:](#) 

Labels: [configuration](#), [configuration language](#), [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [IEC 61850-6](#), [SCL](#), [XML](#)

IEC 61850-80-4 Translation from COSEM to IEC 61850

IEC TC 57 just published the draft Technical Specification (57/1602/DTS):

IEC 61850-80-4 TS:

Communication networks and systems for power utility automation –

Part 80-4: Translation from COSEM object model (IEC 62056) to the IEC 61850 data model

Voting terminates on 2015-10-30

This part defines the one-to-one relationship of IEC 62056 OBIS codes to IEC 61850 Logical Nodes. The purpose is to increase the availability of revenue meter information to other applications defined within the IEC 61850 framework. This increased visibility will contribute to information available for smart grid applications.

Posted by [Karlheinz Schwarz](#) at [1:24 AM](#) [No comments:](#) 

Labels: [COSEM](#), [Gateway](#), [IEC 61850](#), [iec 61850-80-4](#), [meter](#)

IEC 61850-90-8 Models for Electric Mobility

IEC TC 57 just published the 70+ page draft (57/1603/DTR) for comments:

IEC 61850-90-8 TR:

Communication networks and systems for power utility automation –

Part 90-8: **Object model for electric mobility**

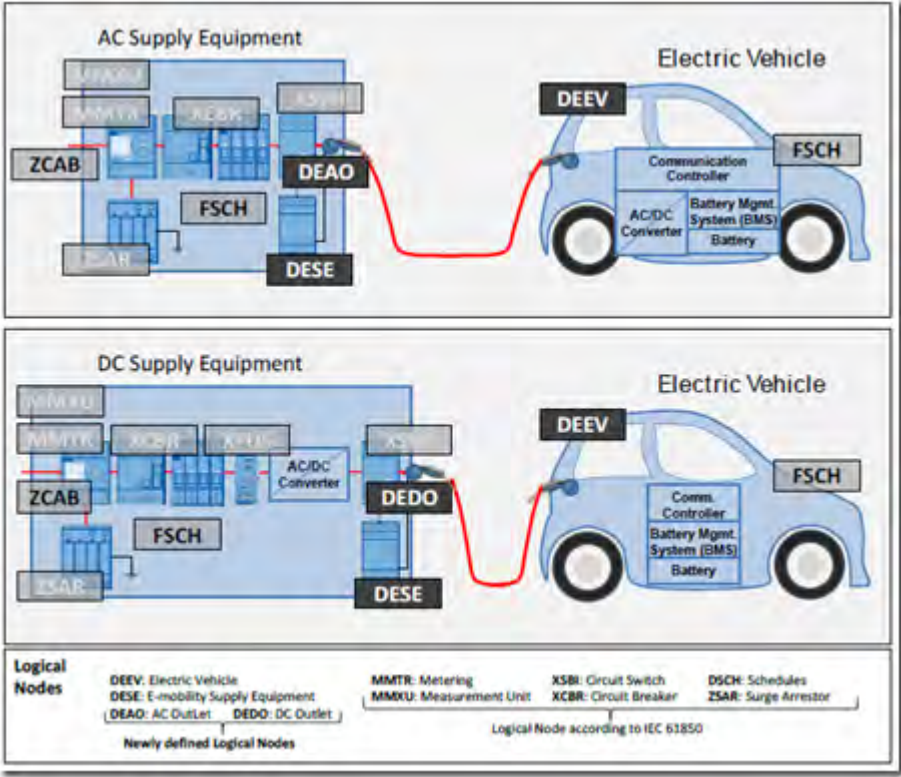
Voting terminates on 2015-09-25

This technical report describes how current standardization for Electric Road Vehicles (EV) and the Vehicle-to-Grid Communication Interface can be linked to IEC 61850-7-420 standard for Distributed Energy Resources (DER). The technical report provides necessary background information and proposes an object model for E-mobility in order to establish an EV plugged into the power grid as DER according to the principles of IEC 61850-7-420. The basic information modeling in IEC 61850 and IEC 61850-7-420 already covers a lot of needs for the e-Mobility domain. Missing parts can be modeled as new logical nodes and data objects, which this technical report defines.

Scope

The scope of this document is to show how IEC 61850-7-420 can be used to model the essential parts of the E-mobility standards related to Electric Vehicles and Electric Vehicle Supply Equipments (IEC 62196, IEC 61851, IEC 15118) and the Power system (IEC 61850-7-420), in order to secure a high level of safety and interoperability.

Here is an overview about the topology of the logical nodes required (existing and new ones):



Standards are key for E-Mobility and many other power application domains.

Posted by [Karlheinz Schwarz](#) at [1:18 AM](#) [No comments:](#)

Labels: [charging station](#), [E-Mobility](#), [IEC 61850](#), [IEC 61850-90-8](#), [logical node](#)

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Tuesday, August 4, 2015

NEWS on IEC 61850 Conformance Test Labs

The following **nine new IEC 61850 Test services** have been approved by the [UCAIUG](#) in during the first half of 2015:

Level A
IEC 61850 Conformance Test for 2nd Edition Server Products

- Korea Electrotechnology Research Institute (KERI) [January 2015]
- TÜV SÜD (Munich, Germany) [January 2015]
- Xuchang KETOP, Testing Technology Co.,Ltd, Xuchang, China [February 2015]

Level B
IEC 61850 Conformance Test for 2nd Edition Server Products

- ALSTOM GRID UK Ltd, Substation Automation , Stafford (UK) [July 2015]

Level A
IEC 61850 Conformance Testing Sampled Values 9-2LE Publisher

- Xuchang KETOP, Testing Technology Co.,Ltd, Xuchang, China [March 2015]
- TÜV SÜD (Munich, Germany) [March 2015]

Level A
Edition 2 Client Systems

- DNV GL – Energy (KEMA), Arnhem (Netherlands) [April 2015]
- TÜV SÜD (Munich, Germany) [July 2015]

LEVEL B
IEC 61850 Conformance testing Edition 1 Server Products

- ALSTOM GRID UK Ltd, Substation Automation , Stafford (UK) [July 2015]

A total of **479 Certificates for Server Ed1 (47 for clients)** and 21 for Server Ed2 (1 for clients) have been issued by July 2015.

Click [HERE](#) to access the **testing information** (requires user name and password – at least you need a guest account).

Posted by [Karlheinz Schwarz](#) at [12:45 AM](#) [No comments:](#) 

Labels: [Alstom](#), [conformance test](#), [Edition 1](#), [Edition 2](#), [IEC 61850](#), [KEMA](#), [KERI](#), [KETOP](#), [test lab](#), [testing](#), [TÜV SÜD](#)

Thursday, July 23, 2015

Security – Hacking a Car is round the corner

I guess you have read or heard the news about the Hackers that took remote control of a car on the highway. Two researchers exploited a zero-day vulnerability in a Jeep Cherokee’s Uconnect infotainment system to gain wireless control of the car.

Click [HERE](#) for the report.

You may be happy to drive a car manufactured “before Internet” hit the road. Now, you can see that the Internet can seriously “hit the road” !

Fortunately there are people that have expected this to happen. Some of them in the USA have already become active: The **world’s first automotive cyber-security law may force automakers to deliver software updates and stop vehicle tracking as part of new IT security standards regarding connected cars** in the US.

Click [HERE](#) to read more background information on the new US Senate Bill.

Click [HERE](#) for the Senate Bill.

The number of cars is much bigger than the number of substations – in the USA and in Europe ... and all over. It is very likely (from my point of view) that the automobile industry will develop very soon international standards for the **Security and Privacy in Cars**. I expect that such a development will impact also the discussion on security for **power delivery systems**. The damage that could be caused by hacking a electrical delivery system could be much higher than turn-on the air-condition in a car.

I have experienced more than 30 years ago that the automakers are strong in introducing

For your Convenience

[New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[Training Opportunities: IEC 61850, IEC 60870-5-104, DNP3, ... - 2015-06-12](#)



[Blog as single PDF until 28 April 2015 \[11 MB\]](#)



Training by NettedAutomation



3 day IEC 61850 Training 2006 in Bangalore (India)

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[Again On Security - A Summary for Managers](#)

[Just Published: CDV IEC 62351-7 -- Network and Sys...](#)

[IEC 61850 for CLS -- Seems to be the natural solut...](#)
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► 2012 (188)

► 2011 (159)

► 2010 (153)

► 2009 (162)

► 2008 (82)


standards: The GM led the project MAP (Manufacturing Automation Protocols). Unfortunately manufacturers of automation equipment decided not to follow GM’s vision.

With regard to security, I hope that the automakers will help to bring more security to any kind of smart devices: in cars, in homes, in factories, in substations and ...

In case of somebody taking over a car, it may be very dangerous to securely bring a (or even many) cars to a hold. But bringing a part of a power system to a hold means: BLACKOUT!!
The “SECURE” state: “STOPPED” means: no power!

In case of a stopped car, you may take the next bus or just walk. A stopped power delivery system must be brought back to operation using again thousands of smart devices. Have you ever asked yourself how many smart network-connected computers are involved in power delivery systems? The number goes into the many millions ...

Discuss security issues with your colleagues and your management. And maybe contract with experts ...

Posted by [Karlheinz Schwarz](#) at [7:28 AM](#) [1 comment:](#) 

Labels: [hacking](#), [IEC 62351](#), [IED](#), [security](#), [Substation](#), [Substation Automation](#)

Friday, July 17, 2015

Learn How Three Big U.S. Utilities Gained Experience With IEC 61850

The three well known U.S. utilities New York Power Authority (**NYPA**), Kansas City Power and Light (**KCP&L**), and Southern California Edison (**SCE**) have recently gained experience with IEC 61850 applications through various projects. Don Von Dollen (EPRI) and Erich Gunther (EnerNex) have given various answers on a very crucial question: “Why is IEC 61850 used all over the world – but not that much in the U.S.?”

The main outcome of their investigation is:

- Need **extensive training** to the workforce.
- Take advantage of **help from** other utilities and entities (consultants, ...).
- Cross-vendor **configuration is burdensome**.
- Case studies and implementation **profiles** needed.
- **Participate** more in the UCAIug 61850 User Group
- Build a **strong test-lab**.

I fully agree with Erich!

The main reason for the slow progress in the U.S. is (from my point of view) related to the misinterpretation what IEC 61850 really is. Most people still believe that it is something like DNP4.0 – DNP3.0 plus ... Which is totally wrong!

My experience – after some 4.000 – experts educated in IEC 61850 is this: Teamwork (of smart engineers) makes the Dream work!

Erich Gunther has presented a one hour webinar on the subject on July 14, 2015.

Click [HERE](#) to listen to Erich’s one hour presentation.
Click [HERE](#) for a copy of his slides [pdf].
Click [HERE](#) for a paper written by Erich on the subject [pdf]

The need of smart and well educated engineers is required independent of the approach:

1. **Build turn-key substations** (most big vendors support this) or
2. **Utility-driven design, configuration, commissioning and test ... and operation.**

After last weeks 4 day training for a big South-American utility that applies the second approach, I see an increasing need for more vendor-independent training for protection and SCADA applications in substations.

We are here to help you in this regard:

[NEW Training Opportunities for IEC 61850, IEC 61400-25, IEC 60870-5-104, and IEC 62351](#)

Posted by [Karlheinz Schwarz](#) at [7:49 AM](#) [No comments:](#) 

Labels: [education](#), [IEC 61850](#), [protection](#), [SCADA](#), [seminar](#), [Substation Automation](#), [Training](#), [USA](#)

Monday, June 29, 2015

An Approach to Developing Power Grid Control Systems with IEC 61850 and IEC 61499 and Holonic Control

An interesting paper discusses the combined use of IEC 61850 and IEC 61499:

An Approach to Developing Power Grid Control Systems with IEC 61850, IEC 61499 and Holonic Control

by Valentin Vlad, Corneliu Buzduga, and Calin Ciufudean (University of Suceava, Romania)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

WSEAS TRANSACTIONS on SYSTEMS, Volume 13, 2014

This paper presents some models and concepts for developing smart power grid control systems based on holonic concepts and the open standards IEC 61850, IEC 61499. Along with the proposed holonic models for different levels of control, we present a simple fault protection application illustrating how the IEC 61499 artifacts can be used for modeling and implementation of IEC 61850 compliant applications.

Click [HERE](#) for the above paper.

Additional information of using IEC 61850 and IEC 61499 in Distributed Power Systems:

[Distributed Power System Automation With IEC 61850, IEC 61499, and Intelligent Control](#) (Neil Higgins, Member, IEEE, Valeriy Vyatkin, Senior Member, IEEE, Nirmal-Kumar C. Nair, Senior Member, IEEE, and Karlheinz Schwarz, Member, IEEE; IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS, 2010)

[Multi-agent Smart Grid Automation Architecture based on IEC 61850/61499 Intelligent Logical Nodes](#) (G. Zhabelova, V. Vyatkin, Senior Member IEEE; IEEE Transactions on Industrial Electronics, 2011)

More to come.

Posted by [Karlheinz Schwarz](#) at [7:19 AM](#) [No comments:](#) 

Labels: [distribution automation](#), [Functionblock](#), [IEC 61499](#), [IEC 61850](#), [Power Automation](#), [power management](#), [power systems](#), [Smart Grid](#)

Saturday, June 27, 2015

BDEW Whitepaper on Security for the Power Industry has been updated

Whitepaper V 1.1
Anforderungen an sichere Steuerungs- und Telekommunikationssysteme

White Paper V 1.1
Requirements for Secure Control and Telecommunication Systems

This updated white paper specifies essential security measures for **control and telecommunication systems for the power industry**. The purpose of this document is to sufficiently protect the operation of these systems against security threats. The security measures described in this document are recommended for all newly procured control and telecommunication systems. The strategic goal of this white paper is to favourably influence the future development for aforementioned systems with regard to IT security. Furthermore the document should establish a mutual understanding for the protection issues of these systems throughout the industry.

Click [HERE](#) for a copy of the whitepaper.

Click [HERE](#) for related documents.

Posted by [Karlheinz Schwarz](#) at [8:54 AM](#) [No comments:](#) 

Labels: [BDEW](#), [control](#), [power systems](#), [security](#), [telecommunication](#)

Thursday, June 25, 2015

Video About the German Energiewende

A 11 minute film about Germany’s Renewable Energy Revolution, the so called Energiewende (energy transition) has been published recently. Voices from science, industry, and politics outline the achievements made so far, next steps, and the opportunities the energy transition offers.

Click [HERE](#) to watch the video.

Even the video does not mention IEC 61850 – it is clear that the standard series plays a major role in the future energy delivery in Germany, in Europe and all over!

After the [announcement of the White House to spent many Billions of US\\$ on clean energy](#), I would not wonder if the German and other governments follow and spent also a lot of Euros and other currencies in the near future.

Hope we have enough well educated engineers to work with the money. If you need good education in the automation of power delivery systems: [Here](#) you can get some.

Posted by [Karlheinz Schwarz](#) at [1:33 AM](#) [No comments:](#) 

Labels: [education](#), [Energiewende](#), [Germany](#), [IEC 61850](#), [seminar](#)

Monday, June 15, 2015

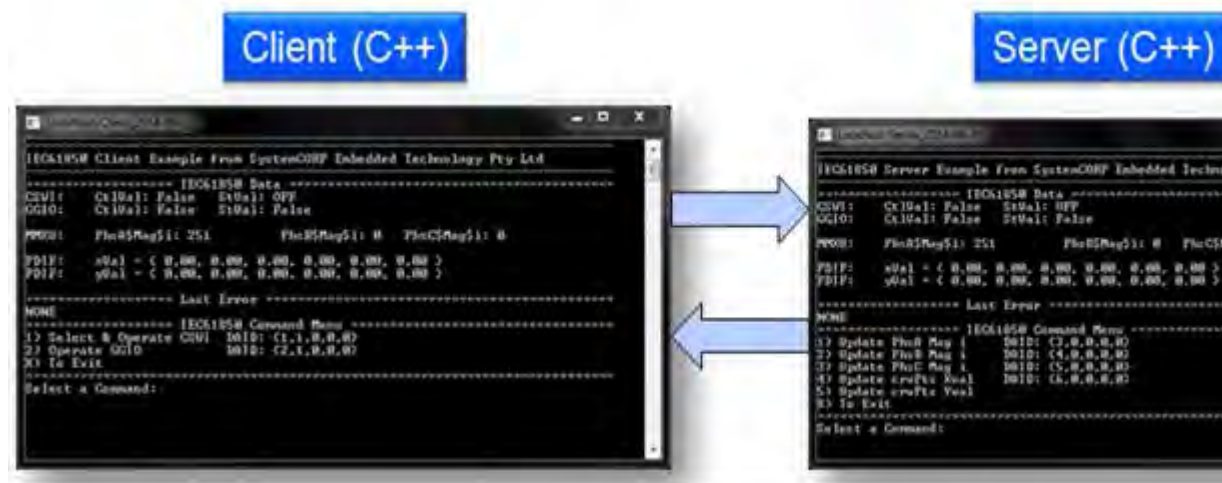
New IEC 61850 Edition 2 Demo Package Available to run on Windows

After successful usage of our old demo package provided 2010 and 2011 NettedAutomation provides a new package for Edition 2 of the IEC 61850 core parts.

The new package comes with a DLL comprising the IEC 61850 Stack, an simple API, and a powerful SCL configuration tool – all included in the DLL. The package contains executable programs that can be used right away. Additionally you will find also the course code of the applications for you to modify the applications to your own needs.

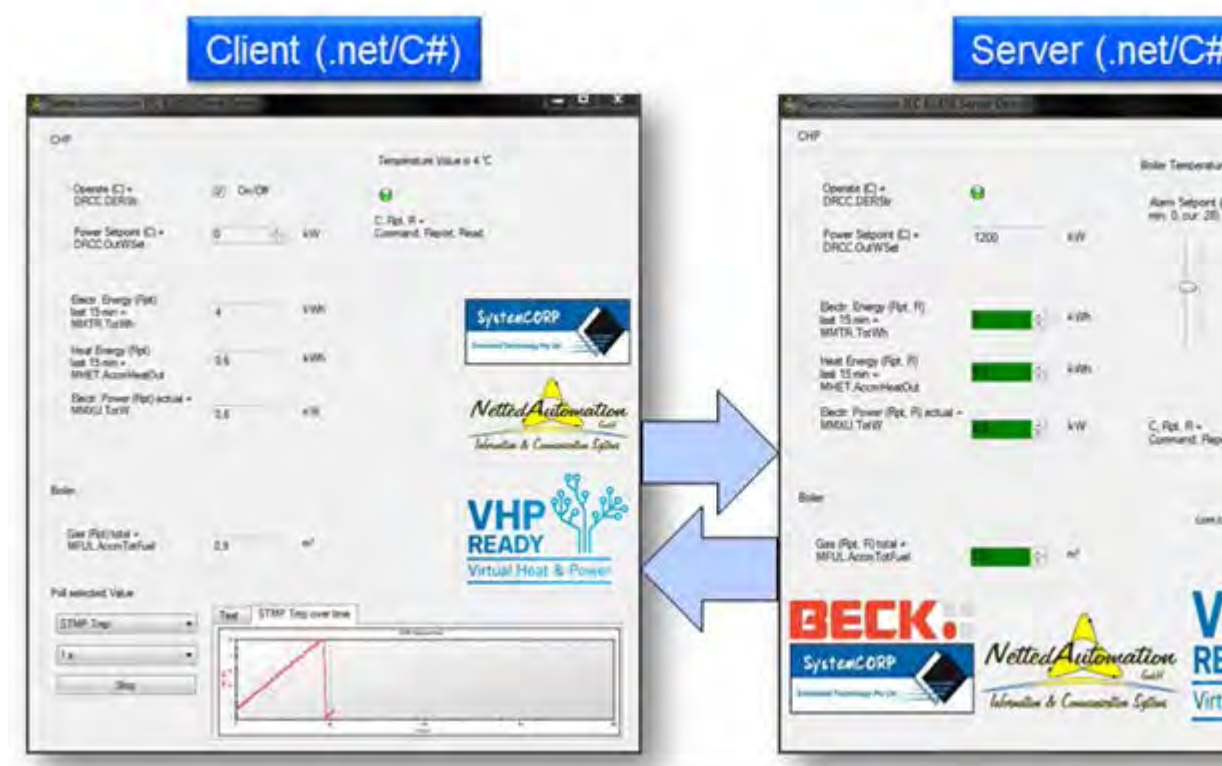
There are two different applications for the client and server:

1. C++ programmed very basic console applications:



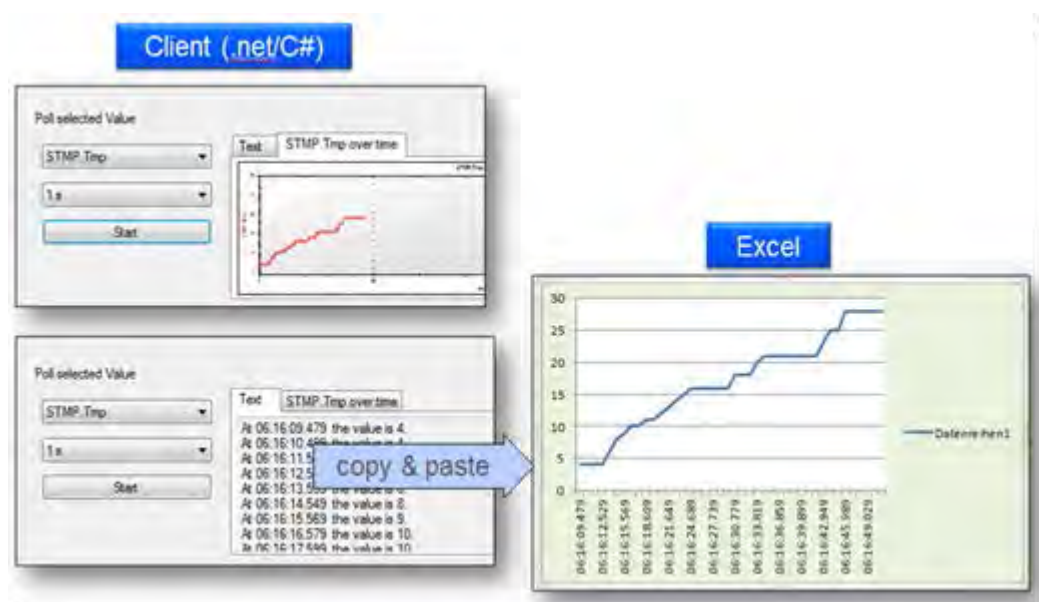
The values can manually be changed ... use the listed commands.

2. .Net/C# programmed enhanced applications (SCADA like):



The client starts the CER system by clicking the box on the upper left corner of the Client application. The Server application will run. Add values in ther server application ... to be reported to the client. The use-case is quite realistic.

All client and server applications use the same DLL (provided by [SystemCorp](#)). The IEC 61850 models and communication services are configured by corresponding SCL Files. The applications provided are intended to show what IEC 61850 offers and how to use the simple API for a short time-to-marked development. The applications show how to exchange information with your applications:



The client and server can run on one machine (local host) or on two machines. In case of two machines you can trace the communication with, e.g., Wireshark. The addresses (MAC and IP) have to be configured differently for the two cases. The client connects automatically with the server (**based on the SCL files**) – no need for manual intervention. The demo shows how an embedded client can communicate with a server – without and browsing service.

The client and server can be configured to publish GOOSE and SV.

Some basic documentation comes with the package that can be downloaded. The main objective is the use of the package in our [comprehensive hands-on training courses](#).

Click [HERE](#) to get access to the package.

Enjoy!

Posted by [Karlheinz Schwarz](#) at [2:13 AM](#) [No comments:](#)

Labels: [client](#), [Demo Kit](#), [Evaluation](#), [GOOSE](#), [hands-on Training](#), [IEC 61850](#), [sampled value](#), [server](#), [Windows](#)

Thursday, June 11, 2015

XMPP - IEC 61850-8-2 Defines Additional Communication Mapping

IEC TC 57 has published a first draft for an **additional mapping of IEC 61850 information models and communication messages**.

IEC 61850-8-2 (57/1583/CD):

Communication networks and systems for power utility automation - Part 8-2: Specific Communication Service Mapping (SCSM) – **Mapping to Extensible Messaging Presence Protocol (XMPP)**

Closing date for comments is 2015-09-11

The new mapping defines (relies on) the following definitions:

Service mapping (unchanged)

The abstract (client-server) services of IEC 61850-7-2 are mapped to MMS as defined in the existing IEC 61850-8-1 Ed2.

Message Encoding (new concrete encoding)

The encoding of the messages uses ASN.1 XER (XML encoding rule) – in addition to ASN.1 BER according to IEC 61850-8-1 Ed2. The encoding defines an XML schema – contained in the draft.

Model mapping (unchanged)

As in IEC 61850-8-1 Ed2. This applies to the **flattening** of the object identification and adding **Functional Constraint** (FC=ST or MX) in the path name and using "\$" for ".":

Bay5_MMUXU1\$MX\$Hz\$mag\$i

Underlying Transport (new T-Profile)

The **transport (exchange) of the XER encoded messages uses a new approach:** using **XMPP**.

This new transport mechanism and encoding will be used between all kinds of utility Distributed Energy Resource devices and related power management systems, over any communication infrastructure including public networks.

The coming IEC 61850-8-2 can be understood as an (encoding and transport) extension of the existing IEC 61850-8-1.

It is very crucial that most parts of implementations and tools can be **re-used! Re-Use** is one of the basic approaches used in IEC 61850! Don't start always from scratch – use what is available and add something.

So, to read the frequency of Bay5 is almost the same .. using the reference

“[Bay5_MMXU1\\$MX\\$Hz\\$mag\\$i](#)”
encoded in ASN.1 BER (IEC 61850-8-1) and in ASN.1 XER (IEC 61850-8-2).

[See also example of encoding.](#)

A second document explains the needs and background for an additional mapping:

IEC 61850-80-3 TR (57/1584/DTR):
Communication networks and systems for power utility automation -
Part 80-3: Mapping to Web protocols – **Requirements and technical choices**

It describes the requirements and the technical principles for a new specific communication service mapping (SCSM) based on Web Protocols.
For more information about the candidate technologies which have been analyzed but not selected as well as about the selection process used for choosing the technology, national committees are invited to consult document 57/1585/INF which is circulated in parallel:

Accompanying document to 57/1584/DTR, Proposed IEC TR 61850-80-3

It mainly describes the technical solutions which have been investigated but finally not selected for the SCSM of the IEC 61850 based on Web Protocols.

1. IEC 61400-25-4 Annex A (Web services)
2. DPWS (Devices Profile for Web Services)
3. REST (Representational State Transfer)
4. XML messaging over Websocket
5. ACSI XML Messaging
6. OPC UA


The finally chosen solution “MMS XER payload over XMPP as transport” was recognized after several years of work as the preferred solution – especially from a fast time-to-market point of view.

What does XMPP provide?

XMPP (RFC 6120) is a **middleware messaging and presence protocol** supporting decentralized architectures and provides:

- Registering resources in publicly reachable servers
- Resolving resources based on names
- Security (authentication, integrity, confidentiality) for the communication with the XMPP server

This fits well to the information models defined in IEC 61850.

Posted by [Karlheinz Schwarz](#) at [2:24 AM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-8-1](#), [iec 61850-8-2](#), [mapping](#), [MMS](#), [OPC UA](#), [SCSM](#), [Web Service](#), [XML](#), [XMPP](#)

Wednesday, June 10, 2015

NEW Training Opportunities for IEC 61850, IEC 61400-25, IEC 60870-5-104, and IEC 62351

Education is one of the crucial aspects when it comes to information modeling, system and device configuration, information exchange, and security measures.

Many new or updated standards have been published during the last couple of months – and more to come: e.g., several parts of the series IEC 61850 will be published as Edition 2.1.

In addition to many new definitions we are seeing more and more utilities and vendors in getting started using the above mentioned standards in Automation and Protection ... SCADA, ...

Taking the experience with the many solutions and the new standard s into account, [FMTP](#) and NettedAutomation offer a [new series of training courses](#) (in English and German). FMTP and NettedAutomation have conducted **more than 10 in-house courses in recent months and several public events. You would tap the experiences of so far more than 4.000 attendees we have trained (FMTP and NettedAutomation) all over.**

Karlsruhe (Deutsch, Karlheinz Schwarz):

02-04 Dezember 2015 (neues Datum)
11-13 Januar 2016
14-16 März 2016

Click [HERE](#) for details

Karlsruhe/Germany (English, Andrea Bonetti and Karlheinz Schwarz):

13-16 October 2015
04-07 April 2016
10-13 October 2016

Click [HERE](#) for details

Dammam City/Saudi Arabia (English, Andrea Bonetti and Karlheinz Schwarz):

18-21 October 2015

Details will be available soon.

Stockholm/Sweden (English, Andrea Bonetti and Karlheinz Schwarz):

22-25 February 2016

19-22 September 2016

Click [HERE](#) for details

We look forward to seeing you in one of the above courses or in an in-house event.

[Contact us if you are interested in an in-house event.](#)

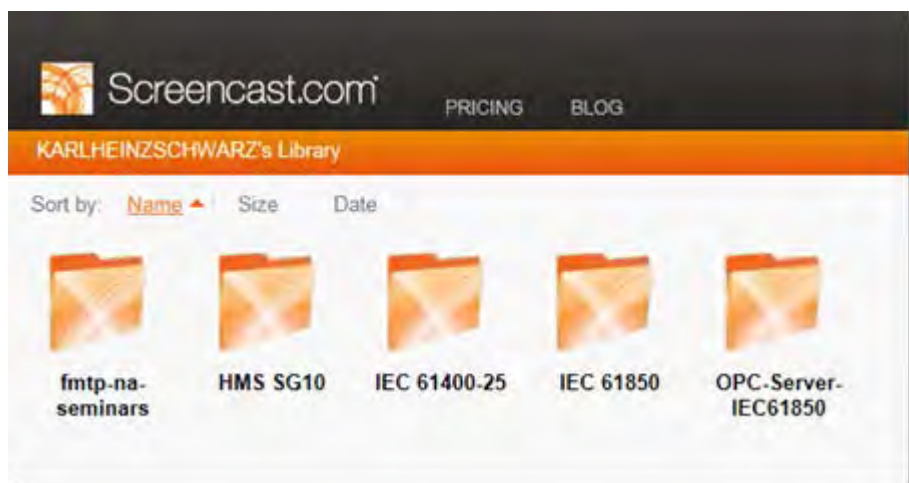
Posted by [Karlheinz Schwarz](#) at [5:37 AM](#) [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [education](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [seminar](#), [Training](#)

Monday, June 8, 2015

Some Videos related to IEC 61850 by Karlheinz Schwarz

Some videos produced by Karlheinz Schwarz (NettedAutomation GmbH) can be found here:



Click [HERE](#) to access a list of several interesting videos on various IEC 61850 (IEC 61400-25) issues.

Enjoy.

In case you would like to see more videos on other issues – let me know.

[Contact Karlheinz Schwarz.](#)

Posted by [Karlheinz Schwarz](#) at [5:35 AM](#) [No comments:](#) 

Friday, June 5, 2015

Security: A Never Ending or a not Yet Started Story?

Everybody talks about security! Who is working on it? Some people are working on meeting compliance requirements like those defined in NERC CIP. Very few are dealing with measures to make and keep systems secure.

What's the difference between **compliance** and **security**? Does being compliant also mean being secure? NO – not at all. Being compliant may let you sleep better ...

Two excellent publications touch on these issues:

1. [NERC CIP v5 Suggests Compliance Does Not Equal Security](#)
2. [What effective legislation would you write for CI ICS](#)

The first article closes:

“Compliance means you **won't be fined**. Security means you **won't end up in the headlines**. A friendly security suggestion would be to look beyond CIP compliance and use it as a baseline for your security policies.”

and the second:

“Hopefully, industry can get behind some sort of meaningful control system security legislation before we end up with a catastrophic attack on a control system.”

Since most people likely not yet have tried to implement security measures ... the following sign (I purchased the other day) wouldn't help either:



Try it again or the first time. But don't give up before you have a process for a higher level of security in operation. And never give up to improve.

Posted by [Karlheinz Schwarz](#) at [5:32 AM](#) [No comments:](#) 

Labels: [CIP](#), [critical infrastructure](#), [Critical Infrastructure Protection](#), [NERC](#), [security](#)

IEC 62351-11: Draft on Securing XML files

XML (a notation for structured documents) is used in many standards published by IEC TC 57 (Power systems management and associated information exchange). IEC 61850-6 (SCL) is one of these parts that rely on XML and XML schema.

A small change in an SCL file may have a crucial impact of the content of the whole file. There is a need to secure such files.

IEC TC 57 just published the first CDV:

IEC 62351-11 Ed.1 (57/1562/CDV)

Power systems management and associated information exchange - Data and communications security -

Part 11: Security for XML files


The 62351-11 extensions provide the capability to provide:

- **Header information:** the header contains information relevant to the creation of the secured document such as the Date and Time of the when the IEC 62351-11 document was created.
- A choice of **encapsulating** the original XML document in an encrypted (Encrypted) or non-encrypted (nonEncrypted) format. If encryption is chosen, there is a mechanism provided to express the information required to actually perform encryption in an interoperable manner (EncryptionInfo).
- **AccessControl:** a mechanism to express access control information regarding information contained in the original XML document.
- **Body:** is used to contain the original XML document that is being encapsulated.
- **Signature:** a signature that can be used for the purposes of authentication and tamper detection.

What do you think about security? It is important! How many time and money have you and your colleagues or your management spent for making systems more secure? One Euro or 1000 Euro?

When it comes to costs – then people are behaving different.

Be more serious about security.

Posted by [Karlheinz Schwarz](#) at [4:50 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-6](#), [IEC 62351](#), [iec 62351-11](#), [security](#), [XML](#)

Thursday, June 4, 2015

1400 Tissues (Technical Issues) listed since 2004

The Tissue process is one of the crucial means to improve the quality of the various parts of the IEC 61850 standard series and helps to improve the interoperability of IEDs. Since 2004 the IEC 61850 experts have posted more than 1400 Tissues – number 1400 was posted today (2015-06-04).

The [Tissue 1400](#) is very interesting: It is based on input from utilities (User Feedback Task Force).

This tissue proposes to remove several options in the area of how the subscription is specified in an SCL file – and to allow only **ONE possibility**.

This is a good news!

I personally expect that this approach (to get rid of options) will be applied more often in the future.

Note: Many tissues are just questions that are tagged as “blue” tissues.

Posted by [Karlheinz Schwarz](#) at [1:51 AM](#) [No comments:](#) 

Labels: [GOOSE](#), [IEC 61850](#), [IEC 61850-6](#), [options](#), [SCL](#), [subscription](#), [tissue process](#), [tissues](#)

Tuesday, May 26, 2015

FDIS of Edition 2 of IEC 61400-25-2 and IEC 61400-25-3 approved


Two final draft international standards of the series IEC 61400-25 have been approved by 100 % of the members on 2015-05-22:

[IEC 61400-25-2 Ed.2](#): Wind turbines -
Part 25-2: Communications for monitoring and control of wind power plants -
Information models

[IEC 61400-25-3 Ed.2](#): Wind turbines -
Part 25-3: Communications for monitoring and control of wind power plants -
Information exchange models

This situation proofs that the core parts of the standard series IEC 61850 and IEC 61400-25 are mature and available.

It is very likely that those vendors and users that were waiting for the second edition are now speeding up to implement and use IEC 61400-25.

Posted by [Karlheinz Schwarz](#) at [5:37 AM](#) [No comments](#): 

Labels: [IEC 61400-25](#), [IEC 61850](#), [wind power](#)

Friday, May 22, 2015

Draft IEC 61850-90-2 for Substation to Control Center Communication published

The substation (or power plant or ...) to control center communication is historically based on hundreds of protocols. Among those you will find also protocols like IEC 60870-5-101, IEC 60870-5-104 or DNP3. The original scope of IEC 61850 was (politically) restricted to substations. From a technical point of view it was expected from the very beginning of the work on IEC 61850 that it could be used also for this and many other use-cases.

After several years of work on the official document it is now available for final vote:

57/1578/DTR (164 pages):
IEC 61850-90-2 TR Ed.1
Communication networks and systems for power utility automation –
Part 90-2: **Using IEC 61850 for the communication between substations and control centres**

The voting ends on 2015-07-24

This document is very important for the communication with control centers. It covers crucial aspects:

1. Information modeling (proxy/gateway),
2. Information models (use of existing models and extensions)
3. Configuration language and engineering,
4. Information exchange services (redundancy, ...)
5. Security aspects

for the following use-cases:

1. Telecontrol
2. Synchrophasor
3. Disturbance
4. Counting
5. Power Quality
6. Asset
7. Parameter configuration

The document contains many examples that help to understand the different use-cases.

This document **closes one crucial gap** in the **information exchange** of many different systems, e.g., substations, power plants, hierarchical control centers, **with control centers**.

The most crucial aspect is the application and extension of SCL (System Configuration Language – IEC 61850-6).

Several useful extensions are defined, e.g., the link between a proxy/gateway model and the original model. To support end to end testing through the Proxy/Gateway functional links between the data objects in the Proxy/Gateway server and the original source of information in a substation IED can be expressed as the following example shows:


```
<LN lnClass="MMXU" lnType="MMXU" inst="1">  
  <Private type="eTr-IEC61850-90-2">  
    <eTr-IEC61850-90-2:ProxyOf externalScl="Substation" iedName="IED2"  
    IdInst="MEAS"
```

```
InClass="MMXU" InInst="1"/>
</Private>
</LN>
```

Links can be created on each level of the data model using the element:

eTr-IEC61850-90-2:ProxyOf

This new part contributes to the **vision of a SINGLE seamless information exchange** solution for the whole domain of power delivery (generation, transmission, distribution, use).

Posted by [Karlheinz Schwarz](#) at [9:43 PM](#) [3 comments:](#) 

Labels: [control center](#), [DNP3](#), [IEC 61850](#), [Modbus](#), [proxy gateway](#), [RTU](#), [SCL](#), [security](#), [Substation](#)

Wednesday, May 13, 2015

Just started: Grid 3.0

Have you heard about “Grid 3.0”? This seems to be the next phase of the power delivery system. Recently several U.S. organizations have discussed the future of the power delivery system. According to their view there are 3 phases so far:

- “**Grid 1.0**” can be thought of as the legacy grid of the 20th century
- “**Grid 2.0**” is the emergence of the smart grid with automation and information technology improvements, and
- “**Grid 3.0**” is what comes next: for example, a **future grid with advanced grid operations and greater interactions with consumers and other infrastructures**.

Click [HERE](#) to access a list of presentations from the

Grid 3.0 Workshop
March 26 to March 27
at NIST, Gaithersburg, MD

Click [HERE](#) for a workshop summary.

We are currently in all three phases at the same time. Most of the systems are still legacy (for the next 20+ years), a few start to use automation and information technology, and some start to think about the future ... power engineers have always thought about the future (even 130 years ago). One of the big issues in Grid 2.0 and Grid 3.0 is the need for interoperable of systems. We can reach a high level of interoperability – if we want! This is less a technical issue. It all depends on decisions to be made by humans. If we decide to get it, we can get it. Some may not like interoperability at all. Or?

Anyway, let’s assume we get there: Would we then generate **Data Tsunamis** all over? It is likely that people start to push every data into the cloud – expecting that somebody may use it.

Make sure that you understand your needs – before you look for a protocol or a data model. We have a single protocol for most near-real-time data (IEC 61850-8-1) and data models for almost everything. But does everybody need everything? No!

The big question is: What do you need? To answer this: You need to understand your application.

Posted by [Karlheinz Schwarz](#) at [12:00 AM](#) [No comments:](#) 

Labels: [Grid 3.0](#), [interoperability](#), [NIST](#), [Smart Grid](#), [smart people](#)

Monday, May 11, 2015

IEC 61850 meets Fieldbus: Bridge between Profinet and IEC 61850

Industrial automation systems highly rely on many different fieldbusses – one of the crucial Ethernet-based fieldbusses is the Profinet IO (defined in IEC 61158). IEC 61850 is THE standard for information modeling, information models, system and device configuration, soft-realtime communication (GOOSE and SV), and SCADA communication (event reporting, control, exchange self-descriotion online from device, logging, statistical and historical statistical information, alarms,recording).

Information exchange between (1) power system protection and automation in **power transmission, distribution, and power generation** (central and distributed) and (2) **industrial automation systems** is one of the crucial needs for energy efficiency and smart(er) grids.

A new bridge between the two domains is now offered by HMS (gateway SG-40): bridging Profinet to IEC 61850.

HMS – a Swedish based company with 370 employees worldwide – has delivered products integrated in millions of devices around the world.

Key features of the SG-40 Profinet Gateway are:

- Web based programming with predefined function blocks

- Optional IEC61131-3 compliant CODESYS softPLC programming
- **PROFINET IO slave**
- Additional industrial Ethernet networks supported with [Anybus technology](#)
- Modbus TCP client
- Modbus RTU master
- IEC61850 client/server
- IEC60870-5-104 server
- OpenVPN client
- Integrated firewall

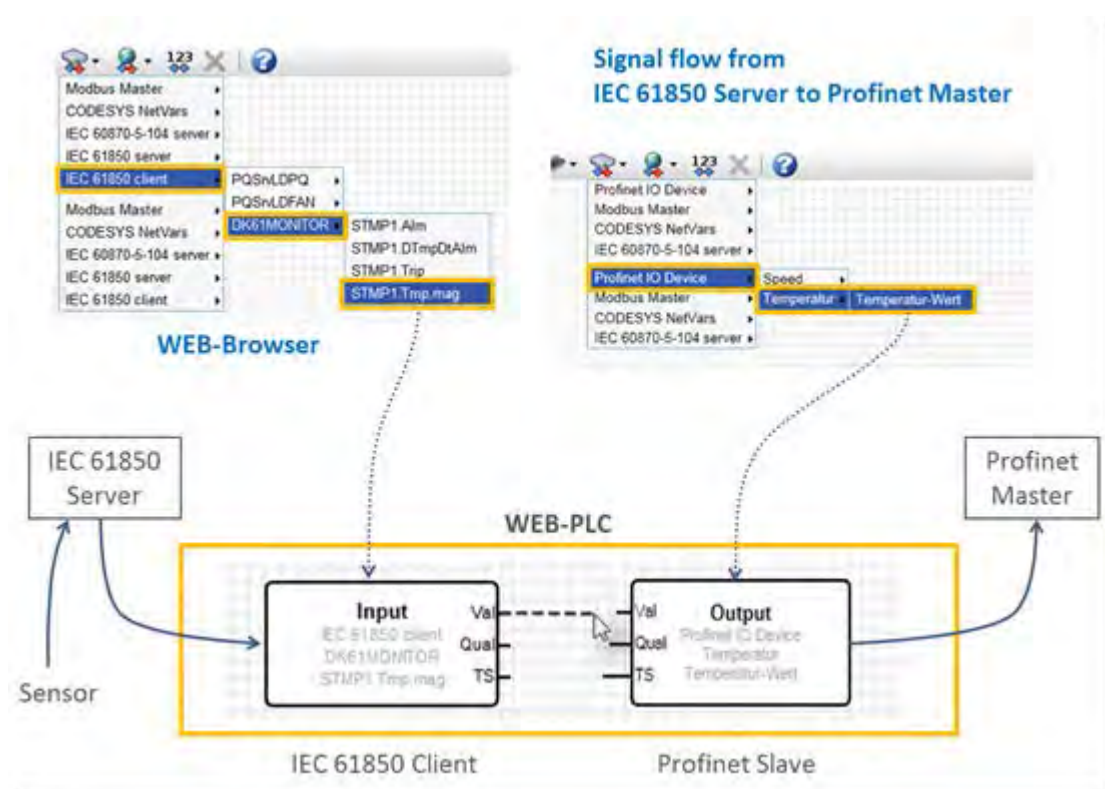
The family of the smart grid supporting devices offered by HMS comprises the following the device types (for many different applications):



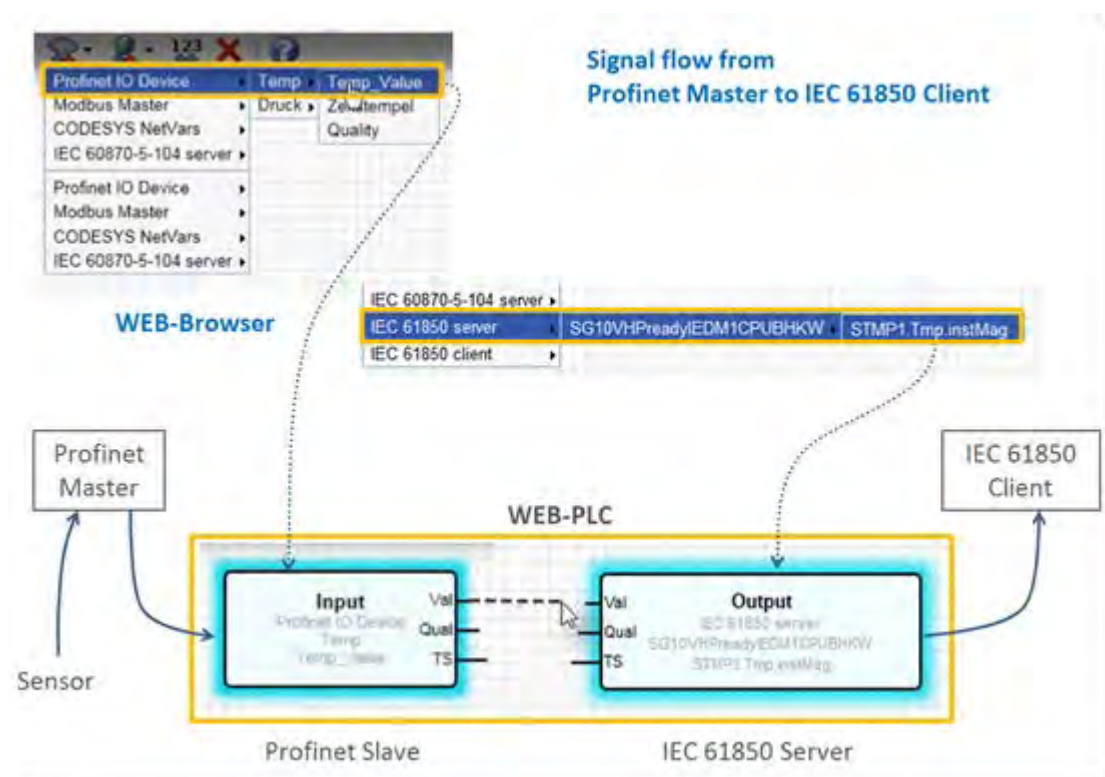
Click [HERE](#) for more information you can find at the HMS website.

The SG-40 supports a variety of mappings between several protocols:

1. **IEC 61850 device information mapped to Profinet IO** to expose IEC 61850 information to the industrial automation world:



2. **Profinet IO information mapped to IEC 61850 device information** to expose fieldbus information to the power delivery automation IEC 61850:



3. **Many other mappings** are supported (to/from Modbus, IEC 60870-5-104, DNP3, ...).

All signals can be mapped in both directions.

The SG-10, SG-11, and SG-40 devices are using a Web-Browser for a very simple graphical programming tool. No other tools – except Web-Browser – are needed.

[A 15 minute video explains the basic concepts](#) of the gateways SG-10, SG-11 and SG-40.

These devices provide a highly standardized and easy approach of bridging signals between multiple standard information exchange systems.

The configuration of the devices is very simple ... no tool other than a web browser is needed to configure the input and output signals coming from (going to) the devices connected to various communication systems.

The devices can play one or all roles of IEC 61850 (Server, Client, Publisher, or Subscriber) in parallel. This allows to “collect”, e.g., many signals from a substation as a client and expose them into a Profinet network; or “collect” signals from the Profinet slaves and master and map them to an IEC 61850 Server.

This allows a very short time-to-market integration of the information of power related information into the industrial automation and vice versa.

One key-point is: The standard series IEC 61850 is the **ONLY** standard that offers a very comprehensive information model for all crucial power delivery system needs!

Posted by [Karlheinz Schwarz](#) at [3:07 AM](#) [No comments:](#)

Labels: [DNP3](#), [Gateway](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [mapping](#), [Modbus](#), [Profibus](#), [Profinet](#), [SCADA](#), [SCL](#), [Smart Grid](#), [smart solution](#)

Friday, May 8, 2015

Are You Looking for IEC 61850 Related Publications?

Here is a very interesting link to a database (**GetInfo - The Portal for Science and Technology**) that lists some 830 publications related to IEC 61850. You can search for authors and contributors.



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Search and Order

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Example: (getriebe* OR gear*) AND hybrid*

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101 Application of IEC 61850 to outdoor feeder automation
Lubkeman, David; Colonna, Donato | **TIBscholar** | 2008
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102 IEC 61850 as a flexible tool for electrical systems monitoring
Lloret, Pau; Velasquez, Juan L.; Molás-Balada, Lluís et al. | **TIBscholar** | 2007
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103 IEC 61850: What You Need to Know About Functionality and Practical Implementation
Doležilek, Dave | **TIBscholar** | 2006
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104 Safety related, distributed functions in substations and the standard IEC 61850
Brand, K.-P.; Ostertag, M.; Wimmer, W. | **TIBscholar** | 2003
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Click [HERE](#) for a search on "IEC 61850".

Posted by [Karlheinz Schwarz](#) at 9:59 PM [No comments:](#)

Labels: [IEC 61850](#), [publication](#), [Smart Grid](#), [smart people](#), [Substation Automation](#)

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WEITERE INFORMATIONEN OK

Sunday, May 3, 2015

Renewable Energies and Energy efficiency in your Neighborhood

I just came about the following interesting website showing a map of thousands of renewable resources in Europe:

<http://www.repowermap.org/index.php?ln=en>

You may search for Frankfurt or other cities:



The map shows some 60,000 examples. You can add your own PV system or ...

Enjoy!

Posted by [Karlheinz Schwarz](#) at 9:22 PM [No comments:](#)

Labels: [photo voltaic](#), [renewables](#), [wind power](#)

Saturday, May 2, 2015

Could a Power Outage of an Airplane happen in the Air?

Yes, a power outage of an modern airplane could be caused by a simple software problem – related likely to a wrong assumption. What does this mean for the future power systems?

The following official report from the U.S. Government FAA, dated May 01, 2015 says that a

“Boeing Model 787 airplane that has been powered continuously for 248 days can lose all alternating current (AC) electrical power due to the generator control units (GCUs) simultaneously going into failsafe mode. This condition is caused by a software counter internal to the GCUs that will overflow after 248 days of continuous power.
...

The software counter internal to the generator control units (GCUs) will overflow after 248 days of continuous power, causing that GCU to go into failsafe mode. If the four main GCUs (associated with the engine mounted generators) were powered up at the same time, after 248 days of continuous power, all four GCUs will go into failsafe mode at the same time, resulting in a loss of all AC electrical power regardless of flight phase.”

Click [HERE](#) for the full report.

What is the **lesson we can learn** from this situation? I guess simply this: If you have to program something you need to know precisely under which assumptions the “something” should work. Usually you have to make firm assumption under which the “something” will work. If you would assume (for example) that an airplane of model 787 would never be powered continuously longer than 90 days, then the counter would not overflow under normal conditions.

But: If this assumption is wrong, then the counter could overflow.

I guess that we quite often design systems under **assumptions** that may be valid at time of the design – but that may show later that they were quite wrong! Some 40-50 years ago it was not assumed that the traffic in 2015 would be as is is now. Or?

The power utilities **assumed** some 15 years ago that PV-Power (mainly installed on roofs) should just be understood and treated as **negative power** connected to the grid – so that there was no need to invest in power management and automation systems. I remember

For your Convenience

[New Demo Kit \(Windows DLL\) for IEC 61850 with executable SW and with Application SW Source Code \(C++/C#\) - 2015-06-12](#)

[Training Opportunities: IEC 61850, IEC 60870-5-104, DNP3, ... - 2015-06-12](#)

[Blog as single PDF until 28 April 2015 \[11 MB\]](#)

Training by NettedAutomation



3 day IEC 61850 Training 2006 in Bangalore (India)

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► 2009 (162)

► 2008 (82)

such discussions in the German national standardization (DKE). Within a short time period they had to learn that the assumption was wrong! Now we have almost 40 GW of installed PV systems.

The **next wrong assumption** could likely be the number of **Batteries** connected to the power grid. The needed investment in the future power system will highly depend on the assumption on **how fast the installation of batteries will happen!** I have talked recently to utility experts that they fear a fast growth of network connected batteries. The batteries behave different compared to Wind Turbines and PV systems – batteries can import and export energy. They can change their behavior within very short time. A sudden huge power flow change of millions of battery systems could cause power outages.

So, **MUST we assume that this could easily happens or not?** Depending on our answer, we have do spent more or less Euros or Dollars ... Experts that don't want to invest a lot more will argue, that it is unlikely to happen.

The (wrong) **assumptions of today** could likely be the reasons of **power outages** in the near future. The bad side of the assumption that **the installation of battery systems will grow fast** is: It will require a lot of more efforts to keep the power system reliable.

I guess we will see increasing numbers of batteries being installed after yesterdays announcement (May 01, 2015) of the new [Partnership for Global Energy Transformation: LichtBlick \(Germany\) integrates Tesla Battery Storage \(US\) into Energy Markets](#).

A crucial key component in the future power systems is related to information management and standardized information exchange with IEC 60870-5-104 and IEC 61850. [VHPready is an important step to support LichtBlick and many other companies](#).

Posted by [Karlheinz Schwarz](#) at [3:49 AM](#) [No comments:](#) 

Labels: [batteries](#), [IEC 60870-5-104](#), [IEC 61850](#), [Power Automation](#), [power management](#), [power outage](#), [power systems](#), [PV](#), [VHPready](#)

Tuesday, April 28, 2015


The Complete Content of the IEC 61850 News Blog is now Available as Single PDF Document

For those readers of this IEC 61850, IEC 60870-5/6, DNP3, ... news blog that want to get the complete content as a single pdf document, it is just a click away ... it contains 1000+ posts from 2008 until 2015-04-28. Once you have downloaded the file you can easily browse the content ... search ... mark ... copy ... You will find useful information about the standards, vendors like ABB, HMS, Siemens, or utilities ...

Click [HERE](#) to download all posts of the IEC 61850 blog in a single pdf [11.3 MB, 766 pages DIN A4]

Enjoy.

In case you have a question, drop us an [EMAIL](#).

Posted by [Karlheinz Schwarz](#) at [12:42 PM](#) [No comments:](#) 

Labels: [ABB](#), [blog](#), [DNP3](#), [fieldbus](#), [HMS](#), [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61158](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [OPC](#), [OPC UA](#), [SCADA](#), [SCL](#), [Siemens](#)

OPC Server using an IEC 61850 Client

OPC (DA and UA) is used quite often for higher level communication between PLCs and SCADA servers. How could you tap IEC 61850 information for communication to an OPC Client?

First of all, you need an IEC 61850 Client that talks to IEC 61850 Servers or receives GOOSE messages. Second, you need an OPC Server that sits on top of the IEC 61850 Client.

Softing (Nuremberg/Munich, Germany) offers such an OPC (DA and UA) Server with an IEC 61850 build-in client. The client automatically detects all logical nodes and data objects and converts them automatically into OPC items:

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

OPC Server using an IEC 61850 Client

First of all, you need an IEC 61850 Client that talks to IEC 61850 Servers or receives GOOSE messages. Second, you need an OPC Server that sits on top of the IEC 61850 Client.

Hands-On Overview

How you can use the Demo

The diagram illustrates the architecture of the demo system, showing the interaction between various components:

- Softing OPC Client (OPC DA and UA)** connects to the **dataFEED OPC Suite (Server for DA and UA)**.
- The **dataFEED OPC Suite** connects to the **NettedAutomation DLL based .Net C# Server Application* (+ source code)** via **API**.
- The **dataFEED OPC Suite** connects to the **SystemCorp's IEC 61850 DLL (Server) [runs 3 months]** via **API**.
- The **dataFEED OPC Suite** connects to the **SystemCorp's DLL based C/C++ server application (+ source code)** via **API**.
- The **dataFEED OPC Suite** connects to the **Your Application** via **API**.
- The **dataFEED OPC Suite** connects to the **NettedAutomation DLL based .Net C# Server Application* (+ source code)** via **API**.
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- The **dataFEED OPC Suite** connects to the **SystemCorp's DLL based C/C++ server application (+ source code)** via **API**.
- The **dataFEED OPC Suite** connects to the **Your Application** via **API**.

The diagram also shows the **Wireshark** interface at the bottom, indicating network monitoring.

A free of charge copy of the dataFEED OPC Suite and OPC Client is available for interested attendees of [NettedAutomations training courses](#).

Posted by [Karlheinz Schwarz](#) at [9:31 AM](#) [No comments:](#) 

What is "Control with Enhanced Security"?

- **Status Only**
- **Direct control**
 - normal security: Operate, TimeActivatedOperate, Cancel
 - enhanced security: Operate, TimeActivatedOperate, Cancel, **CommandTermination**
- **SBO control (Select Before Operate)**
 - normal security: Select, Operate, TimeActivatedOperate, Cancel
 - enhanced security: SelectWithValue, Operate, TimeActivatedOperate, Cancel, **CommandTermination**

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OPC Server using an IEC 61850 Client

What is "Control with Enhanced Security"?

Draft IEC 61850-8-2 SCSM –
Mapping to XER and XMPP...

Attacks doubled on SCADA systems

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► 2009 (162)

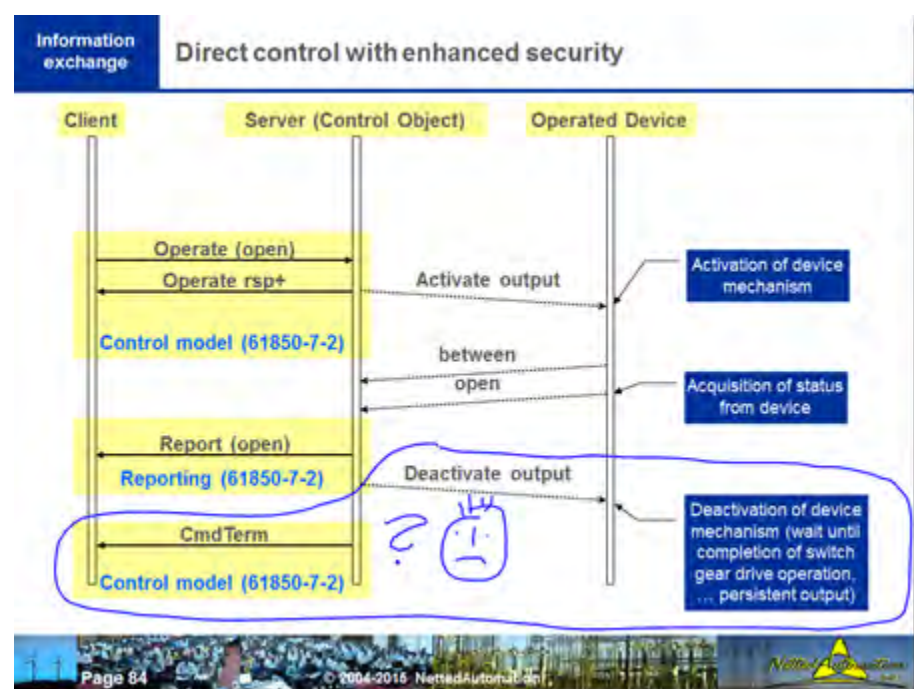
► 2008 (82)

Michael Schwarz

 Karlheinz Schwarz

do with **Cyber Security**! No, it is not linked to that kind of security – even every operate command shall be secured by communication security measures.

So, what is it then? Usually I have explained it with the following slide.



Here is a one of many understandable use-cases for a specific switchgear (based on an email exchange with a [very good friend of mine – a real switchgear expert ... that believes in IEC 61850](#)):

The proper name should be "Control with Confirmed Feedback", so that any interlocks in the switchgear (can be abstract as well), need to be in the De-active state for the switchgear to report "Command Termination", which would mean: the Control Element is now ready for another Operate service request.

A circuit breaker (CB) spring (drive) mechanism may work that it is only charged when the CB is Opened or Tripped. Then the energy in the spring mechanism would be enough to perform a Close Operation as well as a Trip Operation.

As the Trip mechanism does not need spring re-charging, it is instantaneous. However, **there is a big delay after the Trip operation which is needed for the spring to charge or reset the mechanism again.**

Although the indication of Trip will be instantaneous and reported spontaneously, **however the switchgear cannot accept a new command since the spring mechanism is being recharged. During this time, the unit will not transmit the 'Command Termination' message so that a new command cannot be initiated. Once the spring is successfully charged, a 'Command Termination' message is transferred.**

The CB mechanism example given above is one of many... there are some linear actuators which can Over-shoot during the process of operating the switch, this is then re-adjusted (i.e., brought to the normal position) after the instantaneous status change. The extra time needed to re-align actuator position (or to bring the actuator in the dead zone), will be the time after which the 'command termination' message is sent out.

Lesson learned: Ask always the domain experts!

Any question on IEC 61850?

Posted by [Karlheinz Schwarz](#) at 8:29 AM No comments:

Labels: [circuit breaker XCBR](#), [command termination](#), [IEC 61850](#), [IEC 61850-7-2](#), [operate](#), [switch gear](#), [switch gear monitoring](#)

Draft IEC 61850-8-2 SCSM – Mapping to XER and XMPP

Some 20 years after the first draft IEC 61850-8-2 SCSM (Mapping to Profibus FMS) we could expect the real IEC 61850-8-2 to be available by end of 2015.

The draft 8-2 provides an additional mapping of the messages of MMS by XER (XML Encoding Rule) and XMPP.

The MMS messages for IEC 61850-8-2 (above TCP/TLS/XMPP) are just differently encoded as in IEC 61850-8-1, as can be seen by the following example:

IEC 61850-8-1:
MMS Read message
encoded with ASN.1 BER
(Basic Encoding Rule):
Length = 48 Octets (30Hex)

```
confirmed-RequestPDU
  invokeID: 166
  confirmedServiceRequest: read (4)
    read
      variableAccessSpecificatn: listOfVariable (0)
        listOfVariable: 1 item
          listOfVariable item
            variableSpecification: name (0)
              name: domain-specific (1)
                domain-specific
                  domainId: PQSrvLDPQ
                  itemId: MMAXU1$MX$Hz$mag$1
```

0000 00 30 56 a7 e9 8e 5c 26 0a 3c 4f 4a 08 00 45 00 .Ov...\& .<OJ..E.
0010 00 6c 22 ae 40 00 80 06 00 00 c0 a8 b2 64 c0 a8 .1".Q... ..d..
0020 b2 33 ff 9d 00 66 f1 36 01 e0 ce de 82 db 50 18 .3...f.6P..
0030 3e f0 e6 47 00 00 03 00 00 44 02 f0 80 01 00 01 >..G.... .D.....
0040 00 61 32 30 35 02 01 03 a0 30 50 1e 02 02 00 20 .a705... .0.....
0050 24 28 e1 26 a0 24 30 22 a0 00 a1 1e 2a 09 50 51 .L..A..ID... ..P..
0060 53 72 76 4c 44 50 51 18 11 4d 4d 58 55 31 24 4e .>vIDPQ. .hexx01\$
0070 48 24 48 7a 24 6d 61 63 24 6e 61 63 24 6e 61 63 .xHz\$mag \$1

Draft IEC 61850-8-2:
MMS Read message
encoded with ASN.1 XER
(XML Encoding Rule):
Length = 400 Octets

```
<confirmed-RequestPDU>
  <invokeId>166</invokeId>
  <confirmedServiceRequest>
    <read>
      <variableAccessSpecificatn>
        <listOfVariable>
          <SEQUENCE>
            <variableSpecification>
              <name>
                <domain-specific>
                  <domainId>PQSrvLDPQ</domainId>
                  <itemId>MMAXU1$MX$Hz$mag$1</itemId>
                </domain-specific>
              </name>
            </variableSpecification>
          </SEQUENCE>
        </listOfVariable>
      </variableAccessSpecificatn>
    </read>
  </confirmedServiceRequest>
</confirmed-RequestPDU>
```

ASN.1 BER uses a binary encoding that produces less overhead compared to XER. But there will be many benefits provided by IEC 61850-8-2.

According to a presentation by Siemens during the Hanover Fair 2015, these are the main conclusions:

1. It provides a secure and powerful communication **for public networks considering end-to-middle and end-to-end security relations**
2. IEC 61850-8-2 is intended to use for **power management and demand response of DER** (distributed energy resources)
3. In **2015** the IEC TC57 working group WG17 will finalize and publish this new specification

Click [HERE](#) for the full presentation [pdf, 3 MB]

Posted by [Karlheinz Schwarz](#) at [7:54 AM](#) [No comments:](#)

Labels: [ASN.1](#), [BER](#), [IEC 61850](#), [iec 61850-8-2](#), [MMS](#), [security](#), [TCP](#), [TLS](#), [XER](#), [XML](#), [XMPP](#)

Sunday, April 19, 2015

Attacks doubled on SCADA systems

According to a recent Dell Report the security of SCADA systems is very poor:

“Industrial operations often use SCADA systems to control remote equipment and collect data on that equipment’s performance. Whereas the motive behind POS and secure web browser attacks is typically financial, SCADA attacks tend to be political in nature, since they target operational capabilities within power plants, factories, and refineries, rather than credit card information. In 2014, Dell saw a 2X increase in SCADA attacks compared with 2013.

We saw worldwide SCADA attacks increase from **91,676** in January 2012 to **163,228** in January 2013, and **675,186** in January 2014.

The majority of these attacks targeted Finland, the United Kingdom, and the United States, likely because SCADA systems are more common in these regions and more likely to be connected to the Internet. In 2014, Dell saw 202,322 SCADA attacks in Finland, 69,656 in the UK, and 51,258 in the US.”

Click [HERE](#) for the full **Dell Security, Annual 2015 Threat Report**

It MUST be mandatory to implement and use measures as defined, e.g., in IEC 62351!!

Yes, it costs money – but it may cheaper to spent the money now and not later when the damages happen.

Don’t accept excuses.

Posted by [Karlheinz Schwarz](#) at [11:22 PM](#) [No comments:](#)


Labels: [IEC 62351](#), [SCADA](#), [security](#)

Monday, April 13, 2015

Background and Personal Experience of Karlheinz Schwarz

Do you need help regarding IEC 61850, IEC 61400-25, IEC 60870-5-104, DNP3, IEC 62351 (Security), CIM, IEC 61158 (Fieldbus), Modbus, ...

Click [HERE](#) for a description of personal experiences, capabilities, ... find an introduction on IEC 61850, list of training modules, feedback from attendees, list of courses, countries, and pictures (updated 2015-04-11) [pdf, 4.3 MB]

Posted by [Karlheinz Schwarz](#) at [3:08 AM](#) [No comments:](#) 

Labels: [CIM](#), [DNP3](#), [education](#), [fieldbus](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61158](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [seamless](#), [security](#), [seminar](#)

Saturday, April 11, 2015

IEC 61850 at the Hannover Messe 2015

Products and Services regarding IEC 61850, IEC 60870-5-104 and other standards can be seen in action, e.g., at these booths:

SystemCorp, Perth, Australia
Booth C35/4 in Hall 13

Click [HERE](#) for details and a free entrance Ticket.

Beck IPC, Wetzlar, Germany
Booth C35/5 in Hall 13

Click [HERE](#) for details and a free entrance ticket.

HMS Industrial Networks, Halmstad, Sweden
Booth D35 in Hall 8

Clicke [HERE](#) for details and a free entrance ticket.

Posted by [Karlheinz Schwarz](#) at [1:08 PM](#) [No comments:](#) 

Labels: [Anybus](#), [Beck](#), [Beck Chip](#), [Beck IPC](#), [embedded system](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [NettedAutomation](#), [SCADA](#), [Smart Grid](#), [smart people](#), [smart solution](#), [SystemCorp](#)

IEC 61850 Seminar und Training: Erfolgreiche Serie in Deutsch wird auch 2015/2016 weitergeführt

Die erfolgreiche Serie von IEC 61850-Seminaren und Hands-On-Training-Kursen in **deutscher Sprache** wird auch in diesem und nächsten Jahr weitergeführt. Die drei ersten Termine in Karlsruhe wurden von insgesamt 28 Teilnehmern aus Deutschland wahrgenommen! Das Interesse an **kostengünstiger Ausbildung** in Bezug auf Normen wie IEC 61850, IEC 61400-25 oder IEC 60870-5-104 ist mittlerweile groß!

NettedAutomation bietet weitere drei Termine für das dreitägige Seminar und Training in Karlsruhe an:

26.-28. Oktober 2015
11.-13. Januar 2016
14.-16. März 2016

In über 200 Seminaren und mit mehr als 3.800 Teilnehmern aus über 900 Firmen und über 80 Ländern geschult ... **und ist damit die erfolgreichste herstellerunabhängige Schulung und Training in Deutsch und Englisch!**

Anlässlich der **Hannover Messe 2015** bieten wir für die dreitägige Schulung einen nahezu

unschlagbaren Sonderpreis von 790 Euro

an!

Kicken Sie [HIER](#) für weitere Details wie Programm, Schulungsort und Anmeldeformular.

Weitere Seminare (beispielsweise speziell für Schutzingenieure) finden Sie [HIER](#).

[Personal experience, capabilities, of Karlheinz Schwarz ... introduction on IEC 61850, training modules, feedback from attendees, list of courses, countries, and pictures](#)
(updated 2015-04-11) [pdf, 4.3 MB]

Posted by [Karlheinz Schwarz](#) at [12:37 PM](#) [No comments:](#) 

Labels: [de](#), [deutsch](#), [DNP3](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61850](#), [Schulung](#), [schutztechnik](#), [seminar](#), [Training](#)

Thursday, April 9, 2015

Will Information Networks become the “Backbone” of the Power

System?

Information sharing between any kind of intelligent devices is a crucial need for today’s an the future Power Delivery Systems. It requires a huge infrastructure to send information back and forth.

Who do you think will put a lot of efforts into the infrastructure to get control over the information to be shared? Will protection engineers or mechanical engineers (e.g., of wind turbines) gain control over the information infrastructure? I guess that it will work the other way around: The specialists of network infrastructure will have a big impact on how the information will be shared in future.

One of the many activities is supported by a special group within the IETF (Internet Engineering Task Force): Energy Management (EMAN)

Excerpt from the current Applicability Statement

“Abstract

The objective of Energy Management (EMAN) is to **provide an energy management framework for networked devices**. This document presents the applicability of the EMAN information model in a variety of scenarios with cases and target devices. These use cases are useful for identifying requirements for the framework and MIBs.

...

1. Introduction

The focus of the Energy Management (EMAN) framework is **energy monitoring and management of energy objects** [RFC7326]. The scope of devices considered are **network equipment** and their **components, and devices connected directly or indirectly to the network**. The EMAN framework enables monitoring of heterogeneous devices to report their energy consumption and, if permissible, control. There are multiple scenarios where this is desirable, particularly considering the increased importance of limiting consumption of finite energy resources and reducing operational expenses.”

Click [HERE](#) for the current “Energy Management (EMAN) Applicability Statement, draft-ietf-eman-applicability-statement-10”

From an information sharing point of view there is no difference between information of a router or Ethernet Switch and a protection, monitoring or control IED (Intelligent Electronic Device) in the sense of a Fieldbus, DNP3, IEC 60870-5-104 and IEC 61850.

Finally IETF could play a major role in the world of networked devices – including everything that is believed today as somehow special: Field devices on one of the hundreds of fieldbusses, IEDs in the Power delivery systems, etc.

If you are looking for a unique (single standard) that is accepted and used all over the globe: It is IEC 61850. Use the ORIGINAL. A mapping of the IEC 61850 objects (IEC 61850 Logical Nodes and DataObjects) onto a MIB and SNMP could make sense – especially when the structures are used unchanged. The same is true for a mapping of specific MIBs for Ethernet Switches and Routers. This is already happening in IEC 61850-7-4 Ed2 for some network related information, e.g., in:

LN **LCCH**: Physical communication channel supervision:

Status information	
ChLiv	Physical channel status; true, if channel receives telegrams within a specified time interval.
RedChLiv	Physical channel status of redundant channel
OutQv	Output communications buffer overflow
InQv	Input communications buffer overflow
Fer	Frame error rate on this channel; count of erroneous (or missed, in case of redundancy) messages for each 1 000 messages forwarded to the application.
RedFer	Frame error rate on redundant channel; count of missed messages on this channel for each 1 000 messages forwarded to the application.
Measured and metered	
RxCnt	Number of received messages
RedRxCnt	Number of received messages on redundant channel
TxCnt	Number of sent messages
Settings	
ApNam	Access point name to which this channel belongs; only needed, if more than one access point and more than one physical channel exist.
ChLivTms	Timeout time for channel live supervision, default 5 s

More to come.

The motto of NettedAutomation GmbH since 2000 is: “The Net is The Automation”.

Posted by [Karlheinz Schwarz](#) at [1:06 AM](#) [No comments:](#) 

Labels: [DNP3](#), [EMAN](#), [fieldbus](#), [IEC 60870-5-104](#), [IEC 61850](#), [ietf](#), [Network Management](#), [Power Automation](#), [power management](#), [power systems](#)

Wednesday, April 8, 2015

Can Power Outages impact the application of IEC 61850?

Yes – it can. Why? More often we receive reports on power outages caused by aging components of the grid. Upgrading many aged insulators, transformers, lines, ... costs a lot of money! This money is not available for new technologies! Yes!

Yesterday it was an insulator that broke. The **220 kV line dropped to the ground** and caused a blackout in the Washington (DC) and other areas. They were surprised that they “did not know why the outage rippled to far from the Ryceville switching station.”

Click [HERE](#) for a news message on yesterdays event at Ryceville switching station.

A similar incident happened back to 2009 in Auckland, New Zealand, which had a direct impact on IEC 61850 applications. Excerpt from a report on February 13, 2009:

“A power lines company is getting flak from the government after one **of its conductors collapsed on to houses, trapping people in south Auckland**. Amazingly, no-one was hurt when Transpower's monster 220,000 volt line came crashing down late on Friday morning.

The incident comes just 10 days after a Transpower transformer failed and plunged 75,000 Auckland residents and businesses into darkness for two hours. "It's just totally unacceptable," says **John Key, Prime Minister**. **"So look, there is going to be a massive expenditure on the upgrading of Transpower's grid and I'm making sure that that network is not only more reliable, but safer,"** he says. Transpower is investigating the latest incident and feeling the political heat. "It's fallen into a residential area that's been built under the lines since the line was constructed in the fifties and sixties. But no, it's not good enough," says Kieran Devine, Transpower operations manager.”

Click [HERE](#) for the (old) news on the Transpower incident.

The Transpower incident had a direct influence on a project to get experience with IEC 61850 in substations. The project was stopped and my consultancy contract with Transpower was canceled soon after the incident happened.

The aging infrastructure is about to “eat” a good part of the funding for new technologies ... including implementation of cyber-security measures. So it is no surprise that in some cases in the U.S we see routable protocols being replaced by serial links! This saves a lot of dollars.

Excerpt from a GarretCom paper on non-routable protocols:

“... When **only non-routable protocols** are used, substations with critical assets are networked **without requiring the use of Critical Cyber Assets (CCAs) at remote substations**, as defined in CIPstandard CIP-002. Avoidance of “CCAs” means that the other CIP-002 to CIP-009 requirements do not apply at these substations, which will **likely defer significant implementation costs and ongoing administrative overhead associated with CIP compliance.**”

Click [HERE](#) for the complete report. See also [HERE](#) or [HERE](#) for more details on the NERC CIP on non-routable protocols.

Posted by [Karlheinz Schwarz](#) at [1:48 AM](#) [No comments:](#) 

Labels: [aging infrastructue](#), [blackout](#), [IEC 61850](#), [power outage](#), [Substation](#), [Substation Automation](#)

Tuesday, April 7, 2015

Secure Power Delivery Systems and Secure Communication

The power utility domain is facing a lot of challenges these days. There are environmental, technical, political, security-related, and market-related issues that require a new design of the whole chain of design, procurement, installation, operation and maintenance of systems that are needed to provide the needed power to the users of power.

There are tons of lists that require this and that. Take the cyber security aspect: You will find many documents that could help you to procure the right solution. One of the latest documents provides helpful text to write down the needs for “Cyber security of Power Delivery Systems”:

“Cybersecurity Procurement Language for Energy Delivery Systems”

Written by US-Experts and published last year.

Click [HERE](#) for a copy.

Many (likely most) publications on securing our infrastructure are assuming a mainly **hierarchical and centralized Power Delivery and Automation Systems** as described in the following (excerpt from the above document, page 1):

“Energy delivery systems comprise the following:

- The **sensors and actuators** used for **monitoring** and **controlling** energy delivery processes.
- The computer-based systems that **analyze and store data**.
- The **communication pathways and networks** that interconnect the various computer

systems.

Cybersecurity threats, whether malicious or unintentional, pose a serious and ongoing challenge for the energy sector. Today's highly reliable and flexible energy infrastructure depends on the ability of energy delivery systems to **provide timely, accurate information to system operators** and **automated control over a large, dispersed network of assets and components.**"

The cyber security requirements could be lowered dramatically in case we think of a **more de-centralized Power System** that would need **a de-centralized Automation System over a small local system of assets and components – requiring a minimum of operational communication with the next hierarchy level.**

It seems to be in the **interest of manufacturers of network infrastructure** to implement huge systems to control a large, dispersed network of assets and components. Sure: This would require a huge, secure network infrastructure – a huge and long-term business case. Cyber-Security seems to be a **new support programme** to the vendors of communication and automation infrastructure.

As we have experienced, more or less (intended!) simultaneous control commands to a huge number of assets could danger the stability of the power network. I guess that **the risk in using a highly cyber-secure network (for monitoring and control) in a large hierarchical power system** is much bigger than **the risk of a "less" secure network (for monitoring and control) in small de-centralized, self-organizing power systems.**


A cyber-secure network is one issue – the (physical and technical!) architecture of our future Power Delivery System is another.

Why don't we pay more attention to distributed Power Delivery Systems that require distributed monitoring and control? Exchanging measurements, status, settings, and control commands in a huge hierarchical automation system will always be compromised by some people.

Would you trust an avalanche of measurements and status points arriving from millions of sensors communicated in a second? Would you trust that a setting going to millions of controllers will be interpreted in the same way? Or what's about a control commands send out to ALL actuators? The un-thinkable is already a reality. It happened already last year in Bavaria and Austria.

I experienced the mis-interpretation of the power of my green laser pointer when I went through security of an international airport. My pointer has a power of "<1mW". I was near to be arrested because the police officer was reading "one MegaWatt" ... Fortunately I could help to translate "m" to "Milli". Finally I had to check-in the pointer before I could go onboard.

I guess that one of the biggest challenges is to find an architecture of our future power delivery system that requires just a **few or no measurements, status, settings, and control commands being exchanged between millions of interconnected intelligent devices and systems.**

Posted by [Karlheinz Schwarz](#) at [12:38 AM](#) [No comments:](#) 

Labels: [central control](#), [Cyber Security](#), [decentralized](#), [Power Automation](#), [power systems](#), [security](#), [system](#)

Tuesday, March 31, 2015

IEC 61850-9-2 Sampled Values In Use

Quite often people ask me about the application of sampled values according to IEC 61850-9-2 (9-2LE). The sampled values require very solid products (publisher, Ethernet Switches, and subscribers). The recent years have shown that the technology has matured to an extend that applications are already available or underway.

Please find useful links:

Click [HERE](#) for the paper:

Test and Evaluation of Non Conventional Instrument Transformers and Sampled Value Process Bus on Powerlink's Transmission Network

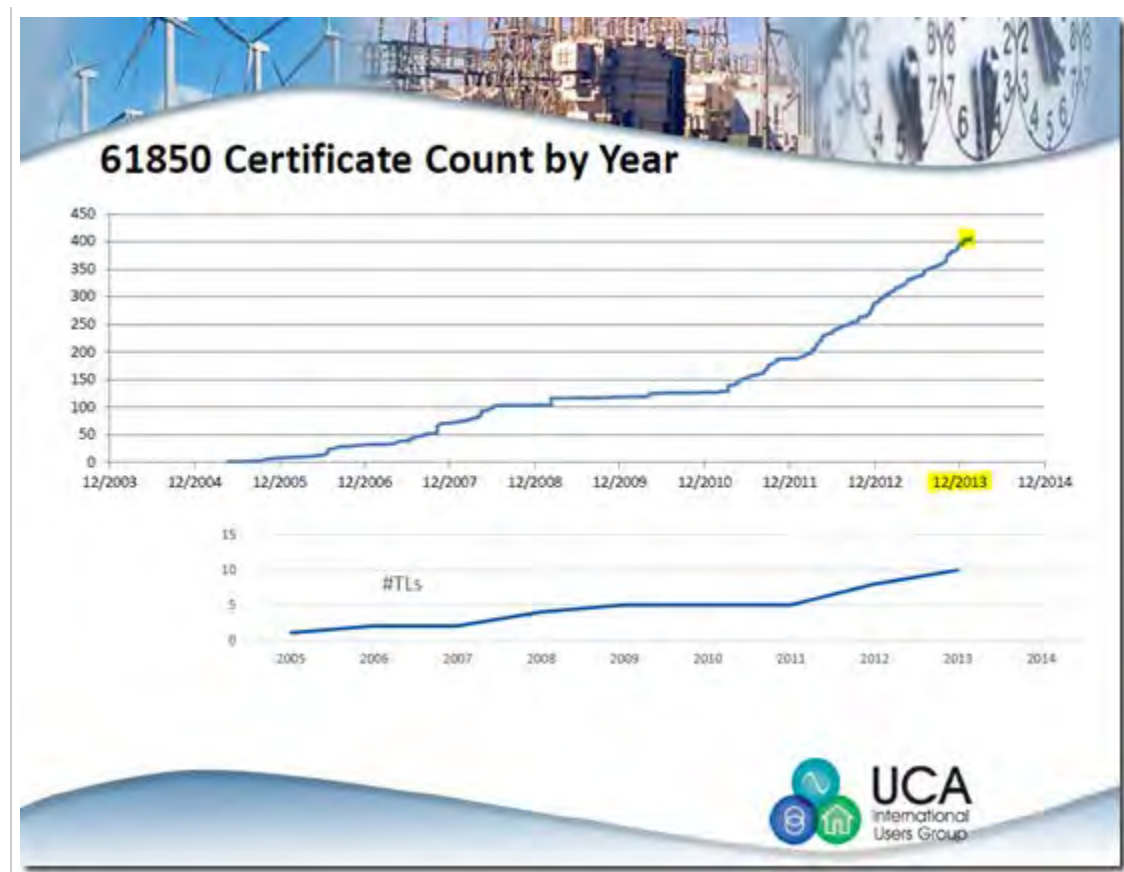
Click [HERE](#) for a related publication:

Australia Leads With Process Bus

Click [HERE](#) for the 9-2LE guideline published by the IEC 61850 community.

More and more 9-2LE compliant IEDs are tested and certified.

There are more than 400 IEDs (Server, clients, publisher) that have been certified by the UCAIug:



Source: [UCAIug](#)

What's about subscriber to sampled values?

Click [HERE](#) for various protection IEDs implementing the subscriber role for sampled values, e.g., Alstom Distance Protection Relay P446, ...

More to come.

Posted by [Karlheinz Schwarz](#) at [1:25 AM](#) [No comments:](#)

Labels: [Alstom](#), [certificate](#), [conformance test](#), [IEC 61850](#), [IEC 61850-9-2](#), [real-time](#), [sampled value](#), [test lab](#), [UCAIUG](#)

IEC 61850-9-3: Precision Time Protocol Profile for Power Utility Automation

IEC TC 57 has published the other day:

IEC/PAS 61850-9-3 (57/1551/PAS):

Communication Networks and Systems for Power Utility Automation –
Part 9-3: **Precision Time Protocol Profile for Power Utility Automation**

Voting terminates on 2015-05-01

The intent of this publication is to present a widely agreed technical solution for a **precision time protocol (PTP) profile of IEC 61588:2009 applicable to power utility automation**. There is urgent need in the power industry for a appropriate profile for power automation application to be defined in IEC 61588. This PAS (Public Available Specification) is intended to temporarily be used as a reference.

This allows to meet the highest synchronization classes of 108 IEC 61850-5 and IEC 61869-9.

Posted by [Karlheinz Schwarz](#) at [12:46 AM](#) [No comments:](#)

Labels: [IEC 61850](#), [IEC 61850-9-3](#), [real-time](#), [time synchronization](#)

IEC 62351-9: Cyber Security Key Management for Power System Equipment

IEC TC 57 has published the following draft standard:

IEC 62351-9 Ed.1 (57/1565/CD):

Power systems management and associated information exchange – Data and communications security – **Part 9: Cyber security key management for power system equipment**


Closing date for comments is 2015-07-03.

IEC 62351-9 specifies how to generate, distribute, revoke, and handle digital certificates and cryptographic keys to protect digital data and its communication. Included in the scope is the handling of asymmetric keys (e.g. private keys and X.509 certificates), as well as symmetric keys (e.g. session keys).

This part assumes that other standards have already chosen the type of keys and

cryptography that will be utilized, since the cryptography algorithms and key materials chosen will be typically mandated by an organization's own local security policies and by the need to be compliant with other international standards. This document therefore specifies only the management techniques for these selected key and cryptography infrastructures. The objective is to define requirements and technologies to achieve interoperability of key management.

Data and communications security are very crucial for the future power delivery system – take the various documents of the series IEC 62351 very serious!

Posted by [Karlheinz Schwarz](#) at [12:32 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [IEC 61850](#), [IEC 62351](#), [key management](#), [security](#)

Friday, March 27, 2015

How to Migrate to Internet Protocol Version 6 (IPv6)?

IEC TC 57 just published a new draft document for a future Technical Report:

IEC 62357-200 TR (57/1563/DTR):
Power systems management and associated information exchange –
Part 200: Guidelines for migration to Internet Protocol version 6 (IPv6)

Application: Utility communications using utility-owned and leased networks, including, but not restricted to communication within substations, from substation to substation, from substation to control center / maintenance center, control center to control center, energy management systems, synchrophasors, distributed and bulk energy generation and storage resources and (including fossil fuel plants and renewables) wind-, and solar power generation, storage, demand side management, and demand response for distribution level consumers / producers.

This draft Technical Report addresses the issues encountered when **migrating from Internet Protocol version 4 (IPv4) to the Internet Protocol version 6 (IPv6)**. It describes migration strategies, covering impact on applications, communication stack, network elements, configuration, address allocation, cyber security, and the related management.

The migration will add new need and require more skills of the engineers. It is highly recommended to have some people that start learning the changes that will come during the next 30+ years.

Maybe you start with a small group as we did in the standardization process 15+ years ago in Seattle (WA) in 1999:



Teamwork makes the dream work!

Be aware that the “network infrastructure” becomes one of the most crucial basics for all other infrastructures.


Would your company's communications infrastructure survive **a blackout like the one in The Netherlands today (2015-03-27)**?

“Dutch electricity network administrator Tennet says that a large part of North Holland province, which is home to some 2.7 million people, was hit by the outage.

Tennet said on its Twitter feed that the outage was caused by a “technical fault” a high-voltage power station in the town of Diemen, just outside Amsterdam.”

[Source: The Independent](#)

I hope it was not caused by an “unknown” GOOSE Trip Message! ... Which – at least – would mean it was not related to TCP/IP ... IPv4 or IPv6. I am kidding! ... a bit.

Posted by [Karlheinz Schwarz](#) at [12:37 PM](#) [No comments:](#) 

Labels: [blackout](#), [IEC 61850](#), [IEC TC 57 WG10](#), [infrastructure](#), [internet](#), [ipv4](#), [ipv6](#)

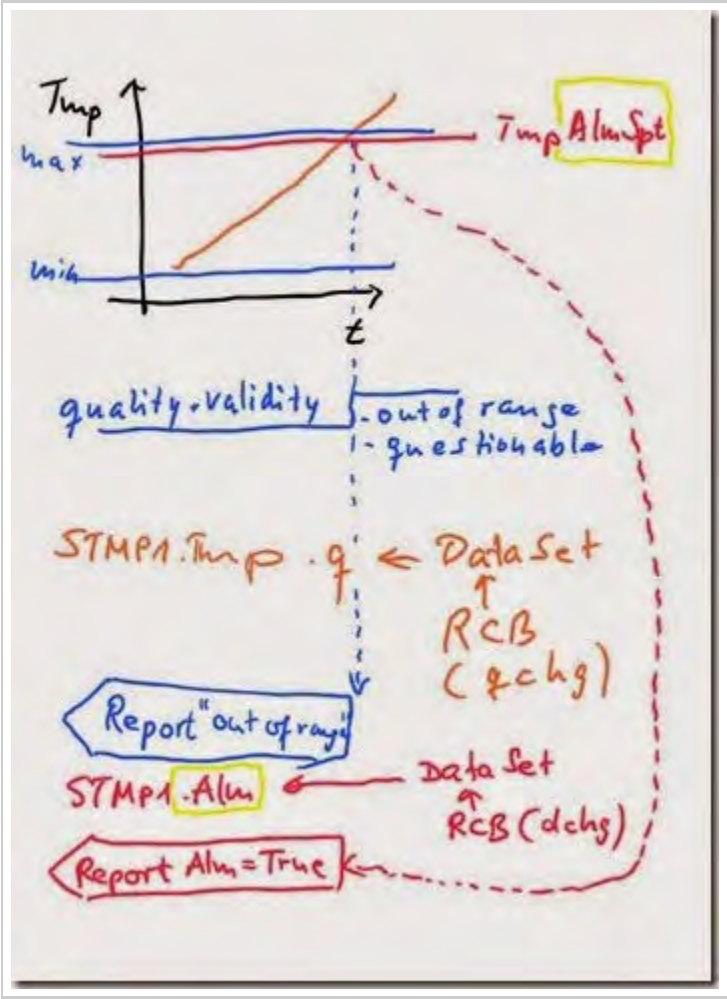
Out-Of-Range Quality Flag and Reporting Quality-Change Event

In addition to the following two discussions that contain a view on measured values:

[What Does Complexity of a Protocol Mean-](#)
[Are you prepared for the Solar Eclipse 2015 on March 20-](#)

I will now look into the possibility to **automatically monitor and report the limit violation** of a measured value using **standard configuration** of IEC 61850 Information Models (LN STMP1), Data Sets and Report Control.

There are two options to report the temperature value reaching the maximum possible value: using the quality information of the "Tmp.q" (configured by the configuration of the "max" value in "rangeC") or the "Alm" (configured by "TmpAlmSpt") as depicted in the following figure:



We need to configure a Data Set and a Report Control Block for each case. In case of using "q" we have to communicate and interpret the "q" value "questionable and out of range" (which is a bit pattern!). In case of using the alarm data object "Alm" we just send and receive a simple Boolean value "True". There is no need to interpret a bit pattern.

For machines it should be no big difference to analyze a bit pattern or a Boolean value.

Both approaches would provide the information that a measured value is higher than a specific limit (max or alarm limit). Which one you would like is up to you.

It is recommended that for specific domains it is specified in a "profile" document, which option to use. Maybe you want to use both: the "q" for asset management and the "Alm" for Automation functions to automatically start a cooling system. The "Alm" could easily be used for GOOSE messaging to inform a wide range of subscribers of the alarm ...

The nice thing is that you can easily configure the multiple options just by SCL !! No programming needed – if the values of "q" and "Alm" are provided by the application.

Lesson learned: First define your need – then design the behavior of your Report and GOOSE messaging. If you don't know what you want to accomplish, no standard can help you.

Posted by [Karlheinz Schwarz](#) at [1:45 AM](#) [No comments:](#)

Labels: [alarm](#), [asset management](#), [data object](#), [data set](#), [IEC 61850](#), [modeling method](#), [models](#), [Reporting](#), [SCADA](#)

Friday, March 20, 2015

Germany Survived the Solar Eclipse 2015 on March 20

During the last days and months there were a lot of discussions and news about a possible blackout during the Solar Eclipse 2015 today. The operators (and the nature) were quite well prepared for the event.

Lesson 1 learned: Nature and Operators did a good job!

Is there another lesson learned? Sure!

Due to the fact that the universe is not made by human beings, we could predict the movement of the sun, the moon and the earth ... and thanks to mathematics we could calculate the impact of the sun on a sunny day like today ...

$$[M_C \text{ to } S_C] = \sqrt{a^2 + 4d^2} \text{ so replace } d \text{ with } \sqrt{\frac{a^2}{4} + d^2}$$

% Overlap at time t is

$$= \frac{2}{\pi} \left[\cos^{-1} \sqrt{d^2 + \frac{a(t)^2}{4}} - \sqrt{d^2 + \frac{a(t)^2}{4}} \sqrt{1 - \left(d^2 + \frac{a(t)^2}{4}\right)} \right]$$

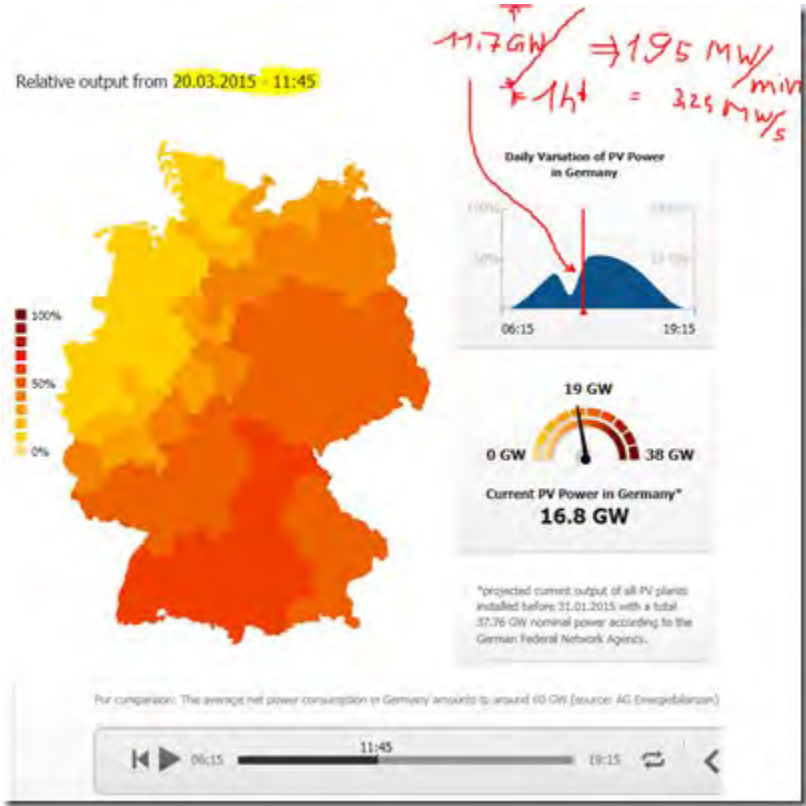
Source: ENTSO-E; click [HERE](#) for further details provided by ENTSO-E.

The first maximum of PV power feed-in of **13.3 GW** was at **9:45 h** today. One hour later the minimum feed-in was **5.1 GW** at **10:45 h**.



Source: SMA, click [HERE](#) for the online data (then select March 20, 2015).

Between 10:45 h and 11:45 h the feed-in **grew by 11,7 GW**. That means **195 MW per minute** or **3,25 MW per second**. The maximum of the day was **20.3 GW** at 12:45 h.



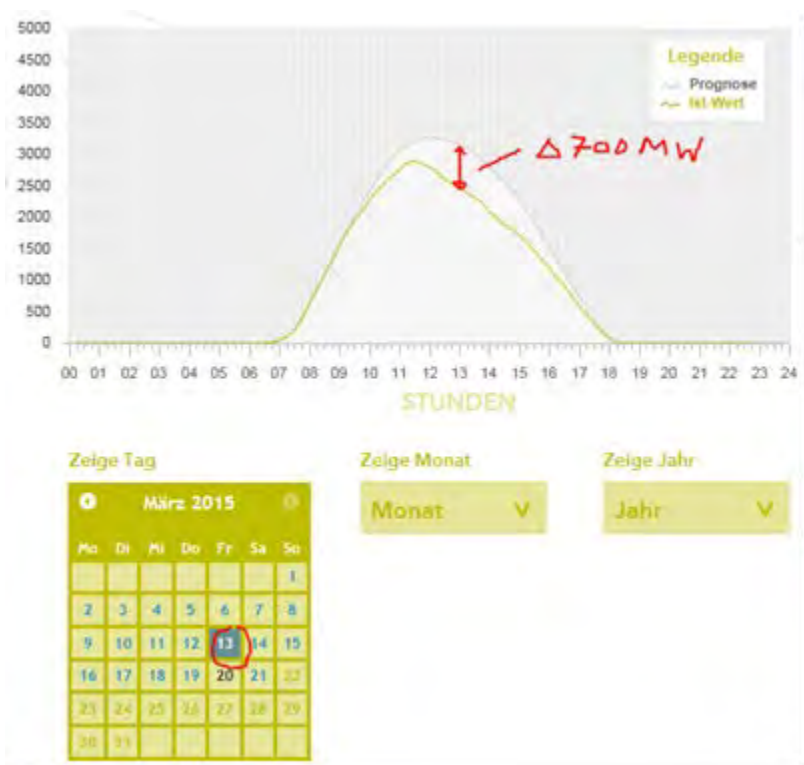
Source: SMA, click [HERE](#) for the online data (then select March 20, 2015).

Note that the forecast was very accurate, as can be seen in the following diagram:



Source: TransnetBW; click [HERE](#) for the online data.

The forecast of March 13, 2015 (one week before) was some 700 MW higher than the actual value for 13:00 h, as can be seen in the following figure:



Source: TransnetBW; click [HERE](#) for the online data.

The transmission companies have spent a lot of money to get a very precise forecast for today – and it worked fine. But these efforts were taken because it was a remarkable day. The forecast may become better – they are still modeling the physical world with laws set by the creator of the nature. The future power system will be impacted by more man-made “laws” that focus more on profit than on physics.

How many power plants have been used today to control the frequency and balance the load and generation? Maybe a few hundred. These power plants are well equipped with remote terminal units and communicate through IEC 60870-5-101 (and some with -104).

The control center are able to control remotely in the context of schedules plant for the day.

Another question is: What if we have to control Millions of decentralized resources (in some years)? What if we have not only 40+ GW Wind Power and 50+ GW PV power installed?? Who will provide the needed schedules for millions of feed-in points? Who and how will we control millions of these resources?

And how will we guarantee that the needed communication links between millions of intelligent devices will operate in a disaster situation? Note: **TODAYs Solar Eclipse was far away from a disaster!**

And what happens if somebody manipulates the information and information exchange? Even if we limit the active control commands to a very few or forbid them at all. We need to exchange at least situational information: current, frequency, voltage, power factor, or ... Who guarantees that the values exchanged can be trusted?

Can we then trust that we know all communication connections that end in a power plant?

You would be surprised if you would start to list the communication assets. As an expert recently said: "I have had the same experience as ... with respect to **finding "unknown" remote access connectivity at almost every facility** I have assessed. These include dial-up modems, wireless access points, and network interface cards that IT and Corporate Engineering did not know existed." Somebody else said: "At another facility we were told that **external connections were always unplugged, but we were able to call the equipment at the phone number we saw posted.**"

The future of our power delivery system is dependent on **millions (instead of hundreds) of power resources**, and on **human beings that may loose the control over the communication infrastructure** or that **may compromise the communication and control systems**.

Lesson 2 (to be learned by all): Take the communication, secure communication, control, secure control, impact of the physics on the power system and other aspects MORE SERIOUS! Think always how to apply standards – I mean real standards like IEC 60870-5-104, IEC 61400-25, IEC 61850, or DNP3.

There is a lot to be accomplished at the engineering level! Power is more than Euros and Dollars ... let's do the job together. We need you all.

All people that have read to this end will agree with me (at least in general).

Thanks for taking your (spare!?) time.

Posted by [Karlheinz Schwarz](#) at [1:51 PM](#) [No comments:](#) 

Labels: [communication](#), [engineering](#), [Power Automation](#), [power generation](#), [power outage](#), [security](#)

Wednesday, March 11, 2015

What Does Complexity of a Protocol Mean?

There is always a discussion on one protocol being more efficient and less complex than another or all other. Does this discussion help? I don't think so.

The key issue is the **"SYSTEM"** – which is **MUCH more than a protocol**.

Let's discuss briefly the **configuration** of a device with regard to reporting a value based on a deadband configuration and the range and multiplier of an analog value.

Usually the deadband values and range configurations and other crucial information are specified in a pdf file or – if you are lucky – in an excel sheet or XML file. So, to interpret a message the receiver has to know the configuration. The tables contained in the pdf file (below) have to be translated by somebody manually ... and how can I find out in 10 years from now, what the limits of the Band width voltage are? Hm. No idea?! Usually you cannot ask the device. So, what now?

I am sorry, if you don't have the pdf you may guess what the limits are – but you don't know. Maybe somebody from the vendor is still there and can answer the question.

[Example](#) of a DNP3 SPECIFICATION - DEVICE PROFILE

Excerpt on deadbands and configuration:

3.5 ANALOG INPUTS Static (Steady-State) Group Number: 30 Static Frozen Group Number: 31 Event Group Number: 32 Frozen Analog Input Event Group Number: 33 Deadband Group Number: 34	Capabilities (leave tick-boxes blank if this data type is not supported)	Current Value	If configurable, list methods:
3.5.4 Analog Inputs Included in Class 0 response:	<input checked="" type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if the point is assigned to a class <input type="checkbox"/> Based on point index (add column to table in part 5)		
3.5.5 How Deadbands are set:	<input type="checkbox"/> A. Global Fixed <input checked="" type="checkbox"/> X. B. Configurable through DNP <input type="checkbox"/> C. Configurable via other means <input type="checkbox"/> D. Other, explain _____ <input type="checkbox"/> Based on point index - column in part 5 specifies which of the options applies, B, C, or D		?
3.5.6 Analog Deadband Algorithm: simple - just compares the difference from the previous reported value integrating - keeps track of the accumulated change other - indicating another algorithm	<input checked="" type="checkbox"/> Simple <input type="checkbox"/> Integrating <input type="checkbox"/> Other, explain _____ <input type="checkbox"/> Based on point index (add column to table in part 5)		

Analog Input points list:

Point Index	Name	Default Class Assigned to Events (1, 2, 3 or none)	Static Variation reported when variation 0 requested or in response to Class polls	Event Variation reported when variation 0 requested or in response to Class polls	Transmitted Value ²		Scaling ¹		Units	Resolution ³	Description
					Minimum	Maximum	Multiplier	Offset			
0	Band width voltage (as percent of nominal voltage)	2	2	2	50	900	100	0	%	1	Configuration of the band width voltage in %
1	Control intentional time delay (in seconds)	2	2	2	10	6000	10	0	s	1	Configuration of the delay time T1
2	Line drop voltage due to line resistance component (ohmic behaviour of the cable)	2	2	2	0	30	1000	0	Ohm/m	1	Configuration of the ohmic resistance load for LDC compensation
3	Line drop voltage due to line reactance	2	2	2	0	30	1000	0	Ohm/m	1	Configuration of the inductive resistance load for LDC

A good thing is, that many vendors publish these files. Sur, you never know if they are up-to-date or applicable for your device you installed some time ago.

The **information models of IEC 61850** provide dedicated **attributes** for a value that provide these meta data like deadband configuration, min, max, multiplier, SIUnit. These attributes could be used in the corresponding SCL file only or they could additionally be exposed by the device and made accessible through a simple read message.

With IEC 61850 in place we could easily expose the limits of power production and load and further attributes. The logical node MMXU (IEC 61850-7-4) could be used for the limits in which a value is valid:

Data Object **TotW** of class **MV** (measured value, IEC 61850-7-3) - Total active power (total P)

could provide the **actual value, quality, range, Scale, limits, units, deadband** in the details provided through the MV CDC:

mag.f	deadband filtered AnalogueValue coded as floating point
q	Quality
range	ENUMERATED normal high low high-high low-low (out of range would change quality value)
rangeC	RangeConfig: hhLim hLim lLim llLim min max
sVC	ScaledValueConfig (scale and offset) for Integer values
db	Deadband filter in % of range (min – max)
units	SIUnit and multiplier

min: the min (minimum) attribute shall represent the minimum process measurement for which values of i or f are considered within process limits. If the value is lower, q shall be set accordingly (validity = questionable, detailQual = outOfRange).

max: the max (maximum) attribute shall represent the maximum process measurement for which values of i or f are considered within process limits. If the value is higher, q shall be set accordingly (validity = questionable, detailQual = outOfRange).

In our case, the TotW for the CHP generator may be limited between **0 W (min) and 35 kW (max)**. A value of “minus 600” MW would have to be flagged as questionable and **outOfRange** !! Negative values and values higher than 35 kW would be flagged **out of range**!

The receiver (a control center) could check the limits of the values (either by reading the range configuration online by a service or getting it from the corresponding SCL file). It could figure out that the **range is 0-35 kW**. Even if the gateway (RTU) would send “minus 600” MW (load) ... the CC could understand that this is a bad value – recommended not to use.

The **ScaledValueConfig** exposes the scale factor and offset value – required to interpret an integer value.

The **deadband db** defines when to report a new value: when a change of the value is “+/- db of the range”: a range of 100 A and db=2000 (2 %) means -> every change of 2 A will be reported; the last reported value was 78 A, then the next report will be issued when the value reaches 76 A or 80 A.

The **units** contain the **SIUnit** (e.g., A) and the **multiplier** (10*0 -> 1).

The meta-data of the measured value serve as a means to help interpreting the plausibility and validation of a value communicated.

To focus on a message “Report a changed value based on a deadband configuration” and discuss which protocol does it more efficient is not helpful! Modbus can communicate the total Power – as can any other protocol. But: HOW to INTERPRET a received value? Is the value within the limits defined for an application? Is the value given in W, kW, MW or GW??

A system should be able to provide more than just A value – all crucial meta data that help to interpret the value are needed in any case. Either you get it – or ...

Please focus on the “System” – a holistic approach is what we need.

This blog post will likely not stop protocol efficiency discussion ... ok. And?

If it makes you happy when you discuss protocol issues ... do it.

Posted by [Karlheinz Schwarz](#) at [11:24 PM](#) [No comments:](#) 

Labels: [complexity](#), [DNP3](#), [efficiency](#), [IEC 61850](#), [Information Model](#), [message encoding](#), [meta data](#), [Modbus](#), [plausibility](#), [protocol](#), [services](#)

Are you prepared for the Solar Eclipse 2015 on March 20?

Why raise such a question on this blog that is about standards like IEC 60870-5-104 and IEC 61850 ...? These are two good questions. Let’s discuss them briefly.

[The Solar Eclipse 2015 and its impact on the power transmission system is discussed these days.](#) The crucial issue is the minute-to-minute power gradient that may exceed between minus 400 MW/minute and plus 700 MW/minute; the highest gradient occurs when the PV in-feed returns at the end of the phase. This gradient may be managed by the TSO or not – who knows. We know it at lunch time on March 20, 2015.

There are many recommendations on the web, how to get prepared: having water, food, ... for up to 10 days or so ... I hope we will not need these.

@Question 2:

There is a need for the TSOs (just four in Germany!) to relay on good measurements from all-over in the grid and secure control possibilities to manage power plant in-feeds and substations. I guess they have good communication systems they can trust. These systems have been developed over many decades. They are tested and run reliably. Still. But what happens in future where we will have hundreds or millions of technical systems (embedded controllers ...) that contribute to the system view and management?? Is this an issue at all?

Yes, it is a crucial issue. Let me discuss the following real-life incident reported last week:

A gateway in a virtual power plant provides the measured load on the network connection point of a CHP (combined heat and power) system. Normally the CHP feeds power into the network. But all in a sudden the VPP/TSO received a signal telling them a jump of the load from 0 MW to 600 MW!! Should the control center responsible for that part of the grid act or not? Hm. If this would be a real jump then it would have to react.

(Un)Fortunately the 600 MW jump was just a jump in the Value communicated!! It was caused by an error in the gateway (RTU kind of device). Was this value plausible? No. Because the CHP could just feed-in – not draw that much power from the grid.

With IEC 61850 in place we could easily expose the limits of power production and load. The logical node MMXU could be used for the limits in which a value is valid:

Data Object **TotW** of class **MV** (measured value) - Total active power (total P)

could provide the **actual value**, **quality**, **range** and the **limits** in the details provided through the MV CDC:

instMag.f	AnalogueValue coded as floating point
q	Quality
range	ENUMERATED normal high low high-high low-low (out of range would change quality value)
rangeC	RangeConfig: hhLim hLim lLim llLim min max

min: the min (minimum) attribute shall represent the minimum process measurement for which values of i or f are considered within process limits. If the value is lower, q shall be set accordingly (validity = questionable, detailQual = outOfRange).

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In our case, the TotW for the CHP generator may be limited between **0 W (min) and 35 kW (max)**. A value of “minus 600” MW would have to be flagged as questionable and **outOfRange** !! Negative values and values higher than 35 kW would be flagged **out of range**!

The receiver (a control center) could check the limits of the values (either by reading the range configuration online by a service or getting it from the corresponding SCL file). It could figure out that the **range is 0-35 kW**. Even if the gateway (RTU) would send “minus 600” MW (load) ... the CC could understand that this is a bad value – recommended not to use.

The meta-data of the measured value serve as a means to help interpreting the plausibility of a value communicated.

IEC 61850 models add very useful information to help (a bit) keeping the power flowing. There are many other physical issues to take into account ... but information and information exchange plays a crucial role!

Posted by [Karlheinz Schwarz](#) at [9:45 PM](#) [No comments:](#) 

Labels: [blackout](#), [IEC 61850](#), [meta data](#), [models](#), [monitoring](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Friday, March 6, 2015

What about security for SCADA systems?

Since the early 80s we have discussions on open systems. I remember well people saying in 1984: If you want open systems – you must be crazy. True! If you don’t shut the doors of the access and let only those in that are allowed to.

There are measures to secure the access – but they have to be implemented and used. There are a lot of concerns about embedded systems on the internet and security.

Read this up-to-date story – and you may not sleep tonight:

Journalists warned system owners and Norwegian NSA of 2500 critical data flaws

How two journalists set out on a mission to test the data security in the whole of Norway

Excerpt:

“Thus far, they have found:

- 290 vulnerable control systems, in banks, schools, nursing homes - and a military camp
- 2048 surveillance cameras in private homes, night clubs, shops and restaurants
- 2500 control systems connected to the Internet with minimal or no security
- 500 of these control industrial or critical infrastructure
- Thousands of data bases and servers that give away content without passwords

These are all found in Norway. Guess if it is any better in your country?”

Click [HERE](#) for the report.

And YOU? Become more serious about security!!! For the good of you and all of us – all over.

And do not blame IEC 61850 not providing security measures! It has: IEC 62351 shall be applied – but you gave to do it! Do it!

<http://blog.iec61850.com/2015/02/standard-iec-62351-3-communication.html>

Posted by [Karlheinz Schwarz](#) at [10:58 PM](#) [No comments:](#) 

Labels: [critical infrastructure](#), [Critical Infrastructure Protection](#), [IEC 61850](#), [IEC 62351](#), [iec 62351-3](#), [SCADA](#), [security](#)

How to get prepared using IEC 61850?

How to get prepared using IEC 61850? This is one of the crucial questions these days. Fortunately there is an increasing number of organizations that understand the challenge with the IEC 61859 technology – and get training and education.

The A.C. electric power system is a very dynamic physical system. Could you remember the exam on Electro Dynamics when you were a student? Oh, don’t remind you ... it was (is) a horror for many electrical engineers – also for me. Even some 40 years later, we have the same **challenge with the dynamics of the electrical system**. It is more complex these days because of the integration of thousands and millions of “power stations” into the system. The need for a good **base knowledge of the electric system** COMBINED with the need to get familiar of using an increasing information exchange to monitor and control the electrical system will be the prerequisites for the future electrical engineers.

I have seen several utilities, vendors, and institutes that are very serious when it comes to the use of IEC 61850 based IEDs in substation designs. A lot of money has been invested in building network simulation systems that can be used in a lab to test IEC 61850 based protection, control and remote monitoring schemas. This is the only way to prove the concepts for a particular application domain. The financial situation of many utilities does not allow to invest into a comprehensive lab.

The education of students is very crucial. I was quite happy to read about a new lab at the **Victoria University (VU) in Melbourne**. They are *“about to become a cornerstone for integrating smart grid technology into Australia’s electricity supply market, with the development of one of the world’s only (if not first) Zone Substation Simulator Centre (VZSSC).*

The Centre will simulate 66 to 22 KV substation environments (specifically a two-transformer zone substation with dual MV buses), control and protection schemes using the IEC 61850 technology standard for the automation and control designs. Whilst a breaker and a half configuration will define the sub-transmission side, the protection and control setup will encompass a specific X & Y protection scheme.”

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 - ▶ [April](#) (10)
 - ▼ [March](#) (10)
 - [IEC 61850-9-2 Sampled Values In Use](#)
 - [IEC 61850-9-3: Precision Time Protocol Profile for...](#)
 - [IEC 62351-9: Cyber Security Key Management for Pow...](#)
 - [How to Migrate to Internet Protocol Version 6 \(IPv...](#)
 - [Out-Of-Range Quality Flag and Reporting Quality-Ch...](#)
 - [Germany Survived the Solar Eclipse 2015 on March 2...](#)
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- ▶ [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

Congratulation to Dr Akhtar Kalam and Graeme McClure that succeeded in convincing enough people to spend money to make this happen!

There is another group of people that need education in IEC 61850: Senior and junior protection and electrical engineers that have long term experience in substation automation, protection, and remote access.

Many of these engineers may have heard some stories about the use of IEC 61850 for power systems – but may have only a chance to read the many parts of the IEC 61850 standards ... good luck. Reading the standards? It is more efficient to get a training conducted by senior engineers that could help you to speed up.


Click [HERE](#) to see what two senior engineers provide: Protection engineer Andrea Bonetti (FMTP) and communication engineer Karlheinz Schwarz.

Click [HERE](#) for a full description of the lab at the Victoria University (VU) in Melbourne.

Additional information of using IEC 61850 and IEC 61499 in Distributed Power Systems .. zone substations ...:

[Distributed Power System Automation With IEC 61850, IEC 61499, and Intelligent Control](#) (Neil Higgins, Member, IEEE, Valeriy Vyatkin, Senior Member, IEEE, Nirmal-Kumar C. Nair, Senior Member, IEEE, and Karlheinz Schwarz, Member, IEEE; IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS, 2010)

[Multi-agent Smart Grid Automation Architecture based on IEC 61850/61499 Intelligent Logical Nodes](#) (G. Zhabelova, V. Vyatkin, Senior Member IEEE; IEEE Transactions on Industrial Electronics, 2011)

Posted by [Karlheinz Schwarz](#) at [10:13 PM](#) [No comments:](#) 

Labels: [education](#), [IEC 61499](#), [IEC 61850](#), [Power Automation](#), [power systems](#), [Substation](#), [Substation Automation](#), [Training](#)

Saturday, February 21, 2015

Neues vom Verein VHPready – E-World Messeerfahrung

Sie finden auf der Website von VHPready sehr interessante Berichte zur Messe E-World und Beiträge:

- das [White Paper](#) zu VHPready 4.0
- ein [Résumé](#) zum E-world Messeauftritt des Industrieforums
- die [Presseinformationen](#) zur E-world
- die [Vortragsfolien](#) zu einem VHPready-Vortrag im „Energy Transition“ Forum der E-world
- eine [Veröffentlichung](#) in den „Energie & Management Powernews“, in der LichtBlick und Fraunhofer FOKUS zu Wort kommen.

Weiterhin ist die Kurzdarstellung der [VHPready Services GmbH \(i.G.\)](#) inzwischen auch auf [Englisch](#) verfügbar.


Einige Aussagen von Besuchern auf dem Messestand:

„Angesichts der vielen auf der Messe gezeigten Szenarien Virtueller Kraftwerke wird die Dringlichkeit von Standardisierung deutlich.“

„Wir haben uns beim Messerundgang schon gewundert, wie die vielen proprietären Lösungen zusammenspielen sollen. Endlich haben wir jemanden gefunden, der sich um die Standardisierung der Kommunikation kümmert!“

„Endlich ein Standard, der auf praktischen Erfahrungen beruht und nicht von anwendungsfernen Technokraten gemacht wurde.“

„Sehr gut, dass Ihr von Beginn an international denkt!“

Posted by [Karlheinz Schwarz](#) at [8:50 PM](#) [No comments:](#) 

Labels: [IEC 60870-5-104](#), [IEC 61850-7-420](#), [VHPready](#), [virtual power plant](#), [virtuelle Kraftwerke](#)

IEC 61850: Protection and SCADA Seminars (updated)

The IEC 61850 applied for several years to many new substation designs all over the world. During the seminar, truly experienced and vendor independent engineers will help you to see and understand how use the core parts of the IEC 61850 standard are applied in **substation design, monitoring, protection and control applications**.

Attendees will learn from a senior protection engineer, how the protection system will improve and understand the crucial lessons learned since the first projects with IEC 61850 in 2004.

Seminar contents:

IEC 61850 Introduction (Edition 1, 2, and 2.1) and experience after 10 years in operation.

Where are we today?

Return of experience, applications and practical demonstrations: Protection and Control in Substation Automation, Engineering and Configuration, Maintenance, Monitoring and SCADA system, Specification of the IEC 61850 protection and control system.

Through the practical demonstrations you will learn: To handle IEC 61850 relay protections from different vendors and their software tools; to be able to efficiently manage flexibility in engineering and interoperability. To use the state of the art IEC 61850 testing tools and equipment to efficiently detect the technical problems and work-out their solutions. To understand SCL files, setup clients and servers for MMS communication to SCADA and RTU Systems All the presentations are supported by practical examples or demonstrations.

The following 3 days special training courses are offered by [FMTP \(Uppsala, Sweden\)](#) and NettedAutomation:

Hong Kong

27-29 April 2015

[Details and registration](#)

Berlin (Germany)

05-07 May 2015

[Details and registration](#)

Bratislava (Slovakia)

18-20 May 2015


[Details and registration](#)

Brussels (Belgium)

08-10 June 2015

[Details and registration](#)

I look forward to seeing you there.

Posted by [Karlheinz Schwarz](#) at [8:24 AM](#) [No comments:](#) 

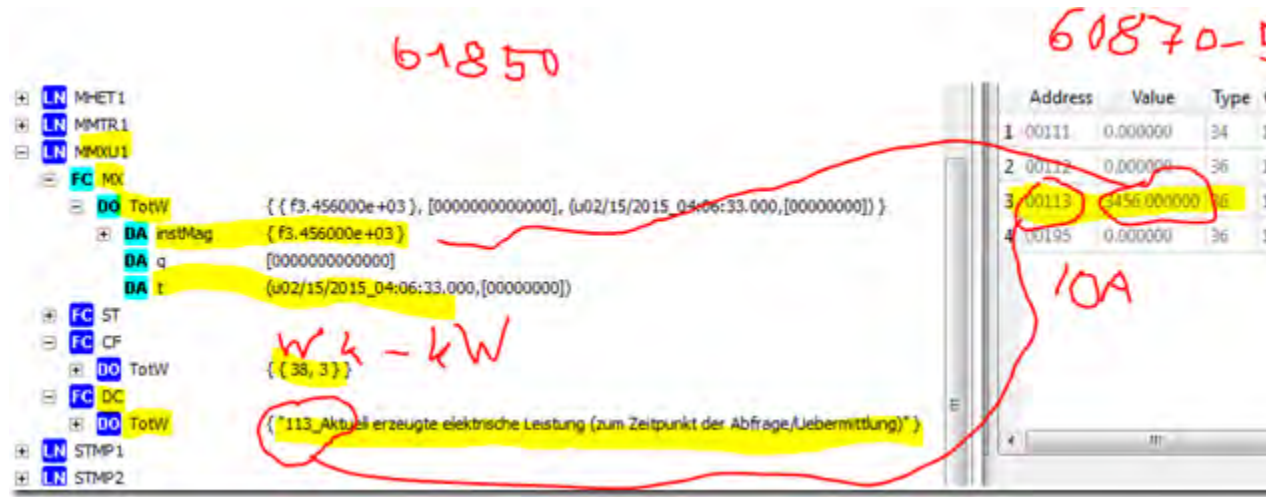
Labels: [DNP3](#), [Edition 1](#), [Edition 2](#), [Edition 2.1](#), [education](#), [iec 60870-5](#), [IEC 61400-25](#), [IEC 61850](#), [protection](#), [SCADA](#), [Training](#)

Saturday, February 14, 2015

VHPready Signal MMXU1.TotW.instMag – versus IOA 113

Signals configured in IEC 61850 and configured in IEC 60870-5-104 look quite different.

The following figure shows the same signal (Current electric Power – Aktuell erzeugte elektrische Leistung) in IEC 61850 (left) and IEC 60870-5-104 (right):



The IEC 61850 model exposes the value, quaity and timestamp as well as the semantic (TotalWatt). The total watt of what? Of the "Current electric Power – Aktuell erzeugte elektrische Leistung" as described in the DC (description of the signal).

On the other side we have the information object address (IOA = 113) that carries the same value in IEC 60870-5-104. What does the value 3456 mean? No idea in IEC 60870-5-104. You have to know upfront what 113 means. IEC 61850 stores the meaning in the device (model).

In the above case we see also the IOA=113 in the description (DC) of the IEC 61850 model. It is a text string attached to the DC attribute.

Posted by [Karlheinz Schwarz](#) at [8:33 PM](#) [No comments:](#) 

Labels: [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEc 61850-7-4 Ed2](#), [modeling method](#), [models](#), [RTU](#), [self-description](#), [VHP Ready](#), [VHPready](#)

Monday, February 9, 2015

IEC 61850 Series is Growing to a Total of 45 Parts

IEC 61850 (Communication networks and systems for power utility automation) is a unique standards series providing a consistent set of standards, draft standards and other IEC publications.

A total of 45 parts cover many application domains in the Power Delivery System. An additional five (5) parts are published under the number IEC 61400-25 (extensions of IEC 61850 for Wind Power).

Document types of IEC:
IS = Standard
TR = Technical Report
TS = Technical Specification

21 Parts are already officially published. 24 draft parts are under preparation. Several drafts will be officially published in 2015.

The list of all documents:

	Title	Status
1	Introduction and overview	TR Ed:2013-03
2	Glossary	TS Ed1:2003-08
3	General requirements	IS Ed2:2013-12
4	System and project management	IS Ed2:2011-04
5	Communication requirements for functions and device models	IS Ed2:2013-01
6	Configuration description language for communication in electrical substations related to IEDs	IS Ed2:2009-12
7-1	Basic communication structure – Principles and models	IS Ed2:2011-07
7-2	Basic communication structure – Abstract communication service interface (ACSI)	IS Ed2:2010-08
7-3	Basic communication structure – Common data classes	IS Ed2:2010-12
7-4	Basic communication structure – Compatible logical node classes and data classes	IS Ed2:2010-03
7-410	Hydroelectric power plants - Communication for monitoring and control	IS Ed2:2012-10
7-410 Add 1	Extension of IEC 61850 information models to also include logical nodes and data models for steam and gas turbines	IS in preparation
7-420	Communications systems for distributed energy resources (DER) - Logical nodes	IS Ed1:2009-03
7-5	IEC 61850 modeling concepts	TR in preparation
7-500	Use of logical nodes to model functions of a substation automation system	TR in preparation
7-510	Hydroelectric plants – Modeling concepts and guidelines	TR Ed1:2012-03
7-520	Use of logical nodes to model functions of distributed energy resources	TR in preparation

8-1	Specific communication service mapping (SCSM) – Mappings to MMS (ISO/IEC 9506-1 and ISO/IEC 9506-2) and to ISO/IEC 8802-3	IS Ed2:2011-06
8-2	Specific communication service mapping (SCSM) – Mappings to web-services	in preparation
9-2	Specific communication service mapping (SCSM) – Sampled values over ISO/IEC 8802-3	IS Ed2:2011-09
9-3	Precision time protocol profile for power utility automation	IS in preparation
10	Conformance testing	IS Ed2:2012-12
10-210	Testing – Interoperability tests for hydro equipment based on IEC 61850	TS in preparation
10-3	Testing – Functional testing of IEC 61850 based systems	TR in preparation
80-1	Guideline to exchange information from a CDC based data model using IEC 60870-5-101/104	TS Ed1:2008-12
80-3	Mapping to Web Services – Requirement Analysis and Technology Assessment	TR in preparation
80-4	Mapping between the DLMS/COSEM (IEC 62056) data models and the IEC 61850 data models	TS in preparation
80-5	Mapping between Modbus and IEC 61850	TS in preparation
90-1	Using IEC 61850 for the communication between substations	TR Ed1:2010-03
90-2	Using IEC 61850 for the communication between substations and control centres	TR in preparation
90-3	Using IEC 61850 for condition monitoring	TR in preparation
90-4	Network engineering guidelines for substations	TR Ed1:2013-08
90-410	Communication network structures in hydro power plants	TS in preparation
90-5	Using IEC 61850 to transmit synchrophasor information according to IEEE C37.118	TR Ed1:2012-05

90-6	Using IEC 61850 for Distribution Automation	TR in preparation
90-7	Object models for photovoltaic, storage and other inverter based applications	TR Ed1:2013-02
90-8	Object models for electrical vehicles	TR in preparation
90-9	Object models for electrical energy storage	TR in preparation
90-10	Object models for schedules	TR in preparation
90-11	Methodologies for modeling of logics for IEC 61850 based applications	TR in preparation
90-12	Wide area network engineering guidelines	TR in preparation
90-13	not yet used	
90-14	Using IEC 61850 for FACTS data modeling	TR in preparation
90-15	IEC 61850 based DER Grid Integration	TR in preparation
90-16	System Management	TR in preparation
90-17	Use of IEC 61850 to transmit Power Quality Data	TR in preparation

In order to keep the crucial contents (mainly models and services) of these parts consistent,

IEC TC 57 WG 10, 17, and 18 have done a tremendous work in converting the crucial contents into UML documents. This allows to extend and maintain the models with support of tools. In future we will see standard documents automatically derived from the UML Models.

Congratulation to all people contributing to this great standard series IEC 61850!

Some 20 years after the IEC TC 57 has decided (in 1995) to write a new standard for substation protection and automation, we see a lot of interest in many different application domains.

In case you need help to understand the many different parts and how they could contribute to solve needs you are faced with today and tomorrow – let me know please.

Even IEC 61850 is a huge Standard Series – it must be accompanied by REAL APPLICATIONS and underlying network infrastructure. The 7 ISO/OSI layers are just a foundation for IEC 61850 – both together are used by applications:



The applications of IEC 61850 can range from a simple polling of a temperature measurement up to comprehensive Schedules to manage distributed energy resources.

By the way: Te cake was very tasty!

Posted by [Karlheinz Schwarz](#) at [12:43 PM](#) [No comments:](#)

Labels: [hands-on Training](#), [iec 60870-5](#), [IEC 61400-25](#), [IEC 61850](#), [modeling method](#), [models](#), [seminar](#), [UML](#)

Saturday, February 7, 2015

Standard IEC 62351-3 “Communication network and system security - Profiles including TCP/IP” published

IEC TC 57 has published the crucial **standard** for security:

Standard IEC 62351-3

Power systems management and associated information exchange - Data and communications security -

Part 3: **Communication network and system security - Profiles including TCP/IP**

Partie 3: Sécurité des réseaux et des systèmes de communication – Profils comprenant TCP/IP




This part of IEC 62351 specifies how to secure TCP/IP-based protocols through constraints on the specification of the messages, procedures, and algorithms of **Transport Layer Security (TLS)** (defined in RFC 5246) so that they are applicable to the telecontrol environment of the IEC. TLS is applied to protect the TCP communication. It is intended that this standard be referenced as a normative part of other IEC standards (e.g., IEC 60870-5, IEC 60870-6, IEC 61850, IEC 61400-25, ...) that have the need for providing security for their TCP/IP-based protocol.

Now it is up to the vendors and users to implement this standard or require it, respectively.

There is no accuse anymore that IEC 61850 has no security measures defined in form of a standard that can officially be referenced.

Click [HERE](#) for the preview of the new standard.

Posted by [Karlheinz Schwarz](#) at [1:38 AM](#) [No comments:](#) 

Labels: [encryption](#), [iec 60870-5](#), [IEC 60870-6](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [iec 62351-3](#), [security](#), [TLS](#)

Thursday, February 5, 2015

Visit Booth of VHPready at E-World 2015 in Essen

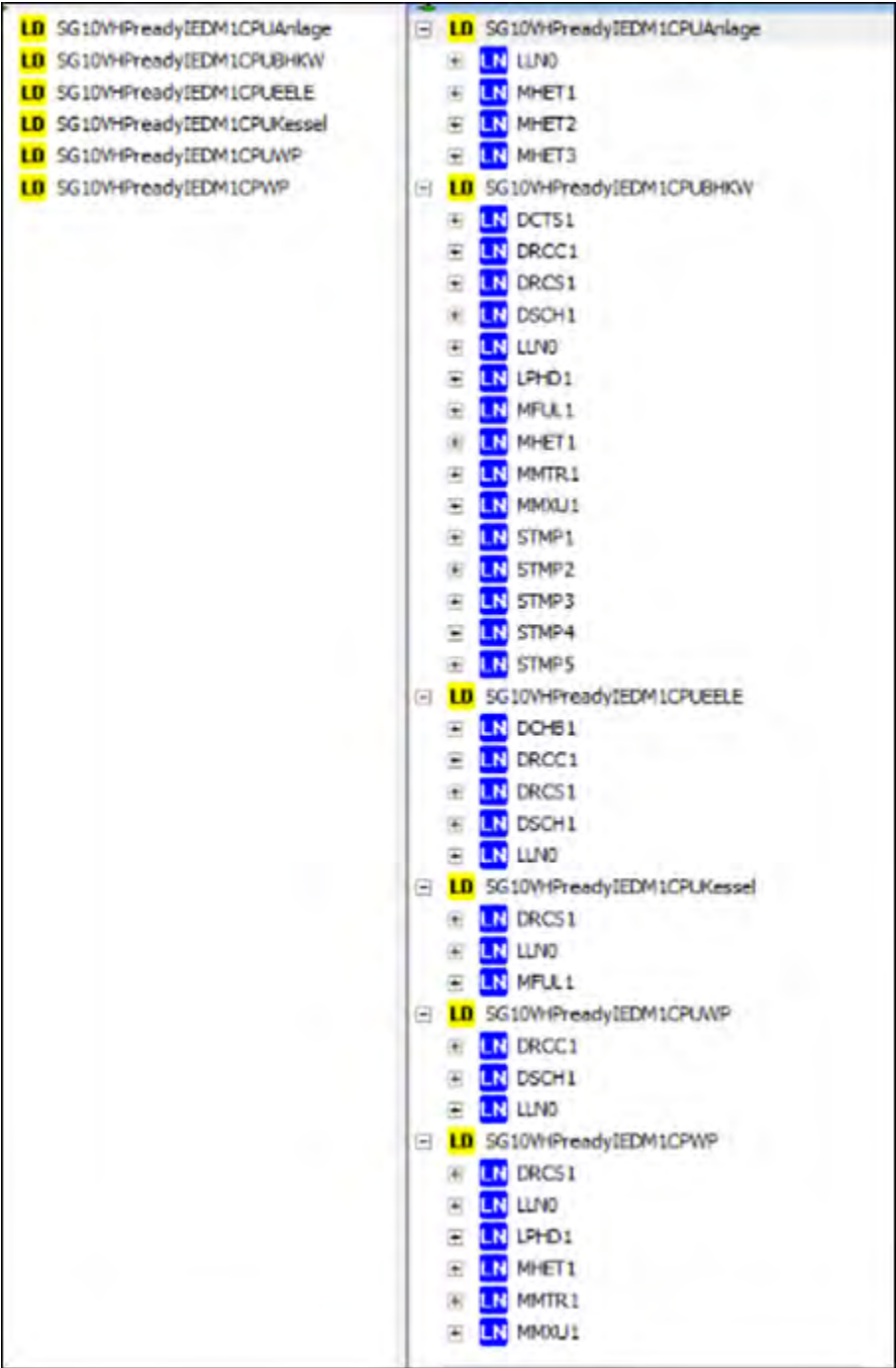
The [industry alliance VHPready e.V.](#) will present the project at the [E-World 2015](#) in

Essen (Gemany)
10. - 12. February 2015
Halle 6, Stand 109

Co-exhibitors are:

- Fraunhofer FOKUS (co-exhibitor)
- Beck IPC GmbH (co-exhibitor)
- SSV Software Systems GmbH (co-exhibitor)
- PHOENIX CONTACT Electronics GmbH (co-exhibitor)

You could see the IEC 61850 (and IEC 60870-5-104) Model of VHPready 3.0 in action ... seen through an IEC 61850 Browser:



Have a look at the booth!

Posted by [Karlheinz Schwarz](#) at [3:26 PM](#) [No comments:](#) 

Labels: [Beck](#), [Fraunhofer Fokus](#), [Gateway](#), [HMS](#), [IEC 61850](#), [Phoenix Contact](#), [SSV](#), [VHP Ready](#), [VHPready](#)

Sunday, February 1, 2015

HMS: Bridging Fieldbus Communication to Power Automation

HMS (one of the most crucial supporter of field busses for industrial and process Automation) brings the **huge installed base of field instrumentation closer to the power automation and vice versa**. With the new approach customers can tap and exchange crucial process information with the most successful power communication standards like IEC 60870-5-104

or DNP3 and others.

HMS provides a new family of products for smart grid applications using IEC 60870-5-104, IEC 61850, Modbus, Profibus, Profinet, HART, ...: The **LABLINE SG gateway family** targets **Demand Response** (networking of industrial electric loads) and **Virtual Power Plants** (networking of energy resources like biogas plants or combined heat and power units) applications.

NettedAutomation’s Motto since 2000 is: **The NET is The Automation**. Networking is really crucial – and also to understand what this all means! Do you know how to bridge the gaps between signals communicated with Profibus DP and IEC 60870-5-104? **HMS has the solution to bridge almost all gaps between factory and process instrumentation field busses and the power world**.

Remote Terminal Unit

The LABLINE SG devices support the communication protocols used in the energy sector, e.g. **IEC60870-5-104**, **DNP3** and **IEC61850**; as well as protocols supported by the electric equipment in the field, e.g. **Modbus** or **M-Bus**. The LABLINE SG gateways can also communicate with industrial fieldbus or industrial Ethernet networks such as Profibus, Profinet or any other industrial network thanks to their [Anybus technology](#).

Smart Gateway

The application logic can be programmed on the device either using a graphical web editor or for more complex applications through the **embedded soft-PLC** from CODESYS compliant to IEC61131-3 standard.

Click [HERE](#) for more details of the new family of products.

More to come.

Posted by [Karlheinz Schwarz](#) at [2:46 PM](#) [No comments:](#) 

Labels: [Anybus](#), [DNP3](#), [Gateway](#), [HART](#), [HMS](#), [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Profinet](#), [proxy gateway](#)

Seminar Schedule of FMTP and NettedAutomation updated

The need for solid education and hands-on demonstrations and hands-on training is more obvious at the beginning of 2015 than ever before.

[FMTP](#) and NettedAutomation have updated their public training courses. The following public courses for the next months are scheduled:

23-25 März	Karlsruhe	Almost Sold Out: 3-tägiges Seminar & Hands-On Training in Deutsch
05-08 May 13-16 Oct	Frankfurt	NEW General Public Courses in ENGLISH
27-29 April	Hong Kong	Special Public Courses in ENGLISH for Protection Engineers and SCADA Applications
18-20 May	Bratislava(Slovakia)	Special Public Courses in ENGLISH for Protection Engineers and SCADA Applications
08-10 June	Brussels (Belgium	Special Public Courses in ENGLISH for Protection Engineers and SCADA Applications

Click [HERE](#) for details.

According to the many enquiries FMTP and NettedAutomation received, we are negotiating with several groups all over.

The most efficient courses are in-house training courses – **appreciated by many well known international companies all over**.

Stay tuned to see updated schedules and news. [Or contact us for more information](#).

Posted by [Karlheinz Schwarz](#) at [1:56 PM](#) [No comments:](#) 

Labels: [2015](#), [FMTP](#), [hands-on Training](#), [IEC 61850](#), [MMS](#), [process control](#), [protection](#), [protocol](#), [seminar](#), [Training](#)

IEC 61850 is more than just a “Future Trend”

A manager from a big Asian power utility wrote me the other day:


“Dear Karlheinz,
... because of the schedule of my visit to the CIGRE2014 session at Paris, also an overseas trip for our protection experts to XXXX at Nanjing and YYYY at Tokyo in late September 2014. For one thing that I could learn from both trips, **IEC 61850 should no longer be called a**

"future trend" for the power industry, as it is already the adapted practice everywhere! Just you know it is always not easy to implement new standards in the utilities, especially talking about some well-established ones ...”.

The standard series IEC 61850 is now available for some 10 years. Many manufacturers of automation systems have implemented a reasonable subset of the standards. It’s in use all over. Don’t worry if your management has still to be convinced to implement or use the standards. It takes some time to get there.

It may happen that in some cases you may have to wait for one or two retirements ...it’ll come.

Note: Haste produces waste. Take your time – in the meantime get yourself and your people trained to understand what it is all about.

Posted by [Karlheinz Schwarz](#) at [8:17 AM](#) [No comments:](#) 

Labels: [Asia](#), [Cigré](#), [hands-on Training](#), [IEC 61850](#), [protection](#), [seminar](#), [Training](#), [utilities](#)

Friday, January 16, 2015

IEC 61850-90-12 “Wide Area Network Engineering Guidelines”

The first draft Technical Report (TR) for the future IEC TR 61850-90-12 has been published the other day (57/1536/DTR):

IEC 61850-90-12 TR: Communication networks and systems for power utility automation - Part 90-12: **Wide area network engineering guidelines**

Voting on this 202 page draft closes 2015-03-13

Wide area networks comprise in this context optical, radio, power line carrier, copper physical layers, with many topologies like rings, trees, and meshed networks, using different protocols (SDH, IP, MPLS, ...), data traffic (packet switching, TDM), and for a variety of applications (protection, SCADA, voice, video, ...) for applications: between substations, between substations and control centers, and between control centers. One crucial aspect relates to **protection data transmission via GOOSE**, and the multicast data exchange of large amounts of **sampled values (SV)**.

The list of normative references is quite long: some 150 documents are listed. Some examples are:

- IEEE 802.1ag, IEEE standards for local and metropolitan area network; Virtual Bridged Local Area Networks Amendment 5: Connectivity Fault Management)
- IEEE 802.1ah, IEEE standards for local and metropolitan area network; Provider Backbone Bridges
- IEEE 802.1Qay, Provider Backbone Bridge Traffic Engineering
- IEEE 802.1x, Port-based Network Access Control
- ITU-T G.0774-04: Synchronous Digital Hierarchy (SDH) - Management of the sub network connection protection for the network element view.
- RFC 3261, SIP: Session Initiation Protocol
- RFC 3376, Internet Group Management Protocol, Version 3

The list of abbreviations comprises some 300 terms from **AAA** (Authentication, Authorization and Accounting (security)) to **ZBFW** (Zone-Based Firewall).

The utilities all over have to get prepared for the huge amount of information to be shared on many different levels from switch gears all the way up to control centers ... for many applications. You have to expect that the content of the IEC 61850-90-12 is a MUST reading for utility experts.

You could find a report that shows the importance of this part to a large utility:

Click [HERE](#) for a 200 page report: Faramarz Maghsoodlou and Jean Raymond, “Cisco and Hydro-Québec Use cases proposal for IEC 61850-90-12, August 2014.”

The DTR contains further implemented use cases.

Posted by [Karlheinz Schwarz](#) at [12:19 AM](#) [No comments:](#) 

Labels: [GOOSE](#), [IEC 61850](#), [IEC 61850-90-4](#), [sampled value](#), [sv](#), [WAN](#), [wide area network](#)

Monday, December 29, 2014

Objectives of IETF EMAN – Energy Management Working Group

The IETF Energy Management (EMAN) defines an Energy Management Framework for **Networked Devices**. Networked Devices could comprise many different devices: Router, Switch, Battery, Printer, ... by the way: the variety of monitoring, control, protection and automation devices in power systems could be understood a “Networked Devices”. So: the scope of IETF EMAN could be quite wide. Yes!

A new document provides the “Applicability Statement” from the IETF viewpoint.

It lists several use-cases for identifying requirements for the framework and MIBs. Further, it describes the **relationship of the EMAN framework to relevant other energy monitoring**


standards and architectures.

One thing is sure: **Electrical Power is one of the crucial issues to be dealt with in 2015 and beyond!**

[Click HERE](#) for the “Applicability Statement”.

On my radar screen I see a lot more IEC 61850 applications that hid the street in 2015! Wherever there is a need to unify the information exchange of crucial information about the electrical system and related information IEC 61850 has them (almost) all standardized.

Please note: The many international standards setting organizations are more or less all independent – this means, every group can define a standard for energy management ... There is one big difference between the various standards available today: IEC 61850 has been defined internationally **by experienced senior Electrical Engineers**.

Posted by [Karlheinz Schwarz](#) at [10:20 PM](#) [No comments:](#) 


Labels: [EMAN](#), [energy management](#), [IEC 61850](#), [ietf](#), [ISO 50001](#), [Power Automation](#), [power systems](#)

Seminar on IEC 61850 for Protection Engineers in Brussels – English and French speaking

Please note for the Seminar scheduled for 16-18 February 2015 in Brussels (Belgium):

NEW SERVICE: Both English and French speaking – Presentations in English and Question/Answers in English and French. We have a native French speaking expert present (Romain Douib, FMTP).

[Click HERE](#) for the course details.

Posted by [Karlheinz Schwarz](#) at [10:59 AM](#) [No comments:](#) 

Labels: [ABB](#), [education](#), [IEC 61850](#), [Megger](#), [protection](#), [SCADA](#), [seminar](#)

Friday, December 19, 2014

Cyber Security in Industrial Automation – Huge list of Links to Crucial Resources

How do you feel at the end of 2014? Save and Secure? Hope you are really doing well.

In case you have some spare time during the days off from the office, here is a huge list of Links that lead to crucial papers, presentations, reports, recommendations, ... in the domain of cyber security for industrial automation systems ... applicable in most power delivery domain.

Click [HERE](#) for the huge list.

Warning: The list comprises several 100 links! More than what you can chew in two weeks!

In case you need to secure your device or system applied in power systems: Contact an expert for power system security ...

In case you don't want to spent days in browsing trough 100 thousand pages ... here is what you may do instead: Study the most common requirement document applied in the German utility industry:

BDEW Whitepaper on Security in Power Systems

The well-accepted dual-language BDEW Whitepaper
- Requirements for Secure Control and Telecommunication Systems
- Anforderungen an sichere Steuerungs- und Telekommunikationssysteme

is now available: [Download Security Whitepaper](#) [pdf].

... this document can also be used to learn German ;-)

Posted by [Karlheinz Schwarz](#) at [9:46 PM](#) [No comments:](#) 

Labels: [BDEW](#), [Cyber Security](#), [security](#)

What to do in case of a blackout? Belgium seems to be prepared

What would you do when lights are OFF during Christmas? How would you get prepared for a brownout or a blackout? Hm ...

In Belgium people are informed officially to look at the four color “energy traffic light”:

DE

- Normale Situation (OK)
- Risiko einer Stromknappheit (Risk of shortage)

- Risiko einer Abschaltung (Risk of load shedding)
- Abschaltung angekündigt (Load shedding planned)

FR

- Situation normale
- Risque de pénurie
- Risque de délestage
- Délestage annoncé

NL

- Normale situatie
- Risico op stroomtekort
- Risico op afschakeling
- Afschakeling aangekondigd

The color of the traffic light at the moment and many tips and hints are posted on the Website: [OFF-ON](#).

Would the website be ON or OFF in case of a blackout?!

The Motto could be summarized: Switch more often OFF to stay ON ... save energy to keep power flowing.

I wish you light during the year-end season ... and in 2015.

Posted by [Karlheinz Schwarz](#) at [12:39 AM](#) [No comments:](#) 

Labels: [blackout](#)

Wednesday, December 17, 2014

IEC Smart Grid Standards Map

IEC has spent some time to list the relevant standards for the many areas of Smart(er) Grids:

<http://smartgridstandardsmap.com/>

When you browse this site, you may wonder to see a list of 301 standards and other official specifications. There are many areas that are related to the 50 Hz or 60 Hz 3-phase electrical power systems:

- Advanced distribution management system
- Advanced metering infrastructure
- Asset management and condition monitoring system
- Blackout prevention system
- Clock reference system
- Communication network
- Communication network management system
- Data modelling
- Demand response / Load management
- Distributed energy resources operation system
- Distribution automation system
- E-mobility system
- EMC & Power quality
- Electric Storage system
- Energy management system
- FACTS for grids
- Generation management system
- Industrial automation system
- Market place systems
- Meter-related back-office systems
- Security
- Smart home and building automation system
- Substation automation system
- Weather forecast

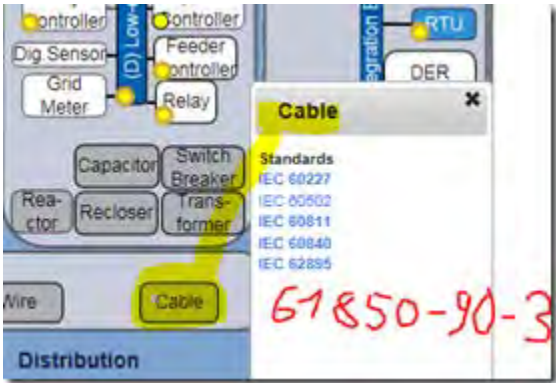
The home page states: “Easily and instantly identify the standards that are needed for any part of the Smart Grid – **no need to be a standards expert**”. Hm, really? There may be no need to be an expert browsing the site – BUT if you are not an expert in standards like IEC 60870-5-10x, CIM, IEC 61400-25, IEC 61850, IEC 62351, ... **then you need to talk an EXPERT. We are here to help you!**

Fortunately, when it comes to information exchange, the many parts of IEC 61850 are the most crucial standards you will find in the list of the 301 standards:

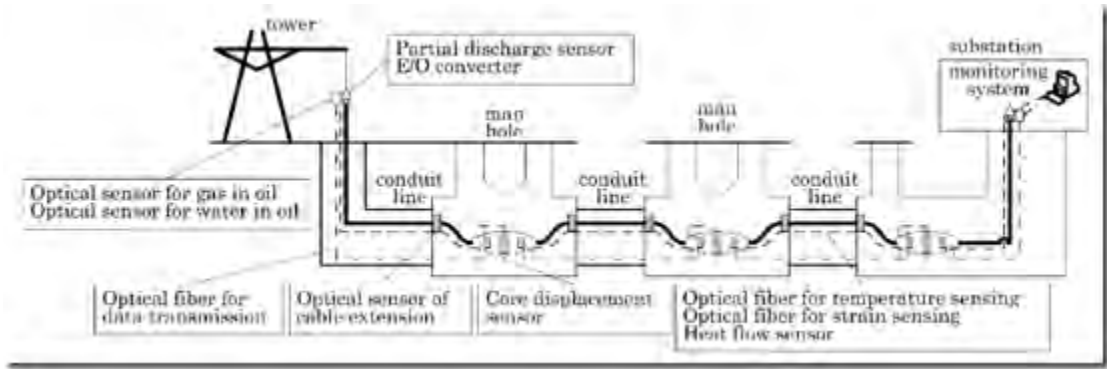
IEC 61850-6	IEC 61850-90-11
IEC 61850-7-1	IEC 61850-90-12
IEC 61850-7-2	IEC 61850-90-13
IEC 61850-7-3	IEC 61850-90-14
IEC 61850-7-4	IEC 61850-90-15
IEC 61850-7-410	IEC 61850-90-2
IEC 61850-7-420	IEC 61850-90-3
IEC 61850-8-1	IEC 61850-90-4
IEC 61850-8-2	IEC 61850-90-5

IEC 61850-80-1	IEC 61850-90-6
IEC 61850-80-4	IEC 61850-90-7
IEC 61850-9-2	IEC 61850-90-8
IEC 61850-90-1	IEC 61850-90-9
IEC 61850-90-10	

I guess, even IEC has not fully understood the impact of IEC 61850 on the power delivery system: So, why is IEC 61850-90-3 missing in the list of standards relevant for cable?



Here is an overview (from draft IEC 61850-90-3) on cable monitoring:



It is impossible to list IEC 61850 in any application domain. The model (LN – Logical Node) STMP (temperature supervision) could be used allover – where ever a temperature is measured. Modeling the temperature in a green house and communication the value with IEC 61850 does not require to list IEC 61850 as a standard for green houses ... ;-)

IEC 61850 is a common standard that covers specific and general models and services.

To understand the impact of IEC 61850: you have to be an expert or you have to ask an expert.

Posted by [Karlheinz Schwarz](#) at 11:57 PM No comments:

Labels: [IEC](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61131-3](#), [IEC 61158](#), [IEC 61400-25](#), [IEC 61850](#), [Smart Grid](#), [smart people](#)

Tuesday, December 16, 2014

2014 comes to a close – wish you the best for 2015

Impressions from Prague (CZ), 2014-12-09 ... after the second day of our training course:



... we saw many happy people there ... enjoying the nice place and the peace.

As 2014 comes to a close, I want to say "Thank You!" for choosing our services, and for the cooperation this year.

I wish you and your family a happy, healthy and prosperous New Year 2015 ... living in peace and harmony!

I look forward to see you next year.

Best Regards,
Karlheinz Schwarz

Posted by [Karlheinz Schwarz](#) at [11:17 AM](#) [No comments:](#) 

Labels: [2015](#), [new year](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Tuesday, December 16, 2014

IEC 61850 in Hydro Power Plants (additional information)

Recently I have [reported about an example](#) of the use of IEC 61850 in hydro power plant.

As I said then: "Be sure: More to come." has become true. Additional information can be found here:

Efacec IEC 61850 automation system is in operation since 2013:

[Document 1](#) (Products)
[Document 2](#) (Projects)
[Document 3](#) (Why IEC 61850?)

Founded in 1948, but with a century-long history, [Efacec](#) is the largest Group in the electric field financed by Portuguese capital. It employs over 3900 people and is present in more than 65 countries, in five continents.

Other vendors will follow soon.

Posted by [Karlheinz Schwarz](#) at [11:11 AM](#) [No comments:](#) 

Labels: [hydro power](#), [IEC 61850](#), [power generation](#), [power plant control](#), [Power Plants](#)

NettedAutomation’s regular IEC 61850 Courses extended to 2 + 2 Days

NettedAutomation GmbH has updated the course agenda early 2014. For 2015 the training will be upgraded: using real devices and solutions (including protection relays and testing equipment) to work with during the public 2+2 days general training course.

Reorganized, extended and improved **program** for the **2 +2 days course**:

- 1 1/2 days **Introduction and Basics**
- 1/2 day **Hands-on training** on SCL

Hands-on training group 1 (SCADA):

- 1 day Configuring and using **Server devices for monitoring and control**
- 1 day Configuring and using **Client devices** for IEC 61850 and gateways

Hands-on training group 2 (Protection; parallel to group 1) - by **Andrea Bonetti** (FMTP):

- 2 days **Impact of IEC 61850 on Protection** (using real protection relays, ...

The next courses are scheduled for

05.-08. May 2015 Frankfurt (Germany)
13.-16. October 2014 Frankfurt (Germany)

Click [HERE](#) for details, program and registration information.

Posted by [Karlheinz Schwarz](#) at [10:57 AM](#) [No comments:](#) 

Labels: [FMTP](#), [hands-on Training](#), [IEC 61850](#), [protection](#), [protocol](#), [SCADA](#), [SCL](#), [seminar](#), [Substation](#), [Substation Automation](#)

Many NEW IEC 618850 Training courses in 2015 – especially for protection engineers

More than 10 years after the first substation have been equipped with IEC 61850 conformant devices, we see now the need for more education. Several new trainers have entered the market.

BUT: What about training for the most crucial engineers in the power delivery system: **Advanced education of the many protection engineers?** They need much more than to understand protocols (MMS, GOOSE, SV) and the configuration language! They need to understand **how IEC 61850 impacts the whole protection system:** When and HOW to use GOOSE for breaker failure protection? How implement interlocking schemas? And how to test systems based on IEC 61850?!? How to ... What you should not do! We could answer all your questions.

These and many other questions **MUST be answered by real protection engineers.** One of the few well (with IEC 61850 experienced) protection engineers is **Andrea Bonetti** ([FMTP](#)).

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 - [NEW DATE for IEC 61850 Seminar in Ecuador: 26.-29....](#)
 - ▶ November (11)
 - ▶ October (12)
 - ▶ September (14)
 - ▶ August (6)
 - ▶ July (16)
 - ▶ June (5)
 - ▶ May (11)
 - ▶ April (5)
 - ▶ March (8)
 - ▶ February (14)

Andrea spent part of his time in Substations!! [Watch his introduction in a 5 min video.](#)

After the first joined course for protection and SCADA engineers in [Prague last week](#), NettedAutomation and FMTP offer several new courses especially for protection and SCADA engineers during the next months:

26-29 January 2015
Guayaquil (Ecuador)

16-18 February 2015
Brussels (Belgium)


09-11 March 2015
Berlin (Germany)

27-29 April 2015
Hong Kong

18-20 May 2015
Bratislava (Slovakia)

Click [HERE](#) for details, program, and registration information.

Other dates and locations are under preparation.

Posted by [Karlheinz Schwarz](#) at 10:48 AM No comments: 

Labels: [ABB](#), [FMTP](#), [IEC 61850](#), [Megger](#), [protection](#), [Training](#)

Friday, December 12, 2014

Protection and Control with IEC 61850 – Very Successful Training in Prague (CZ)

Two crucial application domains for IEC 61850 are the **Power Protection** and **Power Control** – no doubt. What does this mean for the electrical engineers responsible for the reliability of the Power System? A lot!

The first 3 days joint Seminar of FMTP Power and NettedAutomation in Prague, CZ, (8-10 December 2014) was very successful. The Training was held in the Holiday Inn (Congress).



The 3 days were split between presentations and demonstrations of general IEC 61850 issues and special protection issues. The main topics were centered around the impact of IEC 61850 on the protection. Andrea Bonetti (FMTP) used several test tools from ABB and Megger, as well as an ABB protection relay (REL 670):

► [January](#) (11)

► [2013](#) (130)

► [2012](#) (188)

► [2011](#) (159)

► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)



Andrea is one of the developers of the ABB series 670 and the Megger GOOSER. He really knows what he is talking about – when it comes to protection.

The attendees were absolute happy with the many lessons learned during the three days fully packed with experience. Note that Andrea has spent some time of his life in substations – many days and nights ... listen to him next time:

Ecuador, Jan 26-29, 2015
Brussels, Feb 16-18, 2015
China, March 9-11, 2015
Bratislava, Apr 20-22, 2015
Berlin, May 18-20, 2015

Additional courses are in preparation.

Posted by [Karlheinz Schwarz](#) at [11:32 AM](#) [No comments:](#) 


Labels: [configuration](#), [GOOSE](#), [IEC 61850](#), [protection](#), [sampled value](#), [seminar](#), [system configuration](#), [testing](#), [Training](#)

Draft TR IEC 61850-90-2 Substation to Control Center Communication published

The Draft IEC Technical Report: **IEC TR 61850-90-2** – Use of IEC 61850 for the communication between substations and control centres

has been published under 57/1507/DC dated 2014-09-26

This technical report provides a comprehensive overview of the matters that need to be considered in order to use IEC 61850 for information exchange between substations and control or maintenance systems.

Posted by [Karlheinz Schwarz](#) at [2:02 AM](#) [1 comment:](#) 

Labels: [control center](#), [IEC 61850](#), [iec 61850-90-2](#), [RTU](#)

Thursday, December 4, 2014

Fertigungsautomatisierung und Smart Grids

Die Anforderungen an die Kommunikationstechnik in den künftigen Energienetzen ähneln denen in der Fertigungsautomatisierung: Sowohl für die Industrie als auch für die elektrische Energieversorgung ist eine sichere, robuste und zuverlässige Kommunikationstechnik unerlässlich.

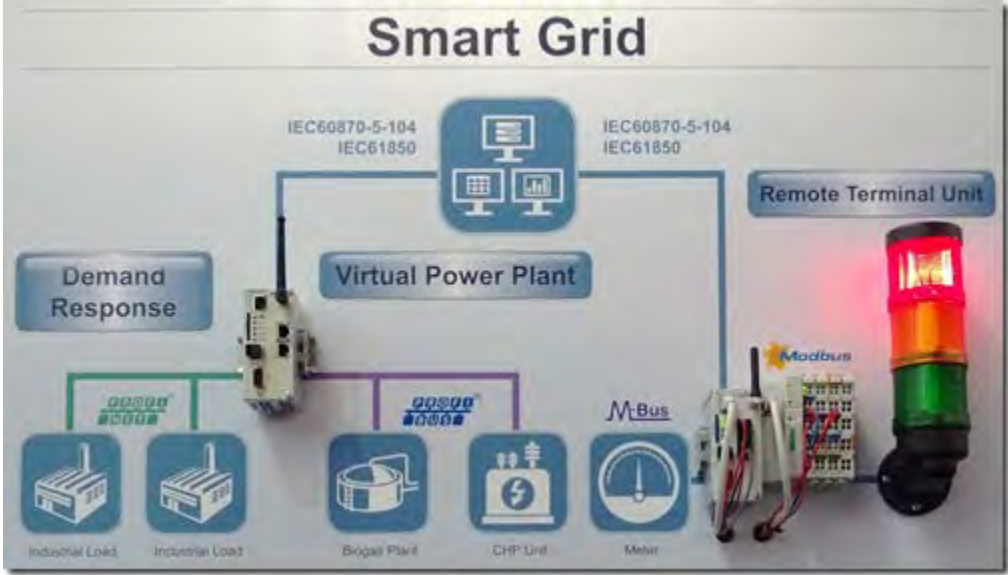
In der **elektrischen Energietechnik werden Normen wie IEC 60870-5-104 und IEC 61850** immer häufiger in Ausschreibungen verbindlich vorgeschrieben. Auch in Fertigungsanlagen spielt die elektrische Energie eine zunehmende Bedeutung (Energiemanagement, Energieeffizienz). Eine schier unendliche Anzahl von Prozessdaten wird über eine Vielzahl von Feldbussen bereits heute feldbus-spezifisch gesammelt. Wie kommen diese Daten in die Leitsysteme der elektrischen Versorgungssysteme?

Ganz einfach: über Gateways, die den Anschluss nach “oben” herstellen!

HMS hat auf der Messe SPS/IPC/Drives letzte Woche in Nürnberg im HMS Innovation Corner gezeigt, wie das mit einfachen Mitteln zu bewerkstelligen ist:



... mit Gateways zu allen relevanten Feldbussen:



In einem Beitrag in der "Energy & Technik" hat Herr Garcés von HMS das Thema näher beschrieben:

- [In Smart Grids wie in der Industrie kommunizieren](#) (Teil 1, mit Link zu Teil 2)
- [Von IEC-61850-Profilen profitieren](#) (Teil 2, Link zu Teil 3)
- [Gateways von der Industrie für Smart Grids](#) (Teil 3, Link zu Teil 4)
- [»SG-gateway«-Familie](#) (Teil 4)

Über die Gateways wächst zusammen, was zusammengehört: Die Energieinformationen aller Ebenen von der Erzeugung, über den Transport, die Verteilung **UND NUTZUNG (in allen Bereichen!)**.

Posted by [Karlheinz Schwarz](#) at [11:46 AM](#) [No comments:](#) [✉](#)

Labels: [Gateway](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#), [process bus](#), [Profinet](#), [Smart Grid](#), [smart solution](#)

VHPready English Website

The Industry Alliance VHPready e.V. is happy to announce that the English website is now online:

www.vhpready.com

The industry alliance VHPready e.V. is committed to the realization of the energy transition ("Energiewende") by creating and using a standardized network of decentralized energy systems.

Standards like IEC 60870-5-104 and IEC 61850 will build the core of the communication system.

The group is growing quite fast ... 25 Members (per 2015-01-01) are supporting the crucial idea that we need standardized information and information exchange in the future energy domain.

Posted by [Karlheinz Schwarz](#) at [3:05 AM](#) [No comments:](#) [✉](#)

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [VHPready](#), [virtual power plant](#)

New Editions for IEC 60870-6 TASE.2 (ICCP) Parts

IEC 60870-6 TASE.2 (ICCP) is a series of standards that are used for communication between control centers. The first parts have been published in the 90s. In the meantime a lot of experiences have been made. These experiences have issued the revision of the documents.

For the following three parts new Editions have been published:

[IEC 60870-6-503:2014](#) Edition 3.0 (2014-07-15)

Telecontrol equipment and systems - Part 6-503: Telecontrol protocols compatible with ISO standards and ITU-T recommendations -
TASE.2 Services and protocol

[IEC 60870-6-702:2014](#) Edition 2.0 (2014-07-15)

Telecontrol equipment and systems - Part 6-702: Telecontrol protocols compatible with ISO standards and ITU-T recommendations -
Functional profile for providing the TASE.2 application service in end systems

[IEC 60870-6-802:2014](#) Edition 3.0 (2014-07-15)

Telecontrol equipment and systems - Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations -
TASE.2 Object models

Please note that the basic technology used for TASE.2 is the same as for IEC 61850: MMS (ISO 9506).

Posted by [Karlheinz Schwarz](#) at [1:11 AM](#) [No comments:](#) 

Labels: [IEC 60870-6](#), [MMS](#), [TASE.2](#), [TASE.2 ICCP](#)

Tuesday, December 2, 2014

Monitoring the Battery of the Boeing Dreamliner 787 would have helped to prevent damages

I guess you remember the trouble Boeing was faced with when the huge battery packs in the Dreamliner 787 some two years ago. The Auxiliary Power Unit Battery Fire was likely caused by several severe “cell internal short circuiting and the potential for thermal runaway of one or more battery cells, fire, explosion, and flammable electrolyte release”.

More precise Condition Monitoring would have helped to prevent such incidents – and would have shown very early that the design of the battery system was quite fragile.

One of the findings (page 91 of the released incident report) is:

“More accurate cell **temperature measurements** and **enhanced temperature and voltage monitoring and recording** could help ensure that excessive cell temperatures resulting from localized or other **sources of heating could be detected and addressed in a timely manner to minimize cell damage.**”

Click [HERE](#) for the complete official NTSB report.

Monitoring batteries is very crucial the more our life depends on these systems – in airplanes, in substations, power stations, mobile systems, communication infrastructure ... It is not sufficient to have a battery – the batteries must be maintained, tested from time to time, and monitored continuously.

Two groups (I am aware of) have defined Battery Monitoring information models:

1. IEC 61850-90-9 (Use of IEC 61850 for Electrical Storage Systems)

Excerpt of the battery system (without further discussion):

3.1LN: Battery Management SystemName: DBMS

DBMS class			
Data name	CDC	Explanation	M/O/C
LNName		Shall be inherited from Logical-Node class (see IEC 61850-7-2)	
System logical node data			
		LN shall inherit all mandatory data from common logical node class	M
		Data from LLN0 may optionally be used	O
Status information			
OpMode	ENS	Operating mode:	M
		Value	
		Explanation	
		0	
		Not applicable / Unknown	
		1	
		Standby	
		2	
		Charging	
		3	
		Discharging	
		4	
		Balancing	
		5	
		Maintenance charge	
		6	
		Error	
		99	
		Other	
WhRem	ASG	Energy capacity at last full charge	O
VHiLim	ASG	Highest allowed DC bus voltage at present operating state	M
VLoLim	ASG	Lowest allowed DC bus voltage at present operating state	O
ChgALim	ASG	Highest allowed charging current at present operating state	M
DisALim	ASG	Highest allowed discharging current at present operating state	M
OvrVALm	SPS	Module/cell overvoltage alarm	O
UndVALm	SPS	Module/cell undervoltage alarm	O
OvrTmpAlm	SPS	Module/cell over temperature alarm	O
UndTmpAlm	SPS	Module/cell under temperature alarm	O
ChgOvrAAIm	SPS	Charge current limit alarm	O
DisOvrAAIm	SPS	Discharge current limit alarm	O
ShCtAlm	SPS	Module/cell short circuit alarm	O
EqTms	ASG	Time to next equalisation	O
EqDurTms	ASG	Duration of next equalisation	O
ChgRampLim	ASG	Highest allowed charge ramp rate	O
DisRampLim	ASG	Highest allowed discharge ramp rate	O
Measured values			
MaxCelTmp	MV	Highest cell temperature	O
MaxCelV	MV	Highest cell voltage	O
MinCelTmp	MV	Lowest cell temperature	O
MinCelV	MV	Lowest cell voltage	O

} Report on change

2. IETF EMAN (Energy Management)

Definition of Managed Objects for Battery Monitoring / draft-ietf-eman-battery-mib-13

```
batteryTable(1)
+--batteryEntry(1) [entPhysicalIndex]
+-- r-n SnmpAdminString batteryIdentifier(1)
+-- r-n SnmpAdminString batteryFirmwareVersion(2)
+-- r-n Enumeration batteryType(3)
+-- r-n Unsigned32 batteryTechnology(4)
+-- r-n Unsigned32 batteryDesignVoltage(5)
+-- r-n Unsigned32 batteryNumberOfCells(6)
+-- r-n Unsigned32 batteryDesignCapacity(7)
+-- r-n Unsigned32 batteryMaxChargingCurrent(8)
+-- r-n Unsigned32 batteryTrickleChargingCurrent(9)
+-- r-n Unsigned32 batteryActualCapacity(10)
+-- r-n Unsigned32 batteryChargingCycleCount(11)
+-- r-n DateAndTime batteryLastChargingCycleTime(12)
+-- r-n Enumeration batteryChargingOperState(13)
+-- rwn Enumeration batteryChargingAdminState(14)
+-- r-n Unsigned32 batteryActualCharge(15)
+-- r-n Unsigned32 batteryActualVoltage(16)
+-- r-n Integer32 batteryActualCurrent(17)
+-- r-n Integer32 batteryTemperature(18)
+-- rwn Unsigned32 batteryAlarmLowCharge(19)
+-- rwn Unsigned32 batteryAlarmLowVoltage(20)
+-- rwn Unsigned32 batteryAlarmLowCapacity(21)
+-- rwn Unsigned32 batteryAlarmHighCycleCount(22)
+-- rwn Integer32 batteryAlarmHighTemperature(23)
+-- rwn Integer32 batteryAlarmLowTemperature(24)
+-- r-n SnmpAdminString batteryCellIdentifier(25)
```

Click [HERE](#) for the EMAN draft for Battery Monitoring.

Battery monitoring could safe life!

Posted by [Karlheinz Schwarz](#) at 7:25 AM No comments:

Labels: [batteries](#), [condition monitoring](#), [IEC 61850-90-9](#), [ietf](#), [MIB](#), [monitoring](#)

Monday, December 1, 2014

NEW DATE for IEC 61850 Seminar in Ecuador: 26.-29. January 2015

Please note the new date for the IEC 61850 Seminar for Protection and Control is scheduled

for:

26 - 29 JANUARY 2015

LOCATION: GUAYAQUIL (ECUADOR)

The focus is on protection and control in HV/MV substations using typical Relays, Tools, GOOSE, SV, SCADA and SCL Language

Click [HERE](#) for details and registration information.

Posted by [Karlheinz Schwarz](#) at [12:22 AM](#) [No comments:](#) 

Labels: [control](#), [IEC 61850](#), [protection](#), [seminar](#), [Substation](#), [Substation Automation](#)

Wednesday, November 26, 2014

IEC 61850 Protection & Control Seminar on 8-10 December in Prague: GET a 25 per cent last call Discount

As a kind of an early Seasonal gift, you could receive a 25 per cent discount of the attendance fee for the following seminar:

PROTECTION AND CONTROL WITH IEC 61850

3 DAYS SEMINAR WITH PRACTICAL DEMONSTRATIONS

PRAGUE, CZECH REPUBLIC, DECEMBER 8TH – 10TH

With focus on protection and control in HV/MV substations using GOOSE, SV, SCADA and SCL Language

Teachers:

Mr. Andrea Bonetti (FMTP Power AB)

Mr. Karlheinz Schwarz (NettedAutomation GmbH)

Click [HERE](#) to receive a **25 per cent discounted attendance fee** [pdf, 530 KB]

Posted by [Karlheinz Schwarz](#) at [10:47 AM](#) [No comments:](#) 

Labels: [control](#), [GOOSE](#), [IEC 61850](#), [protection](#), [sampled value](#), [SCADA](#), [SCL](#), [seminar](#), [Substation](#), [Substation Automation](#), [Training](#)

Friday, November 21, 2014

Can IEC 61850 be Applied in the Industrial Automation Domain?

Sure: It can. Why? Because IEC 61850 uses native standards like Ethernet, Ethertype, TCP/IP, UDP/IP, XML, MMS, ... defines a dictionary of common information models, like MMXU (electrical measurements of a 3-phase AC system) that are applicable wherever a 3-phase AC System provides measurements like phase voltage or phase-to-phase voltages.

A motor with 3 phases is a motor with 3 phases everywhere! Or?

A very interesting paper by Dustin Tessier (Canada) discusses that IEC 61850 could be used in the power and industrial domain:

The Dual-Domains of IEC 61850 – Power vs Industrial Domains

“ ... Despite the popular belief that the “power” domain and “industrial” domain have intrinsically unique principles, this paper suggests **the gap is decreasing**, and through the use of IEC 61850 we can adopt a single strategy that capitalizes on a common technology platform.

... Whether it’s the SAS, DCS or PLC applications, these all share a **common goal of collecting, processing, distributing and visualizing the data.**

... No longer is the day where we ask, **"Is this an industrial product or a utility product?",** and the same applies to system integration services. **IEC 61850 may have been designed for the power domain, but it won't be long before we see it revolutionize the industrial domain."**

Click [HERE](#) for the paper [pdf, 100 KB]

Wherever there is electricity, IEC 61850 will be be involved one way or the other!

Click [HERE](#) for further discussion on the topic: Industrial and Power domain.

Posted by [Karlheinz Schwarz](#) at [10:36 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [industrial automation](#), [Power Automation](#), [power systems](#)

Tuesday, November 18, 2014

New Models for Condition Monitoring: IEC 61850-90-3

IEC TC 57 just published a very comprehensive document (draft technical report, 57/1522/DTR) of 150 pages that suggests a lot of new models:

IEC 61850-90-3 TR:
Communication networks and systems for power utility automation –
Part 90-3: Using IEC 61850 for condition monitoring diagnosis and analysis

The CMD (Condition Monitoring Diagnosis) which diagnoses power grid health status has been one of the major issues to improve the reliability of the power system by preventing a potential failure in advance. Since **too many different information modeling, information exchange, and configuration techniques for CMD** in various forms from many vendors are currently used, they need to be standardized in TC57.

The new document contains a lot of new Logical Nodes and Data Objects like for:

- GIS (Gas Insulated Switchgear)
- Transformer
- Load Tap Changer (LTC)
- Under Ground Cable (UGC)
- Transmission Line (TL)
- Auxiliary Power System

Example of an extension of the very common Model for a tank (KTNK):

LevMaxSet - Maximum level reached setting
LevHlfSet - Half level reached setting
LevMinSet - Minimum level reached setting

LevMax - Maximum level reached
LevHlf - Half level reached
LevMin - Minimum level reached

Voting terminates on 2015-01-16

More to come.

Posted by [Karlheinz Schwarz](#) at [1:29 AM](#) [No comments:](#) 

Labels: [condition monitoring](#), [critical infrastructure](#), [health](#), [IEC 61850-90-3](#), [monitoring](#)

COSEM Object Model (IEC 62056) carried with IEC 61850 Data Model

IEC TC 57 has just published a very interesting new draft (57/1521/CD):

IEC 61850-80-4 TS:
Communication networks and systems for power utility automation - Part 80-4:
Translation from COSEM object model (IEC 62056) to the IEC 61850 data model

The IEC 61850 is already THE international Standard series when it comes to (electric) power applications and information modeling and exchange. Metering Information is quite often exchanged with DLMS and COSEM:

[COSEM \(Companion Specification for Energy Metering\) is part of the DLMS \(Device Language Message Specification\)](#)

This information needs to be “fed” into the IEC 61850 world. That is done by defining how the corresponding COSEM information can be wrapped with IEC 61850 Logical Nodes and Data Objects. The title says: Translated ... which means the same.

Here is an example:


IEC 61850 Data	COSEM OBIS Code	Explanation
TotVAh	(1-b:9.8.0.255) – (1-b:10.8.0.255)	Net apparent energy
TotWh	1-b:1.8.0.255 - 1-b:2.8.0.255 (+A - -A)	Net real energy
TotVARh	1-b:3.8.0.255 - 1-b:4.8.0.255 (+R - -R)	Net reactive energy
SupWh	1-b:1.8.0.255 (+A)	Real energy supply (default supply direction: energy flow towards busbar and is equivalent to Energy Export[+])
SupVARh	1-b:3.8.0.255 (+R)	Reactive energy supply (default supply direction: energy flow towards busbar and is equivalent to Energy Export[+])

DmdWh	1-b:2.8.0.255 (-A)	Real energy demand (default demand direction: energy flow from busbar away and is equivalent to Energy Import[-])
DmdVARh	1-b:4.8.0.255 (-R)	Reactive energy demand (default demand direction: energy flow from busbar away and is equivalent to Energy Import[-])

These IEC 61850 Logical Nodes are of interest for the translation:

- MMTR - Metering 3 Phase
- MMTN - Metering Single Phase
- MMXU - Measurement
- MMXN - Non-phase-related measurement
- MMDC - DC measurement
- MSQI - Sequence and imbalance
- MHAN - Non-phase-related harmonics or interharmonics
- MHAI - Harmonics or interharmonics
- MFLK - Flicker measurement

Closing date for comments: 2015-02-20

Posted by [Karlheinz Schwarz](#) at [1:13 AM](#) [No comments:](#) 

Labels: [COSEM](#), [data object](#), [DLMS/COSEM](#), [Gateway](#), [IEC 61850](#), [iec 61850-80-4](#)

Wednesday, November 12, 2014


HMS offers IEC 60870-5-104 and IEC 61850 Gateways to Industrial Communication

Some four weeks ago I [reported that HMS](#) offers Smart Grid solutions that support building a power network for the future.

In the meantime HMS has posted more details on their corporate website.

One of the most interesting news is, that the LABLINE SG gateways can also communicate with industrial fieldbus or industrial Ethernet networks such as Profibus, Profinet or any other industrial network thanks to the HMS [Anybus technology](#).

Click [HERE](#) to link to the new web pages.

Posted by [Karlheinz Schwarz](#) at [4:43 AM](#) [No comments:](#) 

Labels: [Anybus](#), [DNP3](#), [fieldbus](#), [Gateway](#), [HMS](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Profinet](#)

Monday, November 10, 2014

What does IEC 61850 mean for Power Systems?

A lot. There are many different approaches to describe the benefits. You can start with the System Specification Description (SSD according to part IEC 61850-6, SCL) and go down to the signals and communication. Or you can describe it bottom-up. I like the bottom-up approach:

1. Take a **signal** (e.g. Voltage phase A in kV) coming trough a serial Modbus (Address 12122) by polling into an IEC 61850 Server device
2. Give it a **NAME** (MyMMXU1.PhV.phsA) based on a STANDARDIZED Structure (Logical Node MMXU), and
3. Use the **protocol** (MMS, ISO 9506) to just poll the current value with a MMS Read.

We may have 10 bays with each providing the voltage phase A: then we could model this as follows:

Bay1MMXU1.PhV.phsA
Bay2MMXU1.PhV.phsA
Bay3MMXU1.PhV.phsA
...
Bay10MMXU1.PhV.phsA

That's some basic benefit ... for a first ""brief introduction".

In addition (there are many other features to look at), e.g.:


1. MMS allows to retrieve the **Signal List** (device model comprising all logical nodes ...) ...
2. The system configuration language (SCL) allows to **carry the "signal list" in form of an XML file** ...
3. SCL could carry the **complete signal flow** between any device in a system: who has which signal to offer, who needs which signal, how are signals carried between the many devices (real-time, non-realtime ...) ...

- 4. SCL could carry the **single line diagram** (topology) of an electrical system ...
- 5. SCL could carry how the **information is related to the single line diagram** ...
- 6. ...

So, does IEC 61850 add to the complexity of power systems? No that much! See also:

<http://blog.iec61850.com/2014/10/does-iec-61850-add-complexity-for.html>

Be aware: There is more than IEC 61850 that has to be learned, understood and managed!

Posted by [Karlheinz Schwarz](#) at [12:16 AM](#) [No comments:](#) 

Labels: [configuration](#), [IEC 61850](#), [models](#), [real-time](#), [SCADA](#), [SCL](#)

Wednesday, November 5, 2014

IEC 61850 Devices installed worldwide by Siemens: 300.000

The amount of IEDs installed in China (see post of yesterday) is amazing: some 10.000 by each of the major vendors ... in some 10.000 substations (by 2013).

Siemens reported that they have installed 300.000 already:

Siemens reported in 2010:
As the world’s leading supplier of IEC61850 installations with over 1,000 reference sites,

Siemens was proud to deliver the first IEC61850 installation for a transmission utility in Australia

http://www.siemens.com.au/files/Energy/Distribution/ea_cs_electranet.pdf


and in 2012: Siemens has the largest installed base worldwide:
more than 200,000 Siemens devices with IEC 61850 are in operation around the globe.

http://www.energy.siemens.com/MX/pool/hq/energy-topics/standards/iec-61850/IEC61850_e.pdf

and in 2014: More than 300,000 devices with IEC 61850 are in operation around the globe

<http://w3.siemens.com/smartgrid/global/en/products-systems-solutions/smart-communication/pages/iec-61850.aspx>

These figures speak for themselves.

Posted by [Karlheinz Schwarz](#) at [11:52 AM](#) [No comments:](#) 

Labels: [China](#), [IEC 61850](#), [sales](#), [Siemens](#), [worldwide](#)

Tuesday, November 4, 2014

IEC 61850 in China: More than 10,000 Substations with IEC 61850 Devices in Operation

One of the many responses to my newsletter dated 04 November 2014 informed me about the BIG SUCCESS of IEC 61850 in China.

In a 2 page fact sheet dated October 2014 the authors report that by now **more than 10,000 Substations** in China (35KV to 1000kV) are equipped with IEC 61850 compliant devices. The top four vendors have **each more than 10,000 IEC 61850 compliant devices** in operation.

I guess there have been more than **100.000 IEC 61850 compliant devices** installed in the first 10 years after first substations equipped with IEC 61850.

More to come.

Click [HERE](#) for the 2 page fact sheet.

Posted by [Karlheinz Schwarz](#) at [9:49 PM](#) [No comments:](#) 

Labels: [China](#), [IEC 61850](#), [Substation](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Tuesday, November 4, 2014

New Training in Ecuador: Protection and Control with IEC 61850

FMTP and NettedAutomation (in cooperation with Power Technologies, Lima, Peru) offer a new crucial Seminar:

PROTECTION AND CONTROL WITH IEC 61850 4 DAYS SEMINAR WITH PRACTICAL DEMONSTRATIONS

LOCATION: GUAYAQUIL (ECUADOR)
DATE: 16 - 19 DECEMBER 2014

With focus on protection and control in HV/MV substations using typical Relays, Tools, GOOSE, SV, SCADA and SCL Language.

The IEC 61850 standard has been applied for several years to many new substation designs all over the world. It provides a compact solution, flexibility in engineering and installation and interoperability between devices from different manufacturers.


During the seminar, truly experienced engineers will help you to see and understand how use the core parts of the IEC 61850 standard are applied in substation design, engineering, configuration, communication methods for real-time information exchange, monitoring, protection and control applications.

You will learn all crucial lessons learned since the first projects with IEC 61850 in 2004.

Seminar content:

- IEC 61850 Introduction (Edition 1, 2, and 2.1) and experience after 10 years in operation. Where are we today? What to expect for the next year?
- Return of experience, applications and practical demonstrations:
- Protection and Control in Substation Automation
- Engineering and Configuration
- Maintenance
- Monitoring and SCADA system

Click [HERE](#) for details and contact information [pdf, 370 KB]

Posted by [Karlheinz Schwarz](#) at [8:11 AM](#) [No comments:](#) 

Labels: [control](#), [IEC 61850](#), [protection](#), [seminar](#), [Training](#)

IEC 61850 in Hydro Power Plants

I have been asked recently about the application of IEC 61850 in Hydro Power Plants. Yes, there is growing interest to apply IEC 61850 conformant monitoring and control systems in the hydro domain.

A nice presentation from (Ingeteam Power Technology S.A.) with the title

HYDROELECTRIC POWER PLANTS AUTOMATION USING IEC 61850:
EXPERIENCES AND IMPROVEMENTS FOR THE USER
presented in April 2014

closes with the statement that “**IEC 61850 is a valid solution** for hydro power plant automation ... **More than 10 IEC 61850 hydro projects** mainly in Spain.”

Click [HERE](#) for a nice presentation [pdf, 0.5 MB]

The use of IEC 61850 for conventional power plants is also growing. I have conducted several training courses in 2014 for engineers working in the power plant business.

Be sure: More to come.

Posted by [Karlheinz Schwarz](#) at [7:32 AM](#) [No comments:](#) 

Labels: [control](#), [hydro power](#), [IEC 61850](#), [iec 61850-7-410 Edition 2](#), [monitoring](#), [power generation](#), [Power Plants](#)

Monday, November 3, 2014

UCAIUG Interoperability Report (Munich 2013) available – And Now?

IEC 61850 defines Modeling Methods, Information Models, Abstract Services, Service Mapping to MMS, Configuration Language to specify a whole System composed of several substations

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et cetera. Some 10 years after the publication of the first edition of the core parts (3, 6, 7-1, 7-2, 7-3, 7-4, 8-1 and 9-2) we expect the edition 2.1 of the core documents early 2014. There is a lot of progress during these 10 years of applications!

The well accepted tissue process has helped to increase the consistency of the various parts of the series and to help to reach a high level of conformity of devices and tools:

www.tissues.iec61850.com

In addition to Conformance tests it is obvious that Interoperability is one of the crucial issues that is expected by the users community. Many organizations are involved to further increase the Interoperability between the products provided by many vendors. One major step towards a higher level of interoperability is the [UCAIUG](#) Interoperability Test Session that was conducted at TÜV SÜD (Munich, Germany) the week of 27. October – 01. November 2013.

Click [HERE](#) to download the 240 page Report [pdf, 5.8 MB].

One of the crucial lessons I (and many other experts) have learned trough my long-term involvement in the standardization groups and more than 200 training courses is this: In case you are planning to use the new (IEC 61850) Technology in one of your next projects:

1. Get **education and training** from neutral trainers
2. Purchase or lent the devices and tools you are about to use in the real world: protection & control devices, SCADA systems, RTUs, Network Infrastructure like Switches and Routers, and Tools ... and **test them as a kind of “Multivendor Interoperability Test”**
3. You can speed up this process by cooperating with FMTP Power Systems and NettedAutomation: **They could come to you and provide the most well known and used devices and Tools and introduce Theory and Practice!!**
This helps to keep the cost low – you don’t need to figure out what to purchase ... and how to use the Technology when you start.
You would get the right support for a fast start ... the most efficient way!

Please check these dates and locations:

Special Protection & Control Hands-On Training: 08.-10. Dec 2014 in Prague (Czech Republic)	Click HERE for the details
Special Protection & Control Hands-On Training: 16.-19. December 2014 in Guayaquil (Ecuador):	Click HERE for the details [pdf]
Common Hands-On Training in German: 24.-26. November 2014 (Karlsruhe) 12.-14. Januar 2015 (Karlsruhe) 23.-25. März 2015 (Karlsruhe)	Click HERE for more details

I look forward to meeting you there.

Posted by [Karlheinz Schwarz](#) at [8:32 AM](#) [No comments:](#) 

Labels: [conformance](#), [conformance test](#), [education](#), [hands-on Training](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [protection](#), [SCADA](#), [tissues](#), [Training](#), [TÜV SÜD](#), [UCA](#), [UCAIUG](#)

Friday, October 24, 2014

IEC 61850 Server integrated in CODESYS Development System, Version 3.5 Service Pack 3 or later

3S-Smart Software Solutions GmbH (Kempten, Germany) has developed a **CODESYS IEC 61850 Server** that is completely integrated in the CODESYS Development System and provides implementation for users according to the first version of the standard.

Intelligent electronic devices (IEDs) according to IEC 61850 can be configured directly from the CODESYS Development System and employed as **servers** in energy networks. The configured servers render real generated data from the network units (IED) into messages and reports that can be used for further processing by connected IEC 61850 clients.

Minimum software requirements are:

- CODESYS Development System, Version 3.5 Service Pack 3 or later
- IEC 61850 server library adapted to the runtime system, in order to be able to use the SNTP

Click [HERE](#) for more details.

It is likely that IEC 61850 will be used more often in the factory automation and process control applications – because CODESYS is well known in these domains.

Posted by [Karlheinz Schwarz](#) at [10:36 AM](#) [No comments:](#) 

Labels: [CoDeSys](#), [IEC 61400-25](#), [IEC 61850](#), [PLC](#), [Programmable Logic Controller](#), [server](#)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

IEC 61850 ICD Designer update available

A new update of SystemCorp’s IEC 61850 ICD Designer is available for download: Version 2.00.011

Upgrade / installation:
<http://licenses.systemcorp.com.au/downloads/ICDDesignerSetupV2.00.011.exe>

Standalone version:
<http://licenses.systemcorp.com.au/downloads/ICDDesignerStandaloneV2.00.011.zip>

This is the same version available on the SystemCorp website “Demo”. All versions will operate as a demo if the dongle is missing. The demo version becomes the full version when a dongle is present.

The latest documentation is Revision 2.01 (contained in the above uploads):

SystemCORP

Embedded Technology Pty Ltd



IEC 61850 ICD Designer 2

User Manual

Revision:	2.01
Revision History:	1.00 Initial release 1.01 Document Clean-up <i>DR</i> 1.02 New Logical Nodes 1.03 Updated Quick Validate 2.00 Updated to Edition ½ compatible version and client configuration options added 2.01 Added General Description of Server, Client, Reports and GOOSE
Creation Date:	30 October 2013
Last Revision Date:	26 June 2014

The latest ICD Designer offers several new features – worth to test.

Posted by [Karlheinz Schwarz](#) at [12:52 AM](#) [No comments:](#) 

Labels: [CID](#), [configuration](#), [free download](#), [ICD](#), [IEC 61850](#), [SCL](#), [SystemCorp](#)

Thursday, October 23, 2014

Neu: IEC 61850 Seminar und Hands-On-Training in Deutsch (in Karlsruhe)

NettedAutomation GmbH hat seit 2003 weltweit über 200 Seminare im Zusammenhang mit IEC 61850 und IEC 60870-5-104 durchgeführt. Diese Seminare wurden in Englisch gehalten. Mittlerweile ist das Interesse an Seminaren und Trainingskursen im deutschsprachigen Raum so groß, dass NettedAutomation jetzt auch einen **Trainingskurs in Deutsch** anbietet.

Nachdem über 3.700 Experten aus 800 Firmen und 80 Ländern in Englisch geschult wurden, haben Sie jetzt die Möglichkeit, das gerade neu aufgebaute **dreitägige (deutschsprachige!) Seminar mit Theorie und viel Praxis** in Karlsruhe zu einem günstigen Preis buchen! **Es besteht auch die Möglichkeit, nur den ersten Tag mit der Einführung und Übersicht zu einem absolut niedrigen Preis zu besuchen.**

24.-26. November 2014 (Karlsruhe)
12.-14. Januar 2015 (Karlsruhe)
23.-25. März 2015 (Karlsruhe)

Am ersten Tag wird ein Überblick über das Normungsumfeld und die einzelnen Normen gegeben. Im Mittelpunkt stehen dabei die grundlegenden Eigenschaften und Bedeutung der Normenreihe IEC 61850 für Engineering, Datenmodellierung, Datenmodelle, Kommunikationsmöglichkeiten, Sicherheitslösungen sowie deren internationale Umsetzung und Akzeptanz.
Am zweiten und dritten Tag werden Details behandelt und mit praktischen Übungen an realen Geräten begleitet. Ein Teil der eingesetzten Lösungen und Werkzeuge können auch nach dem Training weiter verwendet werden. Es wird vor allem die Frage behandelt: Was bedeutet der Einsatz dieser Normen für Hersteller von Geräten und Systemen, für die Systemintegratoren und die Anwender?

[Hier für weitere Details, Programm und Anmeldeunterlagen klicken.](#)

[Hier gelangen Sie zu weiteren Seminar- und Trainingsangeboten.](#)

[Hier finden Sie mehr Informationen über meine Erfahrungen und weltweiten Einsätze](#) [pdf, 3.9 MB] zur Unterstützung von Anwendern, Herstellern und vielen anderen Leuten ... und weitere hilfreiche Einblicke in den Markt für Smart Grids und IEC 61850.

Posted by [Karlheinz Schwarz](#) at [11:52 AM](#) [No comments:](#) 

Labels: [deutsch](#), [Deutschland](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [seminar](#)

Wednesday, October 22, 2014

Approved for Publication as Standard: FDIS IEC 62351-3 Communication network and system security – Profiles including TCP/IP

The following document has been approved by 100 per cent of the IEC TC 57 national committees:

FDIS IEC 62351-3 (57/1498/FDIS):
Power systems management and associated information exchange – Data and communications security – Part 3: **Communication network and system security – Profiles including TCP/IP**

Click [HERE](#) for some additional details.

Posted by [Karlheinz Schwarz](#) at [8:04 AM](#) [No comments:](#) 

Labels: [DNP3](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 62351](#), [iec 62351-3](#), [security](#)

Tuesday, October 21, 2014

Smart grid in Denmark 2.0: IEC 61850 and CIM are crucial

The following interesting report has been published recently:

Smart grid in Denmark 2.0
IMPLEMENTATION OF THREE KEY RECOMMENDATIONS
FROM THE SMART GRID NETWORK

One of the key areas is related to information standards. The report summarizes on:

THE MOST IMPORTANT STANDARDS

Internationally, two standards for Smart Grids are singled out in particular, each including a number of part-standards and related standards. **One is the IEC 61850** standard, which was originally developed for substations but which has today been developed to cover a wide range of other areas, e.g. DER units. The information model in IEC 61850 is based on the so-called Logical Nodes, whereby information can be structured in a harmonised way. **The other standard is the IEC 61970** standard, which was originally developed for control centre environments, but which today, via related standards, covers a wide range of system activities in the power system, for example electricity markets. The information model in IEC 61970 is called the Common Information Model - CIM. The two information models are being harmonised with a view to defining a combined information model for the entire power system and its associated components and processes.

Click [HERE](#) for the report.

Posted by [Karlheinz Schwarz](#) at [1:01 AM](#) [No comments:](#) 

Labels: [CIM](#), [decentralized](#), [Denmark](#), [DER](#), [IEC 61850](#), [IEC 61970](#), [Smart Grid](#)

How to Generate IEC 61850 IED Models?

IEC 61850-6 (SCL – System Configuration Language) supports the design, engineering and configuration of systems ... systems composed of many IEDs (Intelligent Electronic Devices). One key question is: How can I define a model of an IED?

Big vendors like ABB, GE, Siemens, ... have their own vendor-specific tools. What’s about third-party tools? Or even freely available tools?

The following tools may be used for free (with some restrictions):

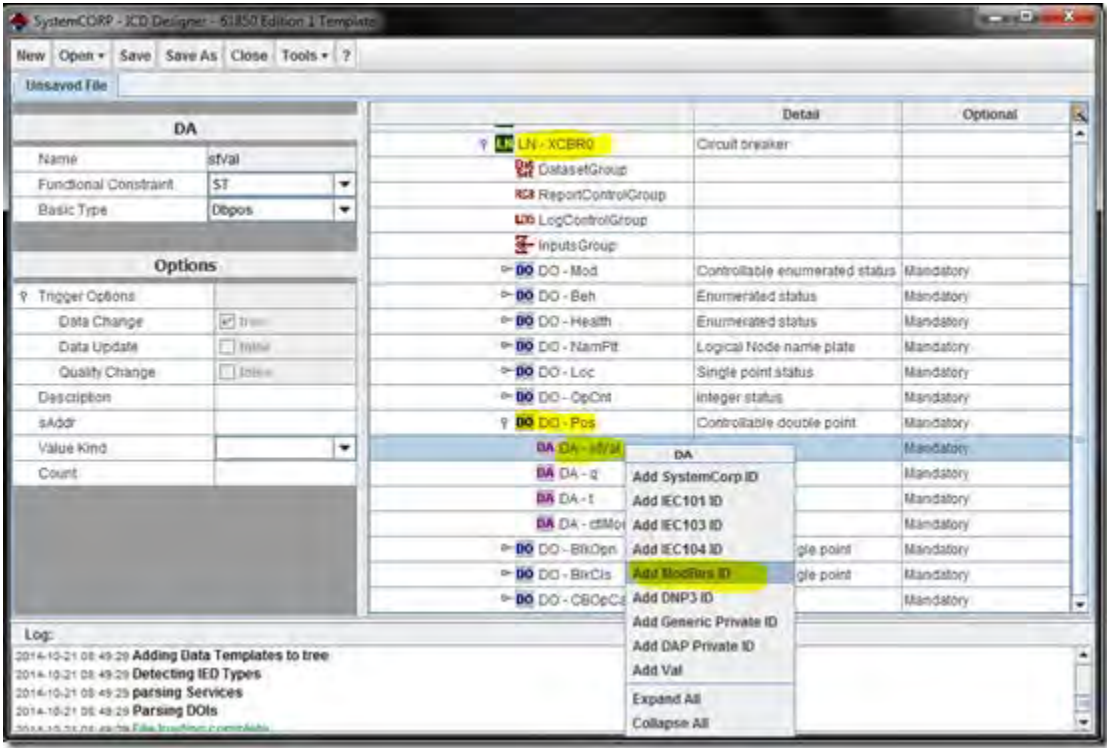
IEDmodeler from RedWind:

IED Modeler is a tool free for use as long as you have an **access to the internet** and **accept their license** ... The program is free of charge for **non-profit purposes** including teaching and research at universities, colleges and other educational institutions, research at non-profit research institutions, and personal non-profit purposes.

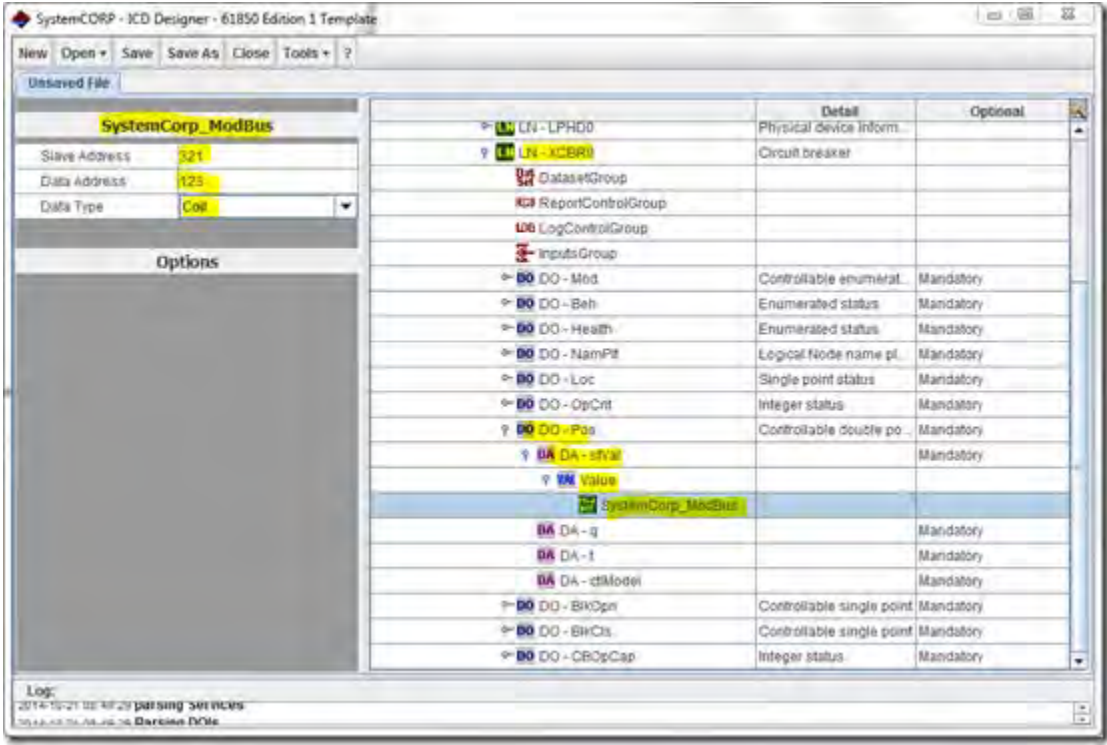
Click [HERE](#) for more information.

ICD Designer from SystemCorp:

The ICD Designer can be used to model IEDs according to Edition 1 and Edition 2 of the core parts of IEC 61850. In addition to modeling IEDs it can be used to bind Models to real applications: bind the "XCBR2.Pos.stVal" to a specific memory location or to a Modbus Coil:



The "Pos.stVal" can be bound to a Modbus Slave:



This binding allows automatic configuration of the IEC 61850 Stack/API and binding to the corresponding Modbus device at address 321.

Other bindings are supported: DNP3, IEC 60870-5-104, ...

The ICD Designer can be used to simplify the application of the [SystemCorp IEC 61850 Stack/API](#).

Click [HERE](#) for more information on the ICD Designer. The ICD Designer can – of course – also be used for creating CID Files.

Posted by [Karlheinz Schwarz](#) at 12:05 AM No comments:

Labels: [CID](#), [configuration](#), [DNP3](#), [engineering](#), [Gateway](#), [ICD](#), [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 61850-6](#), [Modbus](#), [SCL](#), [SystemCorp](#)

Saturday, October 11, 2014

Does IEC 61850 Add Complexity for Technicians in Power Utilities?

This week I was asked the question in the title during an introduction of IEC 61850 to some 15 utility experts. My response was not just yes or no. Initiated by that question I thought it would be of interest to discuss this issue on the blog.

We have to understand that the expected complexity in power system information exchange has at least the following three crucial aspects:

1. **Complexity of the network infrastructure** (independent of protocols defined and used by standards like IEC 60870-5-104, DNP3, IEC 61850, IEC 61400-25, ...). The infrastructure used and discussed these days seems to explode! Compared to dial-up-links and fixed land lines used usually for remote access of something, the application of Switched Ethernet, Ethernet, VPN, VLAN, TCP/IP, UDP/IP, GSM, UMTS, LTE, ... requires a **good understanding of your needs** and the **various solutions** that could be used.
2. **Complexity of standards** (like IEC 60870-5-104, DNP3, IEC 61850, IEC 61400-25, ...) that use the above infrastructure.
3. **Complexity of communication software and application interfaces** between applications and communication software, and **complexity of engineering and configuration tools**.

In many cases I have experienced that users do have little **understanding what they really need!** And may even have **lesser knowledge about the various solutions, how to use them** for their systems, and to understand **how they impact the dynamics** of the whole system!

I have talked to many people that have complained about the complexity of protocols ... but usually we figured out that the complexity was caused by a bit of everything ... and mainly by the fact that people tend to NOT TRUST the chain of solutions from, e.g., a control system application to an API of a front-end, front-end application, protocol API, protocol IEC 60870-5-104, TCP/IP, VPN, GPRS, RTU, interface between RTU and remote application, and remote application.

Here is an example I have experienced recently (with the topology based on GPRS as listed above):

1. The control system does not trust that the information exchange with the RTU is reliable and available. Therefore the control system sends Pings every 2 seconds.
2. The front-end application does not trust that the RTU is reliable and available. Therefore the front-end applications issues a 104 control command (toggle bit) every 10 seconds ... just to see if the 104 protocol is still alive.
3. The front-end application does not trust (even it figures out that the RTU is available) that the remote application is really receiving a parameter setting for a function in the remote application. Therefore the remote application copies a received setting value to another 104 information object and sends a spontaneous message with the just received setting value.
4. The protocol IEC 60870-5-104 exchanges flow control messages to acknowledge the received messages (in both directions).
5. TCP uses flow control messages and keep alive messages ...


So, what do you think about such a bunch of deep mistrusts? Do you think that such a system would work properly and reliable?

I guess that there are many huge GAPS: in the understanding of **the NEEDs, the various links** in the chain like **the dynamics** of a system using, e.g., **GPRS, ... the APIs, the applications** ...

I recommended to the audience that there is a crucial need for: **MORE EDUCATION !!**

A screw driver is not sufficient for future power delivery systems. And: Ignoring IEC 61850 is not sufficient to get the job done! IEC 61850 solutions can be very easy for simple needs.

You can experience it – if you want! Let me know!

Posted by [Karlheinz Schwarz](#) at [3:01 AM](#) [1 comment:](#) 

Labels: [complexity](#), [education](#), [Ethernet](#), [Ethernet switches](#), [GPRS](#), [GSM](#), [IEC 60870-5-104](#), [network infrastructure](#), [TCP/IP](#), [Training](#)

Just Published: Resilience and Security Recommendations for Power Systems with Distributed Energy Resources (DER)

IEC TC 57 just published a Proposal of an IEC Technical Report (57/1514/DC) on

Resilience and Security Recommendations for Power Systems with Distributed Energy Resources (DER) Cyber-Physical Systems (proposed **IEC TR 62351-12**)

Comments are expected by 2015-01-16

While recognizing that the resilience of the power system to anomalous conditions has many components and extends far beyond the impacts of DER systems, the focus of this document is the role of DER systems in grid Resilience, including:

- **DER System Resilience:** The cyber security and engineering strategies for designing and installing DER systems to provide DER resilience to anomalous power system events and cyber attacks.
- **Grid Resilience for Planning with Significant Numbers of DER Interconnections:** The cyber security and engineering strategies for promoting grid resilience by studying the impact of and planning for interconnecting DER systems with the grid to promote grid resilience.
- **Grid Resilience for Operations with Significant Capacity of DER Generation and Storage:** The cyber security and engineering strategies for operating the grid with significantly large numbers and capacities of DER systems that can impact grid reliability and security.

It is highly recommended to review this document during the draft stage. It is more convenient to revise the draft now ... than waiting until the document has been published as a final document. **The content is very important for the future of power systems.**

[Contact your national committee](#) for more information.

Posted by [Karlheinz Schwarz](#) at [2:09 AM](#) [No comments:](#) 

Labels: [bl](#), [blackout](#), [IEC 62351-12](#), [power outage](#), [resilience](#), [security](#)

Just Published: Draft IEC 61850-90-10 Objects for Scheduling

IEC has just published the following document (57/1510/DC):

Draft IEC TR 61850-90-10 – Communication networks and systems for power utility automation – Part 90-10: **IEC 61850 objects for scheduling**

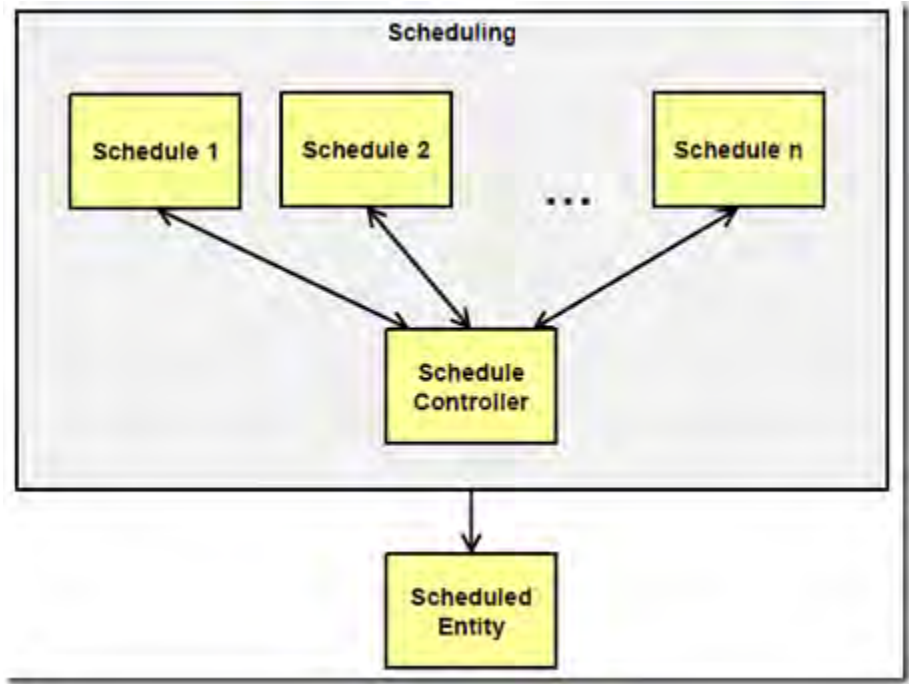
Comments are expected by 2014-12-05.

Schedules configure a specific behavior during configured time intervals. A schedule consists of a series of entries with a setting for the value of a set point, the selection of a particular mode or the value of a parameter for a mode.

Schedules can be used to allow even more autonomous control of the behavior of DER equipment. They may be sent ahead of time, and then activated at the appropriate time, e.g., for applications like:

- direct values (e.g. setpoints for P/Q/cosphi)
- constraints (e.g. do not exceed the maximum value of P/Q/cosphi at a certain time)
- pricing information (act on constraints)
- modes (e.g. Volt-VAr curves)
- parameters of modes
- predictions or forecasts

This part defines two additional **Logical Nodes** (schedule and schedule controller):




LN **FSCH** - defining schedules (23 Data Objects)

LN **FSCC** – schedule controller (3 Data Objects)

It is highly recommended to review this document during the draft stage. It is more convenient to revise the draft now ... than waiting until the document has been published as a final document.

[Contact your national committee](#) for a copy.

Posted by [Karlheinz Schwarz](#) at [2:00 AM](#) [No comments:](#) 

Labels: [DER](#), [IEC 61850-90-10](#), [Schedule](#)

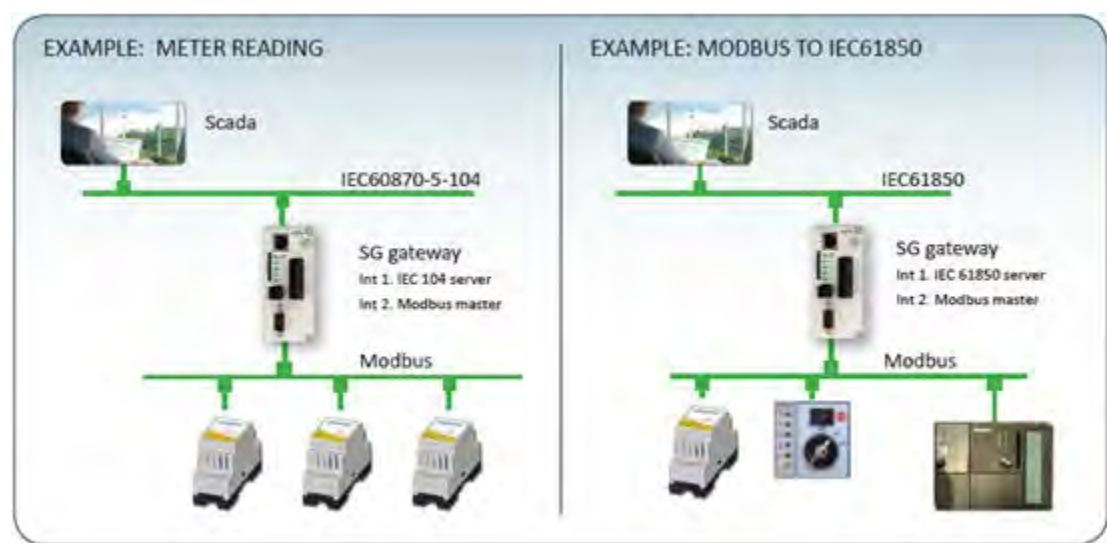
Friday, October 10, 2014

HMS offers IEC 60870-5-104 and IEC 61850 Gateway

HMS is a well known company in the world of communication solutions for any kind of Automation in factories, chemical plants, ... HMS is active in more than 50 countries, with some 350 employees, with the head office in Halmstad (Sweden).

HMS has understood the importance of the standards IEC 60870-5-104 and IEC 61850: Their latest offering are new Gateways under the Product line LABLINE SG. The new products are applicable in any Smart Grid application like Photo Voltaic, Wind Power, CHP, Backup Power,

Metering, Power Quality, ... and beyond:



Click [HERE](#) for more information in German and English.

Posted by [Karlheinz Schwarz](#) at [10:13 AM](#) [No comments:](#)

Labels: [Gateway](#), [HMS](#), [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 61850](#), [meter](#), [Modbus](#)

Monday, October 6, 2014

Prague, December 2014: IEC 61850 Special Training for Protection Engineers

IEC 61850 training courses are under way for some 10 years. The first training course NettedAutomation conducted with 40+ attendees in May 2004 and most other courses focused primarily on the general approach of the "IEC 61850 Framework". We have trained many groups with general purpose issues like basics, history, stacks, applications, and devices. Several training courses were focusing on protection – when NettedAutomation cooperated with protection domain experts.

Today you will find training courses teaching the basics of IEC 61850 all over. The NettedAutomation hands-on training course scheduled for next week (15-17 Oct 2014) in Frankfurt is sold out. We are trying to order a bigger room for more attendees.

BUT: In addition to the general training, there is a need for comprehensive special education for **power system PROTECTION !!** All major vendors of protection relays offer IEC 61850 connectivity for protection and control. There are many groups of protection engineers that have to be more serious about the use of IEC **61850 devices for protection in a multi-vendor environment**.

That is why FMTP and NettedAutomation are offering a 3-days training especially for PROTECTION engineers – conducted by a very experienced senior protection engineer (Andrea Bonetti – who worked for ABB, Megger, STRI).

The first public **IEC 61850 protection training** conducted by FMTP and NettedAutomation is scheduled as follows:

Prague, Czech Republic, December 8th – 10th
Seminar at HOLIDAY INN Prague Congress Centre

Click [HERE](#) for details and registration information.
Click [HERE](#) for video messages on the training and the trainers.

Further public events are planned as follows:

16.-18. Feb. 2015, Brussels, BE
18.-20. May 2015, Berlin, DE
Hong Kong

If you are looking for an in-house training, contact us please.

I look forward to meeting you in Prague.

Posted by [Karlheinz Schwarz](#) at [5:16 AM](#) [No comments:](#)

Labels: [FMTP](#), [GOOSE](#), [IEC 61850](#), [protection](#), [seminar](#), [Training](#)

Just published: NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 3.0

NIST (US National Institute of Standards and Technology) has published the other day the third version of the NIST Framework:

[NIST Framework and Roadmap for Smart Grid Interoperability Standards Release 3.0](#)

September 2014

The 240 page document gives a very broad and deep inside view into the current situation with regards to crucial interoperability standards.

The list of standards (series) comprises a total of 72 entries. The following 16 (out of 72) entries refer to IEC 61850 documents:

- 11 – IEC 61850-1
- 12 – IEC 61850-2
- 13 – IEC 61850-3
- 14 – IEC 61850-4
- 15 – IEC 61850-5
- 16 – IEC 61850-6
- 17 – IEC 61850-7-1
- 18 – IEC 61850-7-2
- 19 – IEC 61850-7-3
- 20 – IEC 61850-7-4
- 21 – IEC 61850-7-410
- 22 – IEC 61850-7-420
- 23 – IEC 61850-8-1
- 24 – IEC 61850-9-2
- 25 – IEC 61850-10
- 26 – IEC 61850-90-5

The term “IEC 61850” is used some 90 times. That means: IEC 61850 is a crucial standard in North America. Other IEC standards like IEC 61968/70 (CIM) and IEC 60870-6-TASE.2 (ICCP) or IEEE standards like DNP.3 are as well included in the list.

Click [HERE](#) to download the Release 3.0 [pdf, 12.7 MB]

Further standards like IEC 61400-25 will be included soon. There are still PAPs working on some issues, e.g., PAP 16 for Wind Power.

There seems to be no serious discussion anymore if IEC 61850 and related standards are accepted – the main question is: When and How to use the “IEC 61850 Framework”.

Posted by [Karlheinz Schwarz](#) at [4:43 AM](#) [No comments:](#) 

Labels: [CIM](#), [DNP3](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [NIST](#), [NIST Roadmap](#), [TASE.2](#), [TASE.2 ICCP](#)

Tuesday, September 30, 2014


TÜV SÜD offers tests for IEC 61850 Client, Server, publisher, and subscriber

TÜV SÜD (Munich, Germany) offers a wide range of testing services covering all crucial aspects to help you reaching a high level of interoperability of your device with other devices.

Their services could reduce the risk of non-interoperation on site dramatically! They have experience with edition 1 and edition 2 of the IEC 61850 core parts as well with IEC 61400-25.

Click [HERE](#) for a brochure that describes what they offer.

Note that they cover much more than just certification conformance tests. They offer a comprehensive range of support.

Posted by [Karlheinz Schwarz](#) at [10:18 PM](#) [1 comment:](#) 

Labels: [conformance](#), [conformance test](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [test lab](#), [testing](#)

Thursday, September 25, 2014

IEC 61400-25 Part 2 and Part 3 CDV approved

The following two documents (CDV – Committee Drafts for Vote) have been accepted by 100 per cent of the Members of IEC TC 88 (in August resp. in September 2014):

Wind turbines – Part 25-2 (Edition 2): Communications for monitoring and control of wind power plants – Information models

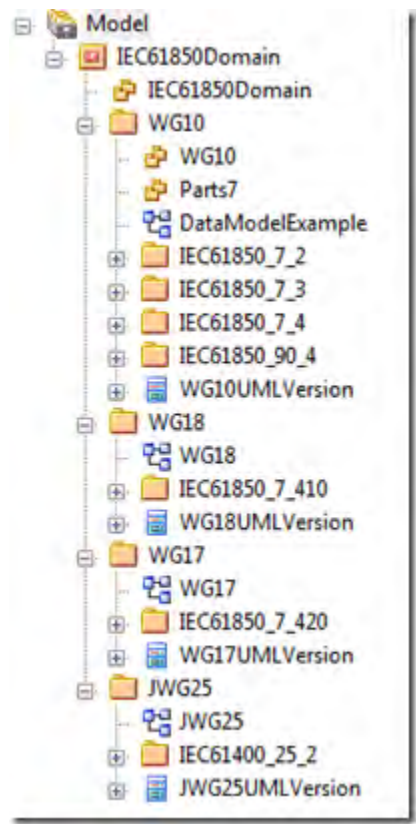
Wind turbines - Part 25-3 (Edition 2): Communications for monitoring and control of wind power plants -Information exchange models

Both parts will be published as FDIS soon.

The Information Models are revised to make them consistent with the many other models defined in IEC 61850-7-x. For example in LN WTUR several names of DataObjects change:

- SptDmdW to DmdWSpt
- SptDmdVAr to DmdVArSpt
- SptDmdPF to DmdPFSpt

The Edition 2 of the models is a major step towards harmonization of the information models. The wind power plant objects are now very stable – they are also incorporated into the UML master maintained by IEC TC 57 WG10, WG 17, WG 18, and JWG25 (TC57/TC88):



The changes proposed in conjunction of the CDV comments on part 25-2 have already been used for the UML model. Now we have a very stable and harmonized set of information models that can be used for the whole power delivery system – all over.

Additional models are under way, e.g., for condition monitoring (90-3).

Thanks to the UML team!

Posted by [Karlheinz Schwarz](#) at [9:36 PM](#) [No comments:](#)

Labels: [harmonization](#), [IEC 61400-25](#), [iec 61400-25-4](#), [IEC 61850](#), [information exchange](#), [Information Model](#)

Wednesday, September 24, 2014

IEC 61850: Is Interchangeability possible?

Yes – If you are seriously requiring it, it is likely that you will get it. Sure: You have to pay for it. You may need to spend some time to find the right vendor ... system integrator, consultant to help you getting there. The key issue is education and training.

A very interesting question is currently discussed at LinkedIn:

“Dear all, How far are we from living the of plug & play age of SAS devices (real and full interoperability under IEC 61850 platform)?”

Click [HERE](#) for the complete (public) discussion.

One of my contributions is this:

“I guess it would be so easy to reach the goal of "exchangeability": IF (only IF !!) substation owners would specify which parts of their future SAS SHALL BE based on the standard and specify the SCD in sufficient details, in order to simplify, e.g., adding a new Bay Controller coming from a thirty part IED vendor. That may work fine within one owner (utility) - but not between different owners. I have seen such an SCD document (6+ MB) ... written by a big TSO ... I am quite sure that this TSO will reach that goal in the near future - I am not sure if all vendors will like the approach.”

You could easily contribute to the discussion on LinkedIn ... or comment on this blog post directly.

Posted by [Karlheinz Schwarz](#) at [3:34 AM](#) [No comments:](#)

Labels: [exchangeability](#), [IEC 61850](#), [interchangeability](#), [interoperability](#), [users](#), [utilities](#), [vendors](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Sunday, September 21, 2014

Another Infrastructure: Are Traffic Lights Secure?

Several experts from the University of Michigan have analyzed the safety critical nature of traffic infrastructures. Their findings are summarized in a paper presented in August 2014:

“Green Lights Forever: Analyzing the Security of Traffic Infrastructure”

Abstract: “The safety critical nature of traffic infrastructure requires that it be secure against computer-based attacks, **but this is not always the case**. We investigate a networked traffic signal system currently deployed in the United States and **discover a number of security flaws that exist due to systemic failures by the designers**. We leverage these flaws to create attacks which gain control of the system, and we successfully demonstrate them on the deployment in coordination with authorities. Our attacks show that an adversary can control traffic infrastructure to cause disruption, degrade safety, or gain an unfair advantage. We make recommendations on how to **improve existing systems and discuss the lessons learned for embedded systems security in general.**”

It would be nice to read one day down the street:

“Power Flows Forever” ;-)

Click [HERE](#) for the paper.

These findings are to some extend applicable to any application domain with similar topologies. The lessons learned could be applied for power delivery infrastructures, too! Or?

Next time you experience a long waiting queue at an intersection or a power black out: It may have been caused by a security flaw.

Note also: No Power no traffic lights!

Posted by [Karlheinz Schwarz](#) at [10:12 PM](#) [No comments:](#) 

Labels: [embedded system](#), [infrastructure](#), [security](#)

ENTSO-E: IEC 61850 in Transport Systems for Electric Power is making good progress

The original scope of IEC 61850 in the late 90’s of the last century was “high voltage substations”. Utilities in the domain HV systems did participate in the beginning of the standardization and later-on showed-up seldom – untile recently. After realizing crucial issues in the inter-operation of devices and tools the ENTSO-E started to support the idea of IEC 61850 interoperability in HV substations.

The latest update on these efforts are documented on the ENTSO-E Website.

Click [HERE](#) to follow the update.

You will find many interesting topics discussed and useful links to other activities and opportunities to learn more about the success of IEC 61850. There are links to the special event during the [IEC 61850 Europe Conference 2014 in Prague](#); and a link to the event: <http://www.iec61850-europe.com/>

The last slide presented at the [ENTSO-E AhG IEC 61850 @ UCA Booth, Cigré 2014](#) is remarkable. It shows somebody who seems to have severe headaches:



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- ▶ [2013](#) (130)
- ▶ [2012](#) (188)

Is this You!? I have seen many people that throw up their hands in despair.

You are not alone! We are here to help you: Training for all experts involved in high voltage substations by **really experienced protection and communication experts**:

[FMTP and NettedAutomation offer special IEC 61850 training for PROTECTION and SCADA applications.](#)

Posted by [Karlheinz Schwarz](#) at [9:37 PM](#) [No comments:](#) 

Labels: [Cigré](#), [ENTSO-E](#), [high voltage](#), [IEC 61850](#), [interoperability](#), [protection](#), [Substation](#), [UCAIUG](#)

Wednesday, September 17, 2014

IEC 61850-7-410 A1 Ed.2 – Amendment for several new models just published

IEC 61850-7-410 A1 Ed.2 (57/1485/CDV): Amendment 1 to IEC 61850-7-410 Ed.2: Communication networks and systems for power utility automation - Part 7-410: Basic communication structure - Hydroelectric power plants - Communication for monitoring and control

has been published for comments and vote by 2014-12-12

The reason for the amendment is that a number of logical nodes, originally intended for hydropower plants, have been found to have wider usage in power system control. To make them more generic, the logical node names are modified and, in some cases, additional data objects are added. A few completely new logical nodes are also added.

Within the scope of WG18, some of the logical nodes have been modified to allow usage in thermal power plants for power evacuation related components such as excitation, synchronization, frequency and active power control as well as electrical protection devices.

Process control for thermal power plants is not included in the scope of this amendment.

Posted by [Karlheinz Schwarz](#) at [7:53 AM](#) [No comments:](#) 

Labels: [control](#), [hydro power](#), [IEC 61850](#), [iec 61850-7-410 Edition 2](#), [Power Plants](#)

Tuesday, September 16, 2014

Extended Training: FMTP and NettedAutomation cooperate on Practical Training for Power System Automation and Protection

FMTP Power AB (Uppsala, Sweden) and NettedAutomation GmbH (Karlsruhe, Germany) have each long-term experience in the application of standards for protection and control as well for communication and SCADA applications. Both companies have agreed to join their long-term experience in training and consultancy for power system automation and protection.

FMTP and NettedAutomation **offer the most comprehensive and vendor-independent education and practical training courses** – they combine their knowledge and practical experience with substation control and protection (Mr Andrea Bonetti who worked for ABB, Megger, and STRI) and communication technology and SCADA (Mr Karlheinz Schwarz).

Some years ago Mr Bonetti and Mr Schwarz conducted together several training courses and seminars. They discovered the value of their combined knowledge and experience for customers and decided recently to provide common seminars based on their combined experience of more than 60 years. The combination of basic Theory and extensive Practical Help is what the industry needs – to keep the power flowing.

First training courses by Andrea Bonetti and Karlheinz Schwarz will be conducted in fall 2014; the first events will be in-house training courses.

FMTP and NettedAutomation will also cooperate with local partners in Asia, South America, North America, Middle East, Africa, and Europe.

If your organization is interested to cooperate, please contact us.

Click [HERE](#) for the complete press release.

Click [HERE](#) for a brochure on the first 3 days training.

Posted by [Karlheinz Schwarz](#) at [5:02 AM](#) [No comments:](#) 

Labels: [ABB](#), [education](#), [GOOSE](#), [hands-on Training](#), [IEC 61850](#), [Megger](#), [protection](#), [STRI](#), [Training](#)

Friday, September 12, 2014

Deutsche Verteilnetzstudie veröffentlicht – mit Hinweisen auf IEC 61850

Das Bundesministeriums für Wirtschaft und Energie (BMWi) hat heute (12. September 2014) die Verteilnetzstudie „Moderne Verteilernetze für Deutschland“ der Öffentlichkeit vorgestellt. Die Studie wurde Ende 2012 vom Bundesministerium für Wirtschaft und Energie (BMWi) in

► [2011](#) (159)

► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

Auftrag gegeben.

Im Koalitionsvertrag der 18. Legislaturperiode „Deutschlands Zukunft gestalten“ wird die vorliegende Studie als **Datenbasis für Entscheidungen** zu notwendigen **Weiterentwicklungen der Anreizregulierung** bezeichnet.

[Hier klicken](#), um zur Downloadseite zu gelangen.

“Rainer Baake, Staatssekretär im Bundesministerium für Wirtschaft und Energie, hierzu: "Der Umbau unserer Energieversorgung hin zu mehr erneuerbaren Energien erhöht zweifelsfrei den Investitionsbedarf in die Verteilernetze. Allerdings macht die Studie zugleich deutlich, dass mit den nun gesetzlich verankerten Ausbaukorridoren des EEG 2014 und einem dadurch besser planbaren Erneuerbaren-Ausbau die Kosteneffizienz des Aus- und Umbaus der Verteilernetze erheblich verbessert wird. Es kommt nun darauf an, das enorme Einsparpotenzial, das der **Einsatz intelligenter Methoden bei der Netzplanung und intelligenter Technik im Netzbetrieb bietet**, zu nutzen. Die Weiterentwicklung des Regulierungsrahmens ist in der 10-Punkte-Energie-Agenda daher bereits angelegt, und das setzen wir jetzt um."

Die Gutachter kommen in der Studie unter anderem zu dem Ergebnis, dass neue innovative Planungsgrundsätze und neue Technologien, wie beispielsweise regelbare Ortstransformatoren, zentrale Elemente für eine effiziente Integration der erneuerbaren Energien bilden und die Kosteneffizienz des Aus- und Umbaus der Verteilernetze erhöhen.

Die Studie wurde erstellt von einem Gutachterkonsortium bestehend aus dem Institut und Lehrstuhl für Elektrische Anlagen und Energiewirtschaft (IAEW) der RWTH Aachen, dem Oldenburger Institut für Informatik (OFFIS) sowie dem Beratungsunternehmen E-Bridge Consulting GmbH.“

Das wesentliche Ergebnis ist die Forderung, bis zu etwa **40.000 regelbare Ortsnetztransformatoren** zu installieren und **für weitgehend alle Einspeisungen** aus Erneuerbaren Energien-Anlagen für wenige Stunden des Jahres gezielt **Abregelungen** zuzulassen.

Natürlich gehen fast alle Maßnahmen mit einer deutlichen Zunahme an intelligenten Steuerungen und Kommunikationslösungen einher. Als wesentliche Kommunikationslösungen werden solche empfohlen, die auf IEC 61850-7-420, IEC 60870-5 und IEC 61969 (CIM) basieren. **VHPready (als ein Anwender der IEC 61850-7-420) wird lobend erwähnt:**

“Die bisherigen Lösungen für das Erzeugungsmanagement sind seit 2006 in Form der Normung der **IEC 61850-7-420** zur Kommunikation mit dezentralen Erzeugern in Demoprojekten und verschiedenen Projekten und Initiativen wie [VHPready](#) vorangetrieben worden. Produkte von namhaften Herstellern sind bereits im Einsatz.“

Ein interessanter Aspekt ist die [Interpretation des Berichts durch den VKU](#) (Verband kommunaler Unternehmen): “... Hingegen kann durch die Steuerung der Verbraucherlast der durch den EE Zubau verursachte Netzausbau nicht nennenswert reduziert werden. **Der VKU wertet dies als eine klare Absage an den Rollout von Smart Metern in Haushalten.**”

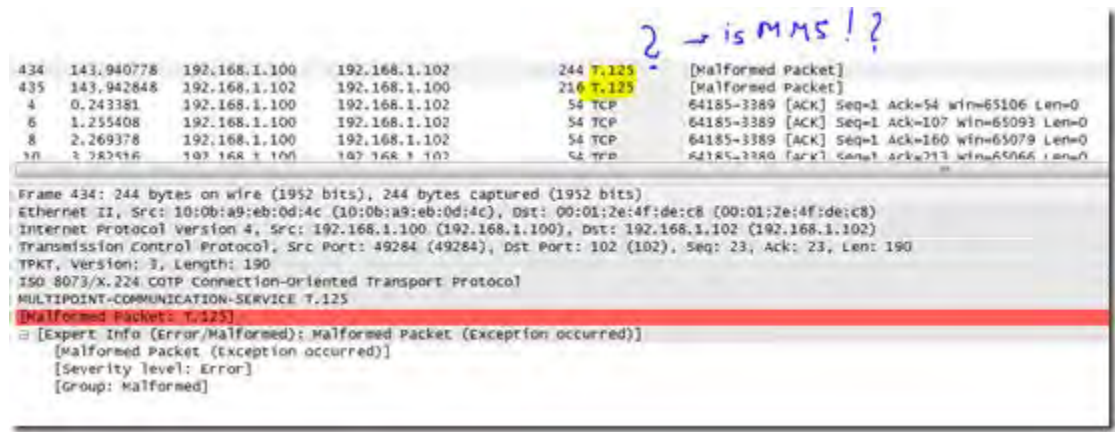
Posted by [Karlheinz Schwarz](#) at [9:59 AM](#) [No comments:](#) 

Labels: [CIM](#), [iec 60870-5](#), [IEC 61850](#), [Verteilnetz](#), [VHP Ready](#), [VHPready](#)

Thursday, September 11, 2014

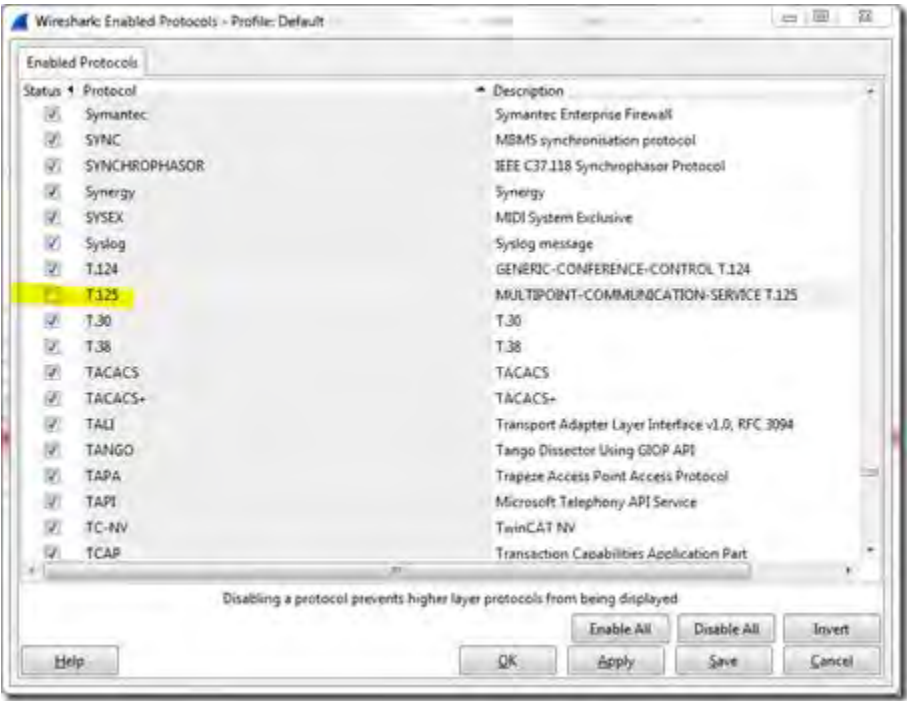
Problem with Wireshark and MMS in the latest versions

You may run into the situation with one of the latest versions of Wireshark, that you cannot display the MMS messages. You may see these frames:

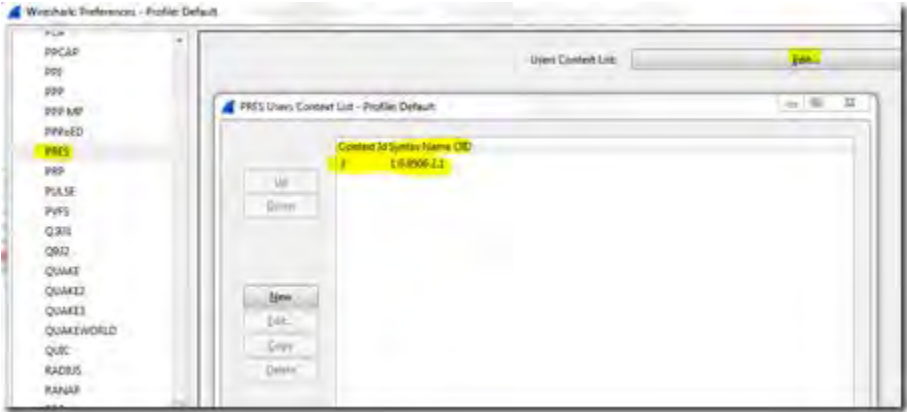


What is that? T.125?

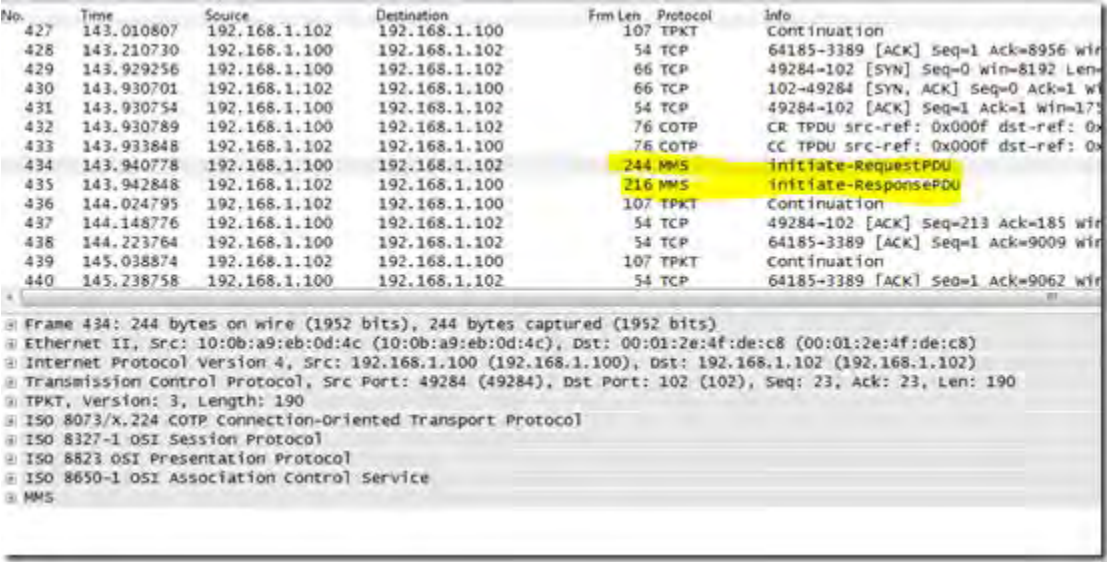
If you see this, you have to remove the T.125 Protocol under Analyze:



Depending on the version of Wireshark you have, there may be also a need to configure MMS under Edit->Preference->Protocols->PRES:



Now you should see MMS again:



I am using Wireshark Version 1.12.0

The bug is reported under:
<http://comments.gmane.org/gmane.network.wireshark.bugs/62519>

Good luck!

Posted by [Karlheinz Schwarz](#) at [10:18 AM](#) [No comments:](#) [✉](#)

Labels: [IEC 61850](#), [MMS](#), [wireshark](#)

IEC 61850 Lab opened by POWER Engineers in Idaho (USA)

Technical support for IEC 61850 based systems, tools and devices is very crucial for the acceptance of the standard. Education and testing are needed all over.


A new competence center for IEC 61850 has opened its doors by POWER Engineers for the North American market. It is no surprise that this kind of services are offered in the USA.

Click [HERE](#) for more information.

“We think that IEC 61850 will become much more prevalent in the U.S. market in the near term,” said Scott Olson P.E., senior project manager for smart grid projects at POWER.

Ok, yes, Scott is absolute right!

More to come.

Posted by [Karlheinz Schwarz](#) at [6:33 AM](#) [1 comment:](#) 

Labels: [education](#), [IEC 61850](#), [Laboratory](#), [test lab](#), [Training](#)

Wednesday, September 10, 2014

Neuer Webauftritt VHPready

Das Industrieforum VHPready hat seit heute einen neuen Webauftritt mit vielen neuen Informationen:

<http://www.vhpready.de/>

See you there.

Posted by [Karlheinz Schwarz](#) at [7:35 AM](#) [No comments:](#) 

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [IEC 61850-7-420](#), [VHP Ready](#), [virtual power plant](#)

Tuesday, September 9, 2014

IETF RFC 7326: Energy Management Framework

The RFC 7326 (just published) defines a **framework for Energy Management (EMAN)** for devices and device components within, or connected to, communication networks. The framework presents a physical reference model and **information model**. The information model consists of an Energy Management Domain as a set of Energy Objects. Each Energy Object can be attributed with identity, classification, and context. Energy Objects can be **monitored and controlled** with respect to **power, Power State, energy, demand, Power Attributes**, and **battery**. Additionally, the framework models relationships and capabilities between Energy Objects.

Click [HERE](#) for accessing the RFC 7326.

The document refers to several parts of IEC 61850. Many of the IEC 61850 objects related to electric measurements like 3-phase voltage and current are modeled in corresponding MIBs.

Click [HERE](#) for the list of related documents of the working group EMAN.

The availability of the communication infrastructure (ICT – Information and communication technology) is very crucial for power delivery systems.

Be aware that:

No ICT -> No Power
No Power -> No ICT
No Power and no ICT -> No Life

The two infrastructures are very **closely interwoven**. We need ICT systems that have reasonable UPS (Uninterruptible Power Supply) in order to help restore power systems after a blackout.

ERDF (French DSO) has taken measures to coordinate with ICT companies in order to get the needed support for fast restoration of power:

“On the strength of its experience in crisis management, in June 2012 ERDF signed a partnership agreement with the three leading telephone operators, Bouygues, Orange and SFT, to consolidate information exchange in the event of a major event or crisis situation. The four companies were keen to pool information which is vital to the mobilisation and implementation of emergency procedures during crisis situations **in order to restore their networks as rapidly as possible.**”

Click [HERE](#) for an ERDF Press kit on the issue.

Close inter-dependencies between these infrastructures should be understood and should be avoided that use of electricity is blocked because my mobile service is still down. So if I have electricity in my home, I wouldn't want to wait for ICT to come by so that I can begin washing or cooking.

Posted by [Karlheinz Schwarz](#) at [4:37 AM](#) [No comments:](#) 

Labels: [energy management](#), [IEC 61850](#), [ietf](#), [infrastructure](#)

Mitgliederzuwachs im VHPready e.V.

Das [Industrieforum VHPready e.V.](#) setzt sich für die Realisierung der Energiewende durch die **standardisierte Vernetzung** dezentraler Energieanlagen ein. Das Industrieforum VHPready e.V. leistet einen Beitrag zur Integration erneuerbarer Energien in den Energiemarkt und ermöglicht den Ausgleich ihrer Volatilitäten durch das **orchestrierte Zusammenwirken**

dezentraler Energieanlagen. Der Standard VHPready und seine Zertifizierung gewährleisten das nahtlose, sichere und kostengünstige Zusammenwirken aller steuerbaren Komponenten und deren Kompatibilität und bilden die Grundlage für flexible Aggregationen dezentraler Energieanlagen zu virtuellen Kraftwerken.

Mittlerweile sind über 20 Firmen und Organisationen dem Forum beigetreten:

1. 2G Energy AG
2. 50Hertz Transmission GmbH
3. Beck IPC GmbH
4. Bilfinger GreyLogix GmbH
5. Bosch Software Innovations GmbH
6. Energy2market GmbH
7. energy & meteo systems GmbH
8. E.ON Connecting Energies GmbH
9. Fraunhofer Gesellschaft e.V.
10. IABG GmbH
11. IT&I GmbH
12. LichtBlick SE
13. N·E·ST Neue Energie Steinfurt GmbH
14. NettedAutomation GmbH
15. Next Kraftwerke GmbH
16. Optimax Energy GmbH
17. Phoenix Contact Electronics GmbH
18. SSV Software Systems GmbH
19. Vattenfall Europe Wärme AG
20. WAGO Kontakttechnik GmbH & Co. KG
21. Energieservice Westfalen Weser GmbH
22. Younicos AG

Die standardisierte Kommunikation nach **IEC 60870-5-104** und **IEC 61850** sind Grundlage der Vernetzung!

Posted by [Karlheinz Schwarz](#) at [12:42 AM](#) [No comments:](#) 

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [VHP Ready](#), [virtual power plant](#)

Tuesday, September 2, 2014

Cyber Security in Industrial Control Systems – Is this enough?

Cyber security is more than a hype. Is this enough to reach a secure and stable power system? No!

I found a very good documentation on cyber security measure:

Since February 2013, industrial stakeholders (final users, vendors, integrators, professional organizations, etc.) and French governmental entities have been working together on elaborating concrete and practical proposals to improve the cyber security of critical infrastructures.

The first results of this working group are the following two documents:

- The first document describes a classification method for industrial control systems and the key measures to improve their cyber security.
- The second one gives a more in-depth description of applicable cyber security measures.

Click [HERE](#) for the website with the links to the two documents. Nice reading!

These measures (comparable to those listed by many other organizations and groups) will help to improve the cyber security of critical infrastructures. No question.

Do these measures help to keep the power flowing, help to keep a stable and highly available power system? To some extent these measures solve mainly issues that are caused by new control system solutions based on standards like Ethernet and TCP/IP.

But: **What’s about the power system stability?** Let’s assume that we have a 100 per cent cyber secure ICS managing the power generation, transmission, distribution, storages, and loads. This “secure” systems may be used in many different ways – taking the physical laws seriously into account or ignoring some basic requirements to keep the power system stable.

One very critical impact on the electrical system is the **change of power flow**. Each change (more or less generation or load) has to be controlled in a bunch of close loop control systems. If the amount of change in a short time (within seconds) is too high, then the systems is likely to black-out.

A highly secure ICS may be used to configure schedules for feeding power into the power system (generator or storage) or drawing power from the system. The power flow change caused by schedules may exceed the maximum value that can be automatically managed by primary power control systems ... risking a power outage.

Who is now responsible that the maximum allowable power flow change in an interconnected power system will be taken into account when we have millions of such schedules? Maybe too many schedules are configured to draw power or feed in starting at 14:00 h today. As a consequence the power flow change could be far beyond the maximum amount that can automatically be managed by the primary power control system (as we have them today in all systems).


Cyber security of ICS is one aspect – **system stability of the power system** is another. Secure ICS’s are important. A high level of power systems stability is more important and requires secure information and communication systems AND the need of **understanding of the power system physics**.

We have to make sure that any new ICS approach does not allow a huge sudden power flow change! This is true also for all solutions based on standards like IEC 60870-5-10x, DNP3, IEC 61850, or ...

These standards would allow to disseminate immediate control commands or specify schedules.

WHO is in charge to have the big picture in mind – to configure power systems in a way that they do not blackout because of commands and settings communicated by highly secure ICS’s? The power system could not differentiate if these commands or settings are intended or caused by hackers.

It is highly recommended to **keep an eye on the power system physics** and prevent any ICS action (secure or insecure) to danger the stability of the power system!

Posted by [Karlheinz Schwarz](#) at [6:47 AM](#) [No comments:](#) 

Labels: [Cyber Security](#), [DNP3](#), [iec 60870-5](#), [IEC 60870-6](#), [IEC 61850](#), [Power Automation](#), [power distribution](#), [power generation](#), [power management](#), [power outage](#), [power systems](#), [security](#), [TCP/IP](#)

Saturday, August 9, 2014

Are you looking for IEC 61850 TICS, PICS, PIXIT, ... Documents?

I talked the other day to experts of a big user. We shared our experience of increased “information hiding” when it comes to the availability and accessibility of the various documents like PICS, PIXIT, TICS, ... Product handbooks, manuals, ... When you checked websites of major vendors some years ago, you could find a bunch of technical material ... I have figured out that these documents are quite often hidden ... or not anymore available online.

I found still good examples for downloading many of the these crucial documents:

Click [HERE](#) for a Website of **ABB** to find PICS and other documents

Click [HERE](#) for a Website of **Alstom Grid** to find PICS ...

Click [HERE](#) for a Website of **Schneider Electric** to find PICS and other documents.

Click [HERE](#) for a Website of **Siemens** to find some 30 PIXIT documents.
Click [HERE](#) to see a list of some 40 references to IEC 61850 Ethernet Module EN100.

Congratulation to the IEC 61850 Teams!

Enjoy the documents. Are you looking for help to understand these documents? Why do we need these at all? Isn’t IEC 61850 a standard? ... and then all these documents ...

Click [HERE](#) to get help!

Posted by [Karlheinz Schwarz](#) at [2:34 AM](#) [No comments:](#) 

Labels: [ABB](#), [Alstom](#), [certificate](#), [conformance test](#), [download](#), [education](#), [IEC 61850](#), [PICS](#), [PIXIT](#), [Schneider Electric](#), [seminar](#), [Siemens](#), [Training](#)

Sensitive, Critical Infrastructure is Not Sufficiently Protected

Recently it was reported that the Stadtwerke Ettlingen (Southwestern Germany – some 15 km from my hometown Karlsruhe), came very close to shutting down the power, water and gas supply of Ettlingen. “The experiment has shown that **sensitive, critical infrastructure is not sufficiently protected**,” said Eberhard Oehler, managing director of the utility, Stadtwerke Ettlingen.

Click [HERE](#) for a brief Report in English and [Here](#) for one Report in German.

Posted by [Karlheinz Schwarz](#) at [12:40 AM](#) [No comments:](#) 

Labels: [infrastructure](#), [protection](#), [security](#)

Just published FDIS IEC 62351-3 Communication network and system security – Profiles including TCP/IP

Security is discussed all over. IEC TC 57 has just published the following Final Draft International Standard:

FDIS IEC 62351-3 (57/1498/FDIS):
Power systems management and associated information exchange – Data and communications security – Part 3: **Communication network and system security –**

Profiles including TCP/IP

This part 3 was a Technical Specification. The just published FDIS will – once approved as standard cancel and replace IEC TS 62351-3:2007.


The voting on the FDIS closes 2014-10-10. Please check with your TC 57 national mirror committee to get a copy of the draft for comments.

The standard will cover the following:

1	Scope
1.1	Scope
1.2	Intended Audience
2	Normative references
3	Terms, definitions and abbreviations
3.1	Terms, definitions and abbreviations
3.2	Additional abbreviations
4	Security issues addressed by this standard
4.1	Operational requirements affecting the use of TLS in the telecontrol environment
4.2	Security threats countered
4.3	Attack methods countered
5	Mandatory requirements
5.1	Deprecation of cipher suites
5.2	Negotiation of versions
5.3	Session resumption
5.4	Session renegotiation
5.5	Message Authentication Code
5.6	Certificate support
5.6.1	Multiple Certification Authorities (CAs)
5.6.2	Certificate size
5.6.3	Certificate exchange
5.6.4	Public-key certificate validation
5.7	Co-existence with non-secure protocol traffic
6	Optional security measure support
7	Referencing standard requirements
8	Conformance
	Bibliograph

A crucial definition of this standard will be to require “**TLS v1.2** as defined in RFC 5246 (sometimes referred to as SSL v3.3) **or higher** shall be supported.”

Be smart and build-in security measures like the ones defined in the IEC 62351-3 Standard! You have to ask for it if you are a user – or you must implement it if you are a manufacturer of smart devices.

Posted by [Karlheinz Schwarz](#) at [12:38 AM](#) [No comments:](#) 

Labels: [DNP3](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 62351](#), [iec 62351-3](#), [security](#), [TLS](#)

Monday, August 4, 2014

MMS & ASN.1 & XER & XMPP selected as the second SCSM of IEC 61850

The second SCSM for the ACSI Client-Server information exchange service models will be the mapping of the ACSI service models to MMS ASN.1 XER and XMPP. IEC TC 57 just released the 122 page document 57/1497/DC:

Draft IEC 61850-80-3 TR, Communication networks and systems for power utility automation – Part 80-

3: Mapping to web protocols – Requirement analysis and technology assessment

The document mainly lists the crucial needs and why the mapping to “MMS ASN.1 XER and XMPP” has been chosen to be published as IEC 61850-8-2 soon.

Chapter 7 presents the future SCSM 8-2, including an overview of the main selected technology: **XMPP**.


The following goals have been particularly considered for the definition of this SCSM:

- Identify a **single profile supporting all the services required** by the domains and defined today in ACSI.
- Cover the full life cycle of a IEC 61850 system, in collaboration with the System Management work in WG10 (from configuration, through conformance testing, down to maintenance). For this purpose, the present document may recommend some changes in other parts of IEC 61850 like part 6, part 10, etc.
- Deploy cyber-security to ensure a secure environment (in conjunction with IEC TC 57 WG 15 work).
- Propose rules for cohabitation with other mappings such as IEC 61850-8-1 and IEC 61850-9-2, and possibly recommend communication profiles depending on specific application context (pole-top equipment, inside DER, connection of DER, ...).

Check with your [national IEC TC 57 mirror committee](#) for a copy of the above mentioned document.

Congratulation for the tremendous success of the web service mapping team!!! Great work!

That means: IEC 61850 will be the preferred solution in substations and many applications outside!!

Posted by [Karlheinz Schwarz](#) at [12:06 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-8-1](#), [iec 61850-8-2](#), [iec 61850-80-3](#), [mapping](#), [SCSM](#), [Web Service](#), [XML](#), [XMPP](#)

Saturday, August 2, 2014

New 3-day Public Seminar and Hands-On Training on IEC 61850 and IEC 60870-5-104

NettedAutomation is entering into a new phase of training: Using real devices and solutions to work with during the public 3 days general training courses. The reorganized and extended program of the 3 days course is as follows:

1 1/2 days	Introduction and Basics on IEC 61850 (and brief comparison with IEC 60870-5-104)
1/2 day	Hands-on training on designing ICD and CID documents, analyzing SCD documents
1/2 day	Configuring and using Server devices for monitoring and control using IEC 61850 and IEC 60870-5-104
1/2 day	Configuring and using Client devices for IEC 61850 and gateways to IEC 60870-5-104 and proxy server to IEC 61850; demonstration of IEC61850 Client to OPC UA Server

The next public courses are scheduled for:

Frankfurt (Germany), 15.-17. October 2014
Frankfurt (Germany), 06.-08. May 2015

Get a Special Price due to the 10th anniversary of the training courses offered by NettedAutomation ... after 3.600+ experts trained:


Click [HERE](#) for the new program and registration information.

List of courses conducted in 2013 (with 400+ attendees):

175.	in-house	Quebec City	Canada	2013-01-07/11
176.	in-house	Erlangen	Germany	2013-01.21/23
177.	in-house	Aachen	Germany	2013-02-06
178.	in-house	Kassel	Germany	2013-02-07
179.	in-house	Karlsruhe	Germany	2013-02-13
180.	in-house	München	Germany	2013-02-05
181.	in-house	Backnang	Germany	2013-03-06
182.	public	Filderstadt	Germany	2013-04-02
183.	in-house	Toronto	Canada	2013-04-22
184.	public	Frankfurt	Germany	2013-05-06
185.	in-house	Backnang	Germany	2013-06-13
186.	in-house	Stafford	UK	2013-06-18
187.	in-house	Kassel	Germany	2013-06-27
188.	in-house	Jakarta	Indonesia	2013-07-01
189.	in-house	Petten	Netherland	2013-07-08
190.	in-house	San Jose	Costa Rica	2013-09-23/27
191.	public	Frankfurt	Germany	2013-10-16/18
192.	in-house	Hong Kong	Hong Kong	2013-10-28
193.	in-house	Hong Kong	Hong Kong	2013-10-29/30
194.	in-house	Hong Kong	Hong Kong	2013-10-31/11-01
195.	in-house	Bad Vilbel	Germany	2013-11-28/29
		Attendees	400+	

As you can see, the most courses are conducted as in-house events.

[Ask for us for an offer for you and your people.](#)

Posted by [Karlheinz Schwarz](#) at [12:48 PM](#) [No comments:](#) 

Labels: [education](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61850](#), [OPC](#), [OPC UA](#), [seminar](#), [Training](#)

Do You Really Want to Use Your Phone for Remote Control?

Kim Zetter reported on 31 July that “Hackers Can Control Your Phone Using a Tool That’s Already Built Into It”.

Would you like to be controlled by somebody else? Somebody you don’t know?

The report starts: “ ... *Two researchers have uncovered such **built-in vulnerabilities** in a large number of smartphones that would allow government spies and sophisticated hackers to*

install malicious code and take control of the device.”

Click [HERE](#) for the full report.

I hope that you are not planning to use smart phones in any critical infrastructure! Be smart! Any remote control in the energy automation could be very dangerous. Automation systems that highly depend on control commands from a central unit are in danger to be hacked or compromised by errors – independent of smart phones.

We have to thing towards more autonomous automation. Inputs to remote stations may be limited mainly to set-points that allow the algorithms in the remote units to check against the physical measurements and other information (situational awareness).

Posted by [Karlheinz Schwarz](#) at [1:30 AM](#) [No comments:](#) 

Labels: [autonomous control](#), [central control](#), [decentralized](#), [remote control](#), [security](#), [smart people](#)

Wednesday, July 30, 2014


Water Infrastructure in Los Angeles under “pressure”

Eight to 10 million gallons of (fresh!) water had been lost after major water main ruptured in Los Angeles yesterday.

Hm, the [more than 90-year-old riveted steel pipe](#) carries an estimated 75,000 gallons per minute ... that’s a bit.

Click [HERE](#) for a report and video by Reuters.

The un-thinkable happened! Which part of the world-wide infrastructures breaks next?

Posted by [Karlheinz Schwarz](#) at [6:42 AM](#) [No comments:](#) 

Labels: [aging infrastructue](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Friday, July 25, 2014

Power Utility Automation Or Power Automation?

The title of IEC 61850 is “Communication networks and systems for **power utility** automation”. The restriction to power utility is an artificial one required by the standardization organization – it is not set by the industry.

In fact the scope of the IEC 61850 series is: “Communication networks and systems for **power** automation”.

Wherever power is generated, transported, distributed, and used, IEC 61850 provides the needed tools to provide a standardized interface for **information**, information **engineering**, and information **exchange**. There is no difference between a 3-phase AC system in a distribution system inside an Industrial Facility or outside in an utility grid. I guess you agree, that voltage phase A is voltage phase A.

All crucial information models for electrical systems are defined in [IEC 61850-7-4](#) (core), [IEC 61850-7-410](#) (hydro), [IEC 61850-7-420](#) (DER), [IEC 61850-90-7](#) (inverters), [IEC 61850-90-17](#) (power quality), ... It would be in the interest of keeping the reliability of power delivery high, to use ONE standard for all power related applications (in public utilities and in any factory or other plant or site).

There seem some people to apply the “fieldbus approach” ... publishing new standards for power systems inside Industrial Facilities AND for an interface between the two domains (between Industrial Facilities and Power Utilities). Fortunately the power does not care if it is flowing inside or outside an Industrial Facility. Why not just use **ONE standard** (IEC 61850) for applications **inside Industrial Facilities**, **inside Power Utilities**, and **between the both domains**.

The IEC TC 65 has published a Committee Draft to open the door for a new standard:

IEC 65/555/CD: IEC/TS 62872 Ed. 1.0:
System interface between Industrial Facilities and the Smart Grid

Click [HERE](#) for a brief project description.
Contact [your National Committee](#) for a copy.

Posted by [Karlheinz Schwarz](#) at [2:22 AM](#) [No comments:](#) 

Labels: [factory](#), [fieldbus](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 62872](#), [industrial automation](#), [power quality](#), [utilities](#)

Tuesday, July 22, 2014

Navigation Light System for Offshore Wind Farms managed by IEC 61850

The Sabik NavAid Controller is part of the control and monitoring system for the marking of offshore wind farms. It is used for controlling and monitoring of illuminating and marking components on offshore structures:

- Activation and generation of the flash code for all of the attached 5 nautical miles lanterns
- Activation and generation of an intensity control signal for spotlights
- Current consumption monitoring for all components of the navigation light system, as well as error detection and reporting

The communication supports Modbus and IEC 61850.

Click [HERE](#) for a two page NavAid Controller brochure.
Click [HERE](#) for the Gateway used in the NavAid Controller.

The Sabik Logo is enhanced by the slogan: WE SHOW THE WAY ... with the application of IEC 61850 (IEC 61400-25) Sabic shows also the way how to apply IEC 61850 for many applications outside substations.

Posted by [Karlheinz Schwarz](#) at [5:24 AM](#) [No comments:](#) 

Labels: [Gateway](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [wind farm](#)

Monday, July 21, 2014

New: Hands-On Training with Real Devices and Process Signals

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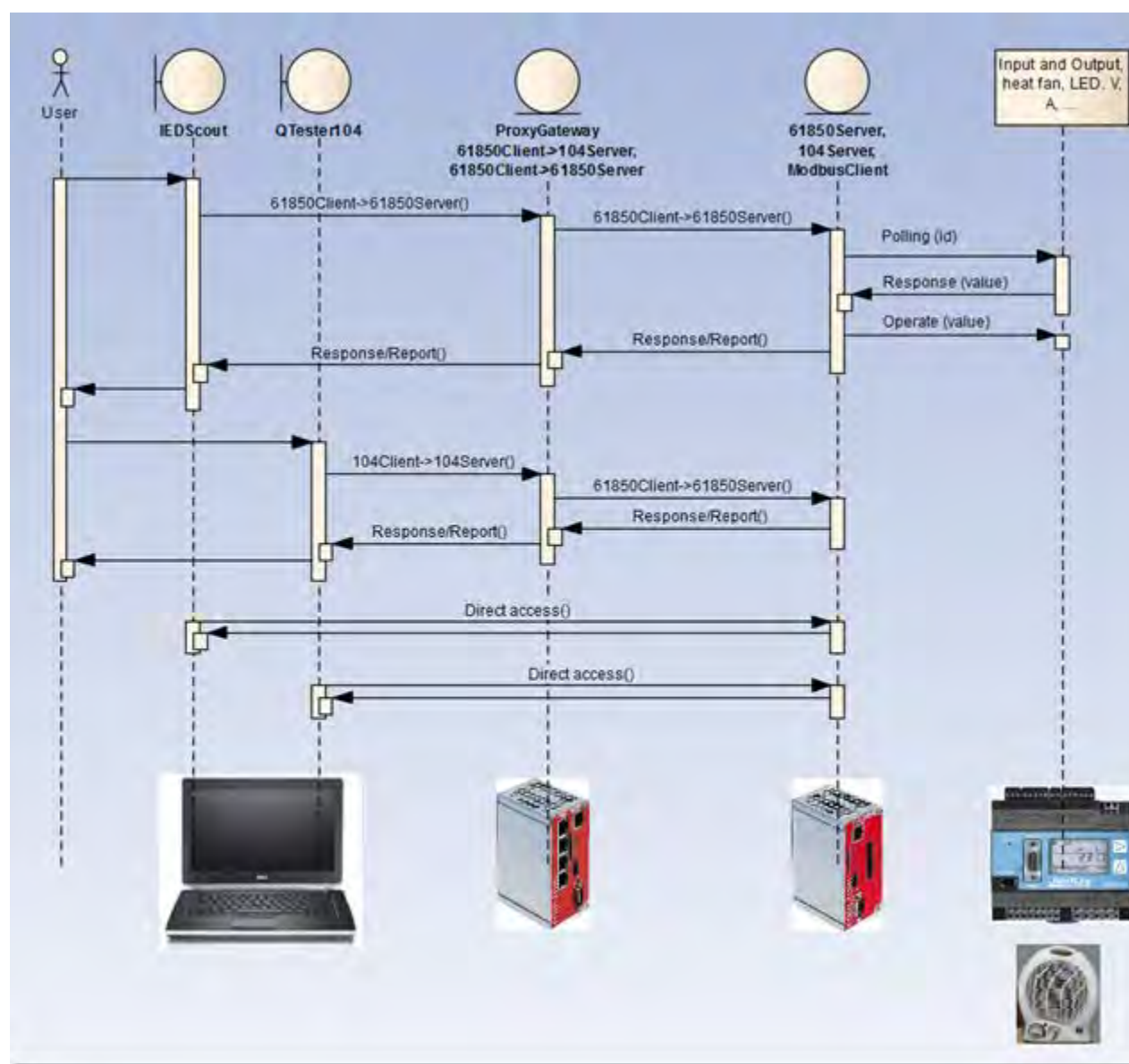
19 years after IEC 61850 standardization started, 10 years after publication of the first set of IEC 61850 core documents, and 10 years after intensive training worldwide, we are now facing a new challenge: Can everybody do hands-on work with the new technology without spending a lot of money?

Yes, You can – if you work with NettedAutomation GmbH.

NettedAutomation GmbH is entering into a new phase of training: using real devices and solutions to work with in the public 3 days general training courses. The program of the 3 days courses is as follows:

- 1 1/2 days Introduction and basics on IEC 61850 (and briefly on IEC 60870-5-104)
- 1/2 day Hands-on training on designing ICD and CID documents
- 1/2 day Configuring and using Server devices for monitoring and control using IEC 61850 and IEC 60870-5-104
- 1/2 day Configuring and using Client devices for IEC 61850 and gateways to IEC 60870-5-104 and proxy server to IEC 61850

The first new training session according to this program will be conducted from **October 15-17, 2014 in Frankfurt (Germany)**. The hands-on sessions using real devices, as depicted in the following figure, show the devices involved. Further evaluation software running under Windows (offered for free) will be provided at the beginning of the course.



On request we are preparing the above evaluation package with one [com.tom 3.1S](#) (104 Server, 61850 client and server), one [com.tom 5.1](#) (104 Server, 61850 Server, Modbus client), a [simple meter with Modbus RTU](#), 24 V power supply, relay to operate a fan, and a fan - mounted on DIN Rail. The com.tom (application, communication, and gateways) are configured via a web browser and a CID file – no programming or extra tools required.

[Contact NettedAutomation GmbH to receive an offer for the above evaluation set, for the training in Frankfurt in October, or for an in-house training.](#)

NettedAutomation will provide several evaluation sets for the hands-on training in October. For in-house hands-on training NettedAutomation can offer communication with these and other devices – even: bring your own devices.

By the way, beginning in fall 2014, **NettedAutomation will also offer (with senior power and protection engineers) intensive 3 days Seminars on Protection and Control with IEC 61850 for HV/MV substations using GOOSE, SV, SCADA, ... SCL:**

- IEC 61850 Introduction and experience. Where are we today?
- Return of experience and application: with Protection and Control (mainly in medium and high voltage) Substation Automation and with SCADA systems.

All Presentations will be supported by practical examples

[Contact NettedAutomation for further details on the special protection and SCADA training courses.](#)

► [January](#) (11)

► [2013](#) (130)

► [2012](#) (188)

► [2011](#) (159)

► [2010](#) (153)

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Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

Please stay tuned.

Posted by [Karlheinz Schwarz](#) at [8:56 AM](#) [No comments:](#) 

Labels: [Beck IPC](#), [Edition 1](#), [Edition 2](#), [education](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEDScout](#), [Modbus](#), [seminar](#), [wireshark](#)

Security for XML based System and Device Configuration Information

Discussion on the protection of configuration information can be found [HERE](#) (just one blog post down). Please note that IEC TC 57 is working on a new part for series IEC 62351 (Data and communications security):

[IEC 62351-11 Ed.1:](#)

Power systems management and associated information exchange - Data and communications security – Part 11: Security for XML Files

The key objectives of this proposal are:

- Provide a mechanism to authenticate the source of the file.
- Provide a mechanism for tamper detection.
- Provide these security mechanisms in a manner that maintains as much compatibility with the current CIM, SCL, and other XML formats as possible.
- Provide a mechanism so that a source of data can identify what data may or may not be made available to other entities in addition to the initial receiving entity.

It is crucial for the whole industry to support these kinds of standardization projects. The user communities have to pay anyway: now or later.

We have that many good standards and draft material that should be implemented soon to make sure that we can keep control over a wide range of infrastructures.

Click [HERE](#) to download an White Paper on Security Standards in IEC TC57 written by Frances Cleveland, WG 15 Convenor [pdf].

Posted by [Karlheinz Schwarz](#) at [4:41 AM](#) [No comments:](#) 

Labels: [configuration](#), [engineering](#), [IEC 62351](#), [iec 62351-11](#), [security](#)

Just published: Draft 61850-90-17 – Using IEC 61850 to transmit power quality data

IEC TC 57 has just published the 52 page Draft IEC Technical Report 61850-90-17 – **Using IEC 61850 to transmit power quality data** (57/1488/DC).

The document is available for comments until 2014-10-10.

[Contact your TC 57 National Committee](#) for a copy.

Phenomena considered in the draft are related to:

- Power frequency
- Magnitude of the supply voltage
- Flicker
- Supply voltage dips and swells.
- Voltage interruptions
- Transient voltages
- Supply voltage unbalance
- Voltage harmonics
- Voltage interharmonics
- Mains signalling voltage on the supply voltage
- Rapid Voltage Changes (RVC)
- Underdeviation and overdeviation
- Magnitude of current
- Current recording
- Harmonic currents
- Interharmonic currents
- Current unbalance
- Frequency deviation
- Supply voltage variations
- Voltage unbalance
- Harmonic voltage
- Interharmonic voltage
- Voltage fluctuation and flicker
- Mains signalling and voltages

This draft is intended to increase the interoperability between power quality monitoring systems and any application that needs the corresponding information for operation or post mortem analysis.

Posted by [Karlheinz Schwarz](#) at [4:19 AM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [monitoring](#), [photo voltaic](#), [power management](#), [power quality](#), [SCADA](#), [wind power](#)

Saturday, July 19, 2014

Are Object Names like “CircuitBreakerMainStreet” a Security Problem?

Security is a very crucial issue in the power management and automation. There are standards and other specifications that help to “close” the automations, information and communication systems. Several blog posts discuss these issues.

In a discussion recently the problem with semantic names like “CircuitBreakerMainStreet” for process information (signals) was understood as crucial. Would such names make it easier for somebody to attack a system? **Why should the problem be in the Name?** If you keep the **doors** to your device or engineering system **wide open** – you should not be surprised if your system will be hacked and the infrastructure be damaged.

Is there really a difference (from a security point of view) if the identification is “CircuitBreakerMainStreet” or “Staus1829” or just “1829”? There would be an issue if somebody could retrieve the name from the device by a “too open” communication protocol. Even with IEC 61850 it should be prevented that everybody could just retrieve the self-description. **Keep the door to the model closed** ... allow only the configuration engineer to access it. This would require to implement IEC 62351-8 (Role based access) or something similar.

The easiest access to the model (SCL file or any other configuration Excel Sheet) is likely hacking the engineering computer and download the corresponding configuration files – or to work at the engineering company and copy the files ... It does not matter what is communicated later at run-time, if you get the **signal designation and the used identifiers in the protocol** you can understand the bits on the wire. This applies to all protocols! DNP3, IEC 60870-5-104, Modbus, IEC 61850, CIM, ... Profibus, ProfiNet, ...

We have to keep an eye on the **whole chain** – not just look at the protocol and how signals are designated:

The **main objective** of the IEC 61850 based engineering process resulting in a comprehensive model description like a SCD File (System Configuration Description according to IEC 61850-6, SCL) **is to get a system document that is consistent, has less errors and less omissions!** Part of the SCD content can be retrieved by self description service of IEC 61850-8-1 – not.

Let’s now look at two persons that use such a comprehensive system document: first person **is authorized person** using the document and second person is **UN-authorized person** using the document. Let’s look at two use cases:

- Case A: Provide and use “open”, comprehensive SCD File.
- Case B: Use proprietary system configuration description.

... and discuss the situation:

	authorized person	UN-authorized person
Case A	Can properly monitor and control the system because the operation is using a consistent and well documented system configuration. Needs to be maintained.	In the (hopeful very unlikely) event of gaining access to the system configuration it may harm the system.
Case B	E.g., especially after some years in operation and after operators have been replaced by new staff, then it may be possible that the operators are not able to properly operate the system!	It is unlikely that the UN-authorized person can do a lot of harm.

I believe that Case A is the preferred one that should be implemented: the **possibility to properly operate** the system by an authorized person outweighs the potential harm that can be done by an UN-authorized person.

One thing is for sure: **Protect the system!!** Don’t allow anybody to get on your network or systems, implement authentication, and many more ...

What do you think? What is your experience? Are you aware of any analysis on this?

I would appreciate receiving your feedback – or you may just post a comment online.

Finally: One more detail on names:

Just a reminder: The IEC 61850 reporting messages and the GOOSE messages **do not need to exchange these names** like “CircuitBreakerMainStreet”. The content of these messages is specified by the corresponding DataSets. [For Reporting see this blog post.](#)

We have to focus on the **WHOLE System!**

Posted by [Karlheinz Schwarz](#) at [1:05 AM](#) [2 comments:](#) 

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [security](#), [self-description](#), [signal designation](#)

Thursday, July 17, 2014

PhD Thesis about IEC 61850 Process Bus application in High Voltage Substations

A few hours after my offer to post links to further thesis that discuss applications related to IEC 61850, I received very useful information from David Ingram (PhD RPEQ MIEAust CPEng(Aus) SMIEEE, Electrical Engineer). He wrote:

“ ...my PhD thesis was on process bus networks looking at SV and PTP. It is freely available for those that are interested.

Title: Assessment of precision timing and real-time data networks for digital substation automation

This project researched the performance of emerging digital technology for high voltage electricity substations that significantly improves safety for staff and reduces the potential impact on the environment of equipment failure. The experimental evaluation used a scale model of a substation control system that incorporated real substation control and networking equipment with real-time simulation of the power system. The **outcomes confirm that it is possible to implement Ethernet networks in high voltage substations that meet the needs of utilities**; however component-level testing of devices is necessary to achieve this. The assessment results have been used to further develop international standards for substation communication and precision timing.”

Click [HERE](#) to download the full PhD thesis [pdf, 17 MB]. It is quite interesting that his thesis has been downloaded 3 times per day (on average)! He has something important to tell you!

[Visit his website](#) with further results of his investigations ... you will find many papers related to IEC 61850 for free download.

Dear David, Thanks for your very valuable contributions. Keep going!

Posted by [Karlheinz Schwarz](#) at [10:21 PM](#) [No comments:](#) 

Transformer Load Tap Changer Control using GOOSE

Nelli Sichwart wrote 2012 her Thesis

TRANSFORMER LOAD TAP CHANGER CONTROL USING IEC 61850 GOOSE MESSAGING

“... IEC 61850 has many benefits including great flexibility and improved interoperability and promises to be **more widely implemented in the United States** with time as is already the case in many other parts of the world. This research shows that **LTC operation using IEC 61850 is reliable and brings with it all**

the benefits that the implementation of IEC 61850 has to offer. Above all, due to elimination of the majority of copper wiring, the proposed method is very flexible and can be implemented using a variety of different devices ...”

Click [HERE](#) to download the thesis [pdf].


Many other thesis related to IEC 61850 have been written:

- [IEC 61850 to ZigBee Gateway](#),
- [Implementation of the IEC61850 international protocol for accurate fault location in overhead transmission lines](#)
- [Use of Semantic models in Integrated Operations for Oil & Gas and New Energy](#)
- ...

Just [GOOGLE for further master thesis](#) ... You will be surprised.

If you find some other interesting publications (papers, presentations, thesis, ...) let me know in order to post it on the blog.

Thanks!

Posted by [Karlheinz Schwarz](#) at [8:11 AM](#) [No comments:](#) 

Labels: [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [master thesis](#), [MMS](#)

IEC 61850 (MMS) running over LTE

Giang T. Pham did some research on running IEC 61850 (MMS) over LTE. The result is a Master Thesis at the University of Twente:

“Integration of IEC 61850 MMS and LTE to support smart metering communications”

“... The objective of this research is to **integrate IEC 61850 MMS and LTE** to support communications between **smart meters** and the central meter data management system. The research includes a literature study of IEC 61850 MMS protocol, focusing on its

requirements to support smart metering communication, and **simulation-based performance evaluation** of IEC 61850 MMS smart metering traffic over LTE network. ...

... Since both MMS and LTE support the use of TCP/IP communication profile, the mapping of MMS over LTE to support remote control communication is feasible ... the simulation results prove that the **integration of IEC 61850 MMS and LTE is not only possible but also provides good performance in term of delay, throughput and packet loss**.

Click [HERE](#) to download the Master Thesis [pdf].

Posted by [Karlheinz Schwarz](#) at [7:27 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [LTE](#), [master thesis](#), [MMS](#)

Why does Security often have a low priority?

During a conversation with a manager of a vendor of Energy Management Systems (EMS) today, I was surprised hearing that they offered a training course on Security measures in 2013 – but had to cancel the course because of too less registrations! Could that be true in 2013?

Here is some information on security measures easy to read and understand – maybe hard to implement:

Whitepaper
Anforderungen an sichere Steuerungs- und Telekommunikationssysteme

White Paper
Requirements for Secure Control and Telecommunication Systems

Click [HERE](#) for the bilingual document [pdf]

There is also a companion document (in German) available that gives further guidelines on how to apply the requirements for control center level systems, for communication infrastructure level, and for substations and RTUs:

“Anforderungen an sichere Steuerungs- und Telekommunkationssysteme
Ausführungshinweise zur Anwendung des BDEW Whitepaper”

These requirements are mandatory for vendors!!

Click [HERE](#) for the document [pdf, DE].

Every expert in the energy automation business should read, understand, and apply these requirements.

On page 58 you can read (in German):

“Entsprechend den technischen Möglichkeiten sollten in **allen Bereichen standardisierte IEC-Protokolle angewendet werden**. Der private Bereich dieser Kommunikationsprotokolle sollte nach Möglichkeit nicht verwendet werden.
Eine **Verschlüsselung der Protokolle nach IEC 62351** sollte durch den Betreiber geprüft werden, wobei ggf. auftretende Einschränkungen bei der Fehlerdiagnose sowie die notwendige Infrastruktur und Prozesse zur Schlüsselverwaltung berücksichtigt werden sollten.
Dort, wo aktuelle Systeme und Geräte noch nicht die Möglichkeit der Verschlüsselung nach IEC 62351 bieten, sollte die Fernwirkübertragung daher auf den unterlagerten Netzwerkebenen geschützt werden, z.B. durch Nutzung von VPN-Technologie oder SSL/TLS-Tunnelung.
Insbesondere für IP-basierte Protokolle sollten entsprechend sichere Netzwerkstrukturen vorgesehen werden (siehe 2.3).”

By the way, the whitepaper can be used by English speaking experts to learn German – and vice versa ;-)

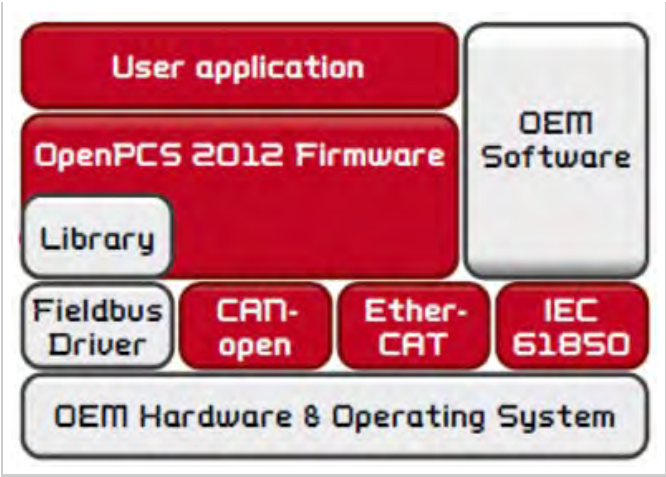
Posted by [Karlheinz Schwarz](#) at [6:02 AM](#) [No comments:](#) 

Labels: [BDEW](#), [control](#), [control center](#), [IEC](#), [IEC 62351](#), [security](#), [Substation Automation](#)

Wednesday, July 16, 2014

infoteam software supports IEC 61850

Programming application software using OpenPCS (infoteam implementation of IEC 61131-3) is one of the well known options in the PLC world. OpenPCS also incorporates IEC 61850 client/server and publisher/subscriber roles as well as SCL configuration. The result is, for example, a powerful “Smart Grid Controller”:



Click [HERE](#) for more information [EN].
Click [HERE](#) for more information [DE].

Posted by [Karlheinz Schwarz](#) at 7:53 AM No comments:

Labels: [IEC 61131-3](#), [IEC 61499](#), [IEC 61850](#), [infoteam software AG](#), [SystemCorp](#), [TQ](#)

Tuesday, July 15, 2014

Security – A never ending Story

The more our societies rely on computerized information sharing the more we need to take care that we implement protection mechanisms to run the systems reliable. There are many discussions and approaches how to make or keep the systems robust.

These days there are several discussions going on about whether it is better to keep the vulnerabilities top secret or to let people know how close we are to a lot of critical damages.

Whatever your position is: There is a need to increase the efforts to keep control over our critical infrastructures. And this will require a lot more resources than those written in many business plans for 2014, 2015 and beyond. We have to pay for it anyway: NOW or LATER! Maybe it will be more expensive to pay later!

It is not sufficient to know the issues – We must prevent or fix them actively ... as soon as possible.

The other day a new study on ICS and SCADA Security was published:

Critical Infrastructure: Security Preparedness and Maturity

Sponsored by Unisys Independently conducted by Ponemon Institute LLC

“The purpose of this research is to learn how utility, oil and gas, alternate energy and manufacturing organizations are addressing cyber security threats. These industries have become a high profile target for security exploits. Moreover, it has been reported that if their industrial controls systems (ICS) and supervisory control and data acquisition (SCADA) systems were attacked the damage could be enormous. ... As the findings reveal, organizations are not as prepared as they should be to deal with the sophistication and frequency of a cyber threat or the negligence of an employee or third party. In fact, the majority of participants in this study do not believe their companies’ IT security programs are “mature.””

Click [HERE](#) to download the report.

My personal understanding is: Everything that is remotely accessible can be breached; everything that is programmed can be re-programmed.

Isn’t it true what King Salmon wrote in Ecclesiastes 1,18 (King James Version): “For in much wisdom is much grief: and he that increaseth knowledge increaseth sorrow.”

This is our daily experience! Or?

Posted by [Karlheinz Schwarz](#) at 1:23 AM No comments:

Labels: [ICS](#), [programming](#), [protection](#), [protocol](#), [SCADA](#), [security](#)

Friday, July 11, 2014

New Power Quality and Energy Measurement device supporting IEC 61850

Bender Grünberg offers a new Power Quality and Energy Measurement device supporting IEC 61850 information exchange:

The digital universal **measuring device PEM735** is suited for measuring and displaying electrical quantities of electricity networks. The device measures currents and voltages, energy consumption and power, and displays the individual current/voltage harmonics for assessment of the power quality in accordance with DIN EN 50160. The accuracy of active energy measurements corresponds to class 0.2 S in accordance with DIN EN 62053-22 (VDE

0418 part 3-22). The current inputs are connected via external .../1 A or .../5 A measuring current transformers.

Click [HERE](#) for general information.
Click [HERE](#) for the data sheet.

Posted by [Karlheinz Schwarz](#) at [5:37 AM](#) [No comments:](#) 

Labels: [Bender](#), [DIN EN 50160](#), [IEC 61850](#), [power quality](#)

Wednesday, July 9, 2014

Deutsche Gasversorgung nutzt Profil für IEC 60870-6 TASE.2

20 Jahre nach der Veröffentlichung der Normenreihe IEC 60870-6 TASE.2 (ICCP) ist das Thema TASE.2 bei der deutschen Gasversorgung immer noch hochaktuell! Das wird sicher auch für die nächsten 20 und mehr Jahre so sein!

IEC 60870-6 TASE.2 basiert auf derselben Basistechnologie wie IEC 61850 und IEC 61400-25: MMS (Manufacturing Message Specification, ISO 9506). MMS ist aus dem MAP-Projekt Mitte der 80er Jahre hervorgegangen.

Der DVGW-Arbeitskreis „Standardisierung des Informationsaustausches zwischen Dispatchingzentralen“ empfiehlt für den Austausch von Prozessdaten den Einsatz des „Telecontrol Application Service Element Two“ (kurz TASE.2).

Die Spezifikation des TASE.2-Standards zum Einsatz zum Prozessdatenaustausch zwischen Leitzentralen der Gaswirtschaft sowie einen Leitfaden zur Anwendung finden Sie in der DVGW Gas-Information Nr. 18 "Prozessdatenaustausch zwischen Leitzentralen der Gaswirtschaft auf Basis von TASE.2" , Ausgabe Februar 2012.

Der Leitfaden gibt einen Überblick über die wichtigsten Merkmale und Funktionalitäten von TASE.2 und die konkrete Anwendung von TASE.2 im Extranet der Gaswirtschaft. Der Leitfaden kann auch als Profil verstanden werden. Von der Vielzahl der Möglichkeiten der TASE.2 werden die Definitionen ausgewählt, die für den Anwendungsbereich zu verwenden sind – um einen hohen Grad an Interoperabilität zu erreichen.

Hier [klicken](#), um die DVGW Gas-Information Nr 18 herunterzuladen [pdf, nur lesbar]. Eine [druckbare Pdf-Version](#) kann erworben werden.

Vor 15 Jahren haben die an der Normung beteiligten Experten den folgenden Report veröffentlicht:

etz-Report 32

Open communication platforms for telecontrol applications:
benefits from the new standard IEC 60870-6 TASE.2 (ICCP)

Einige [Exemplare des etz-Reports 32](#) stehen noch zur Verfügung und werden kostenlos abgegeben.

Die hier beschriebene Profil-Bildung sollte auch für IEC 61850 in anderen Anwendungsbereichen zum Vorbild dienen! Dafür werde ich mich verstärkt einsetzen.

Posted by [Karlheinz Schwarz](#) at [2:05 AM](#) [No comments:](#) 

Labels: [control center](#), [etz Report](#), [gas](#), [ICCP](#), [IEC 60870-6](#), [profile](#), [TASE.2](#), [TASE.2 ICCP](#)

Monday, July 7, 2014

Industrieforum VHPready nimmt Fahrt auf

Das "Industrieforum VHPready" erarbeitet einen Standard für virtuelle Kraftwerke, der auf den Normen IEC 60870-5-104 und IEC 61850 aufbaut. Mittlerweile haben die ersten Arbeitsgruppen des Vereins ihre Arbeit aufgenommen:

- AG 1: Weiterentwicklung von VHPready
- AG 2: Zertifizierung/Präqualifikation
- AG 3: Marketing, Internationalisierung und Standardisierung

Vision und Mission des Vereins:

Das Industrieforum VHPready e.V. setzt sich für die Realisierung der Energiewende durch die **standardisierte Vernetzung dezentraler Energieanlagen** ein. Der Standard VHPready und seine Zertifizierung gewährleisten das nahtlose, sichere und wirtschaftliche Zusammenwirken aller steuerbaren Komponenten und deren Kompatibilität. VHPready bildet die Grundlage für den flexiblen Zusammenschluss **dezentraler Energieanlagen zu virtuellen Kraftwerken**.


[Hier](#) für den Flyer klicken.
[Hier](#) finden Sie den Zugang zu VHPready.
[Hier](#) ist eine aktuelle Veröffentlichung in den EW Medien.

Mitte Juni 2014 waren folgende Firmen und Organisationen Mitglied: 2G Energy • 50Hertz • Beck IPC • Bosch SI • Energy2market • E.ON Connecting Energies • IABG • Fraunhofer Gesellschaft • IT&I • LichtBlick • Optimax Energy • Phoenix Contact • SSV Software Systems • Vattenfall Europe Wärme • WAGO Kontakttechnik • Younicos

Das Industrieforum ist aus meiner Sicht die erste ernstzunehmende Aktivität in Deutschland, die Vielfalt in der Kommunikation zwischen den vielen dezentralen Energieerzeugungsanlagen (Energie-Erntemaschinen) und Leitsystemen zu reduzieren beziehungsweise erst gar nicht aufkommen zu lassen.

Ohne (eine oder vielleicht zwei) einheitliche Kommunikationslösungen werden die Aufwendungen bei der Realisierung von notwendigen Informationsaustauschverfahren sehr hoch – was dazu führt, dass entweder viele Energieerzeugungsanlagen gar nicht oder nicht optimal eingesetzt werden können oder die Anlagen nur mit einer einzigen Leitstelle kommunizieren kann.

Die Mitarbeit im Industrieforum VHPReady sollte ein Muss für alle Netzbetreiber, Betreiber von virtuellen Kraftwerken und von dezentralen Erzeugungsanlagen sein!

Posted by [Karlheinz Schwarz](#) at [3:22 AM](#) [No comments:](#) 

Labels: [Beck IPC](#), [E.ON](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Vattenfall](#), [VHP Ready](#), [virtual power plant](#)

Sunday, June 29, 2014

One Standard – multiple Terms for the same Thing

The Standard series IEC 61850 and IEC 61400-25 define hundreds of new terms for information models and communication models. Usually a term defined in one part and re-used in another part is the same (syntactically and semantically). In some cases you will find different terms for the same “meaning”.

Here is one example to explain what I mean:

The Standard part IEC 61850-7-2 (ACSI) defines in clause 12.3.3.3:

TrgOp [0..2] – trigger option

The attribute TrgOp of type TriggerConditions shall define the trigger conditions (associated to a data attribute of a data object) that may cause a report to be sent or a log entry to be stored into a log.

Three values are defined to be used inside the data object:

dchg data-change A report or a log entry shall be generated due to a change of the value of the associated data attribute

qchg quality-change A report or a log entry shall be generated due to a change of the value of the associated quality data attribute q

dupd data value update A report or a log entry shall be generated due to updating the value of a data attribute. An updated value may have the same value as the old value. An example is freezing the value of a freezable data attribute updating the value of another data attribute, which could lead to the same value it already has.

The trigger conditions **integrity** and **general-interrogation** of the TriggerConditions type are used independent of instances of a data object.

The service parameter **IntegrityPeriod** is mapped to **intgPd**:

17.2.2.12 IntgPd – integrity period

IntgPd shall indicate the period in milliseconds used for generating an integrity report.

So far so good – even we have already three terms:

integrity, IntegrityPeriod, IntgPd, or integrity period.

What does part 6 (SCL) define?

```
<xs:complexType name="tTrgOps">
  ...
  <xs:attribute name="period" type="xs:boolean" use="optional" default="false"/>
```

and for the value attribute of “period”: **intgPd="2000"** in the report configuration element.

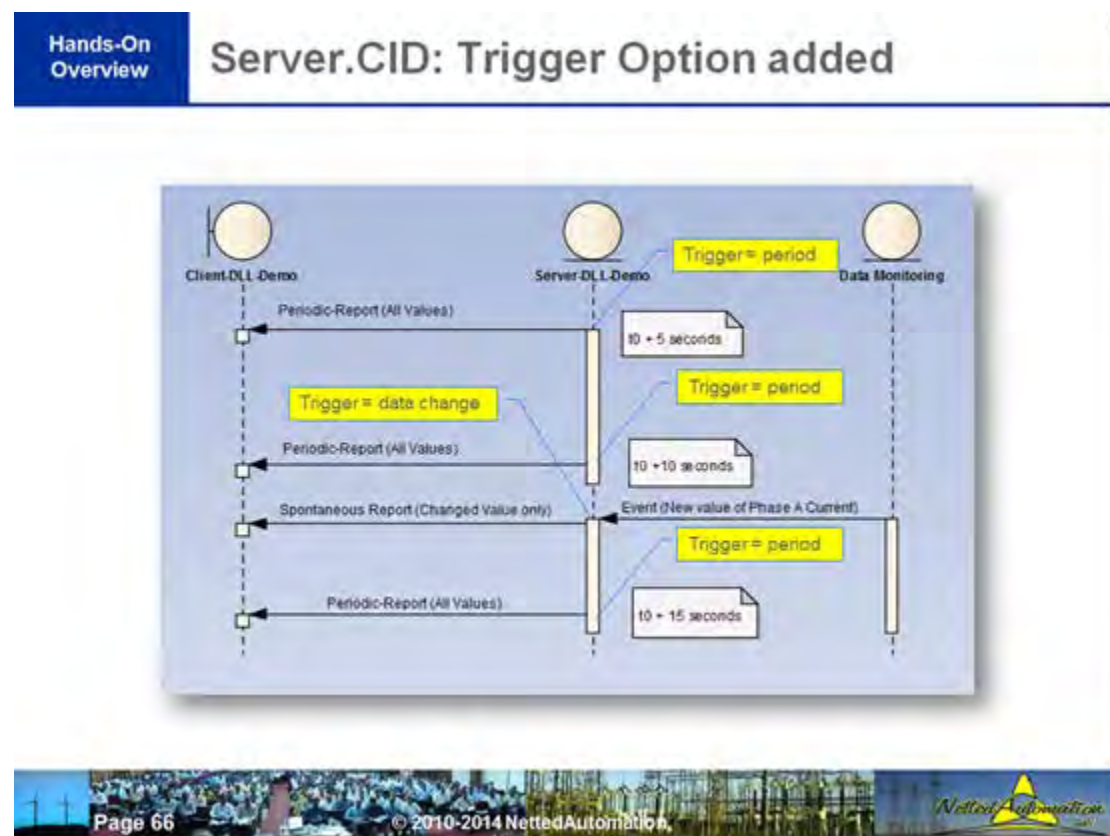
So, we find six terms that mean more or less the same thing ... you have to understand what they mean and when to use one or the other!

When it comes to IED Configuration Tools (ICT), you may have to learn new terms again:

Trigger Options	
Data Change	<input checked="" type="checkbox"/> true
Data Update	<input checked="" type="checkbox"/> true
Included in Integrity Poll	<input type="checkbox"/> false
Quality Change	<input checked="" type="checkbox"/> true

Here the SCL attribute “period” is set to true, if the checkbox for “Included in Integrity/Poll” is set.

By the way, these terms describe something quite easy: **Push** all (!) values of a DataSet every n milliseconds. Without a request from the client. In addition to the cyclic push you may configure the server to report the value of a single signal after it has changed (data change)):



You want to learn how to use the standard? We offer training courses that help you to apply the standards in your daily business! It is more convenient to attend a training than to read all the standards ... we have the long-term experience that we would like to share with you.

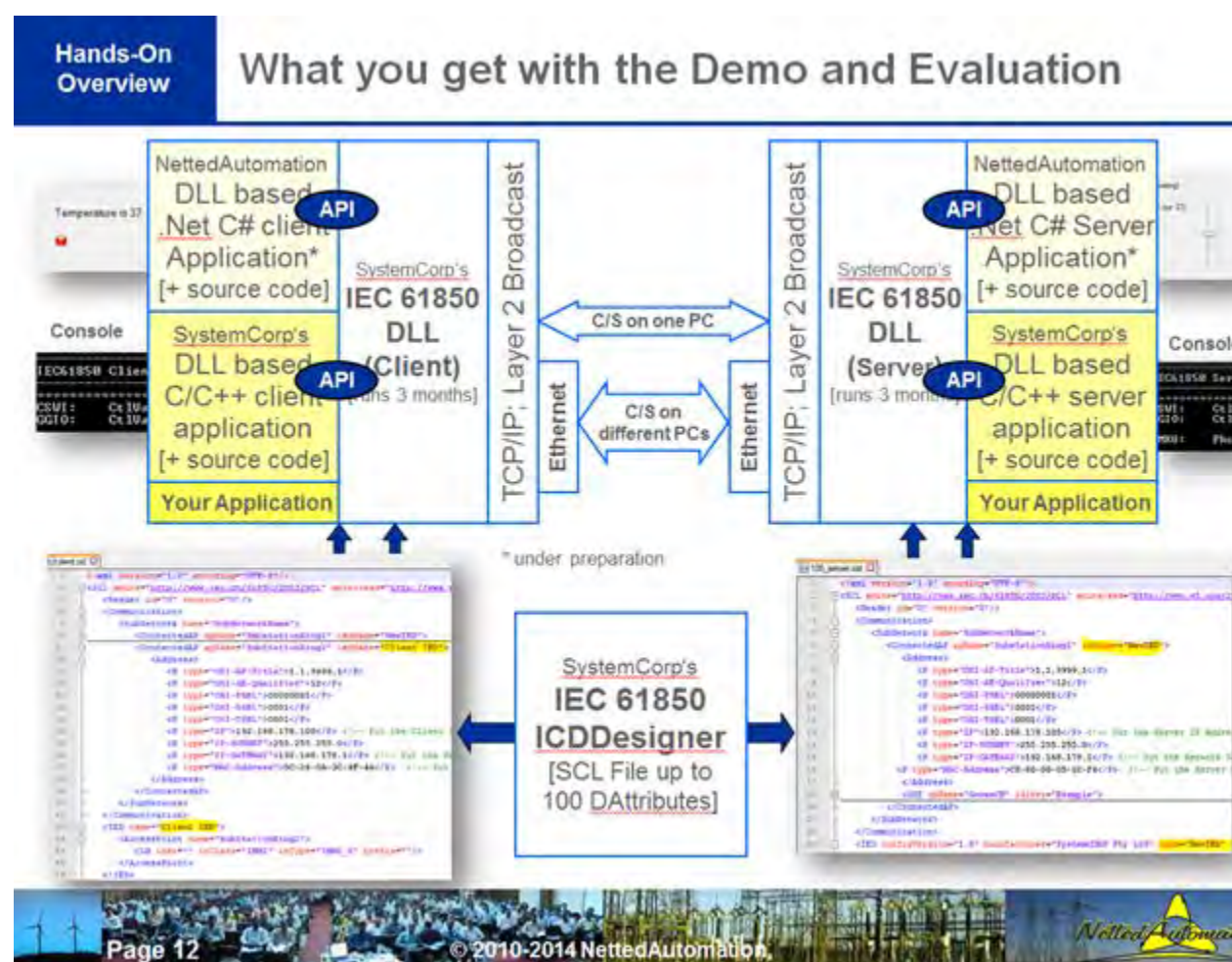
Posted by [Karlheinz Schwarz](#) at 9:01 AM No comments:

Labels: [cyclic](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [polling](#), [Reporting](#), [seminar](#), [standards](#), [Training](#)

Friday, June 27, 2014

Version 2 of SystemCorp's IEC 61850 Stack and API available

The V2.02 of SystemCORP's IEC 61850 library is now available for all platforms. A new demo and evaluation package that runs under Windows is also available. This evaluation provides the DLL (includes Stack, internal IED SCL configuration tool, and API), a server application, and a client application. The demo applications come also with source code in C/C++:



This version supports both Edition 1 and Edition 2 of the IEC 61850 standard, and includes multiple improvements to system communication and memory management.

The following list shows the communication service models implemented:

Supported IEC 61850 Functionality			
Basic Exchange	Association, Abort, Release	Unbuffered Reporting	GetURCBValues
	GetServerDirectory		Optional Fields
	GetLogicalDeviceDirectory		Trigger Conditions
	GetLogicalNodeDirectory		General Interrogation
	GetDataValues		GetURCBValues
Data Set	GetDataDirectory/GetDataDefinition	Buffered Reporting	Optional Fields
	GetLogicalNodeDirectory(DATA-SET)		Trigger Conditions
	GetDataSetValues		General Interrogation
Substitution	GetDataSetDirectory		Buffering Events
	SetDataValues		
	GetDataValues		
GOOSE Publishing		GOOSE Subscription	
Sample Value Publishing		Sample Value Subscription	
Direct Control		SBO Control	
Enhance Direct Control		Enhance SBO Control	
Time Synchronization			

and these are the API functions:

Overview PIS-10 IEC 61850 API
<ul style="list-style-type: none">Stack Management Functions: <i>CREATE, LOAD <configuration file>, START, STOP, FREE</i>User Data Exchange Functions: <i>READ, WRITE,UPDATE, CONTROL_SELECT, CONTROL_OPERATE, CONTROL_CANCEL</i>System Interface Functions: <i>GET_TIME, SET_TIME</i>Version Control Functions: <i>GET_VERSION</i>Debugging Information: <i>ERROR_STRING, PRINT_DATA_ATTRIBUTE_ID, PRINT_DATA_ATTRIBUTE_DATA</i>

The API is very convenient and simple!

Click [HERE](#) for more general details.
Click [HERE](#) for the getting started check list ...

We are offering 6 hours comprehensive hands-on training in our standard public training courses like the one scheduled for October 15-17, 2014:

<http://nettedautomation.com/seminars/uca/sem.html#fra14-05>

The most efficient education are offered as in-house training courses.

Posted by [Karlheinz Schwarz](#) at [8:49 AM](#) [2 comments:](#) 

Labels: [API](#), [Demo Kit](#), [Evaluation](#), [free download](#), [hands-on Training](#), [IEC 61850](#), [IEC 61850 edition 2](#), [seminar](#), [stack](#), [SystemCorp](#), [Training](#)

Tuesday, June 10, 2014

Useful Links for Visitors of the SG Paris 2014 - From Smart Grids to Smart Networks, June 11-13

In order to save paper copies, please find links to some interesting documents I usually distribute during conferences and exhibitions:

"The Beautiful Simplicity of the Integration of Modbus, DNP3, IEC 60870-5-104, and IEC 61850 into a powerful WEB-PLC operating on an Embedded Controller"
[com-tom-Gateway_Introduction_2014-03-21.pdf](#)

com.tom WEB-PLC and Integration of IEC 61850 and IEC 60870-5-104 - This document explains the first steps
[com.tom WEB-PLC_61850-104_GettingStarted_V01.pdf](#)

"Easy, Affordable and Fast Integration of IEC 61850 in Small Devices". - More about IEC 61850 on IPC@CHIP®.
[IEC61850_Schwarz_EN_2014-03-21.pdf](#)

[Personal experience, capabilities, of Karlheinz Schwarz ... introduction on IEC 61850, training modules, feedback from attendees, list of companies, countries, and pictures](#)

[Training opportunity 15-17 October 2014 in Frankfurt/Main, Germany](#)

Posted by [Karlheinz Schwarz](#) at [3:07 AM](#) [No comments:](#) 

Labels: [Beck Chip](#), [Beck IPC](#), [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#), [seminar](#), [Training](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Friday, June 6, 2014

A REFRESHER ON THE “STANDARDS CONTINUUM”

Erich Gunther, Aaron Snyder and Grant Gilchrist, EnerNex have published an interesting article in the SGIP Newsletter, Volume 6, June 2014 Issue:

A REFRESHER ON THE “STANDARDS CONTINUUM”

Their Conclusion is right:

“Often misapplied, the term “standard” is truly only applicable in certain situations. The author of this piece advocates reserving the **use of “standard” for de jure standards**, especially when employed without the "de jure" modifier. There may appear to be little harm in referring to de facto "standards" simply as “standards,” but this actually dilutes and confuses the definition in the manner that the term "engineer" is often misapplied to functions requiring no engineering education or certification. For example, in these cases, it is preferable to use the applicable term of "specification," "requirements" and "requirements specification" instead of "standard.””

Click [HERE](#) for the full article.

So far so good. There are other languages that differentiate between “Standard” and “Norm”, like in German. German “DIN Standards” are specifications that are reflecting a document that has been published with lower hurdles than a “Norm”. The “DIN Norm” compares to the de-jure Standard.

The reality is more complex than just to differentiate between de-jure Standards and other documents. The **(de-jure) Standards have to be extended in many cases by non-de-jure Standards**: e.g., Implementation agreements that can be written by a Two-party (two vendors, one vendor and one user, one vendor and one testlab, ...), an Alliance, Users Group, or standardization bodies.

The future power delivery systems will need many combinations of **de-jure (Base) Standards and non-de-jure Documents** (Implementation agreements, Profiles, ... and even Green-Tissues-List as in case of IEC 61850, IEC 61400-25 – these are documents that are refer to de-jure Standards).

In the end of the day, we want to get interoperable devices to build multi-vendor automation systems for the future power delivery system! Or?

In case of IEC 61850 I see a lot of pressure to come up with more “official” Implementation agreements or Profiles that are **agreed by more than two parties, two companies, or two experts**.

One good example is the [VHPReady Industrieforum](#). Click [HERE](#) for the current Specification 3.0 in English.

This is a good starting point – it’s not yet the final result ... to expected early 2015.

Posted by [Karlheinz Schwarz](#) at [2:10 AM](#) [No comments:](#) 

Labels: [de jure](#), [IEC](#), [Normung](#), [profile](#), [SGIP](#), [standards](#), [VHP Ready](#)

Wednesday, June 4, 2014

MegaWatt Needs Smarter Megabit/s

What do we need? Huge countries need many **MWatt** (unit of power) to survive. To get the power whenever we want to use it, we need more **“Smart Mbit/s”** (“smart” data transfer rate in Mega bit per second). That means: more communicating devices ... maybe tens of Millions in some time down the road. What do 1,000 MegaWatt (= 1 GW) and 1,000 Mbit/s (= 1 Gbit/s) have in common? These are huge numbers! And more: We need them both in the near future! The crucial issue is here: One needs the other. Zero GW means Zero Gbit/s and Zero Gbit/s means Zero GW.

Yes, you got it! The two are becoming **increasingly interdependent**!

There is (mainly) **ONE medium** to carry power: wires. There are **hundreds or even thousands of media** to communicate information! Guess you could not count them all. In order to keep the cost for the future power delivery system reasonably low, we could and should think of preventing the proliferation of communication systems. Guess you agree. But: Which solutions are worth to use? No doubt: IEC 61850, IEC 60870-5-104, DNP3, Modbus, ... are those that would do a good job!

I would be very happy to have as many communication systems as we have power delivery systems: DC 24V, DC 48V, 3 phase AC 110V/60Hz, 3 phase AC 240V/50 Hz, ... and a few more.

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Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

Clark Gellings (one of the world's leading experts on the electricity system, ERPI Palo Alto) talked in a podcast about "The Future of the Power Grid". He talks about crucial aspects of the future power systems. Key issues (from my point of view) are summarized in the following three points:

Question:

"So what are a few of the things that will have to happen between now and 50 years from now to make your vision of the grid a reality?"

Clark Gellings' answer:

Well, first, we're **going to need communications standards** that allow devices to talk to one another, so that we don't have the problem we have now. For example, in buildings, the **electronics that are being used have as many as 28 different communications architectures**. And so one building technology that might control some new thermal storage unit you have may not be able to talk to another device in that building.

Number two, the computer system that would control these millions of nodes in any given region of the United States, they don't exist. I mean, we can control tens of thousands of nodes, and we do now, but we're going to need to control millions of nodes. So that's another area of development.

And thirdly, technology. For example, power electronics to fully be able to control, in a very fluid way, the power systems, even to the point of doing things like having the system self-heal, or taking action so as to mitigate from an outage that it sees, even before necessarily the outage has occurred."

... sounds very expensive!? Not that much ... listen to Clark Gellings.

Click [HERE](#) to listen to the podcast, find a link to download the mp3, and read the content.

Anyway, the 28 different communication architectures in the building automation he mentions are not so bad - compared to the factory automation with hundreds of solutions!



why not use the IEC 61158 (solutions)? Because it has too many!



IEC 61850 is about to unify most of them (at least at the near-process level where we find the Millions of signals to be shared between Millions of smart devices). And to provide smarter mechanisms to share information.

I hope we can convert more Mbit/s into "Smart Mbit/s": using them in a smart way. Using **smart communication mechanisms** (like IEC 61850) will require **less bandwidth** and **smart power systems** will need **less MW**.

Posted by [Karlheinz Schwarz](#) at [10:40 AM](#) [No comments:](#) [✉](#)

Labels: [communication](#), [DNP3](#), [EPRI](#), [future](#), [IEC 60870-5-104](#), [IEC 61158](#), [IEC 61850](#), [Smart Grid](#), [smart](#)

[people](#), [smart solution](#)

Friday, May 30, 2014

Exhibition in Paris: SG Paris 2014 - From Smart Grids to Smart Networks, June 11-13

You are invited to stop at booth i4 at the **SG Paris 2014** - From Smart Grids to Smart Networks, and see IEC 61850, IEC 60870-5-104 and Gateways in action:



The Exhibition & Conference start from June 11 to 13 in La Défense (Paris) – daily from 8:30h – 19:00h).

In France, Smart Grid technologies have been rapidly developing over the course of the past few years, with high stakes surrounding the roll-out of smart meters, and notably ERDF's highly publicized meter, Linky, and GRDF's Gazpar.

The Smart Grids Paris trade show is now one of Europe's leading events in the Smart Grids field, counting 3000 attendees, 70 exhibitors and almost 150 speakers.

Beck IPC, [EBDS](#) and NettedAutomation invite you to visit us at the SG Paris 2014 at the booth of EBDS (European Business Development Services) **i4** and see our standard-based solutions for smart grids:


- **com.tom data manager** with an integrated service router, switching functionality, various modems, and live data connection to the com.tom internet portal system.
- **IEC 61850, IEC 61400-25, IEC 60870-5-104**, and IEC 62351 (security) are integrated to easily build gateways and manage your data.
- **Everything you are looking for** - integrated in a single device!
- **Applications:** Data Concentrator, System Monitoring, Asset Monitoring, Gateway, RTU, Interface to any process level devices, sensors and actuators, ...
- Examples of applications:
 - [Power quality meter information and simple I/Os](#)
 - [PV inverter monitoring and control](#)

Access to the exhibition is free.

More about com.tom under www.com-tom.de

More about the fair under www.sgparis.fr

See you there.

Posted by [Karlheinz Schwarz](#) at [5:52 AM](#) [No comments:](#) 

Labels: [Beck IPC](#), [com.tom](#), [conference](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Smart Grid](#), [smart metering](#), [smart people](#), [smart solution](#)

Thursday, May 22, 2014


VHPReady Website online

Das Industrieforum VHPReady e.V. setzt sich für die Realisierung der Energiewende durch die **standardisierte Vernetzung** dezentraler Energieanlagen ein. Das Industrieforum VHPReady e.V. leistet einen Beitrag zur Integration erneuerbarer Energien in den Energiemarkt und ermöglicht den Ausgleich ihrer Volatilitäten durch das orchestrierte Zusammenwirken dezentraler Energieanlagen. Der Standard VHPReady und seine Zertifizierung gewährleisten das nahtlose, sichere und kostengünstige Zusammenwirken aller steuerbaren Komponenten und deren Kompatibilität und bilden die Grundlage für flexible Aggregationen dezentraler Energieanlagen zu virtuellen Kraftwerken.

Das Industrieforum hat seit einigen Tagen einen eigenen Webauftritt:

<http://vhpready.de/>

Click [HERE](#) for some discussion of the approach.

Posted by [Karlheinz Schwarz](#) at [12:58 AM](#) [No comments:](#) 

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [interoperability](#), [Vattenfall](#), [VHP Ready](#), [virtual power plant](#)

Thursday, May 15, 2014

IEC 61850-90-2 for the Communication With Control Centers

The Communication With Control Centers (from substations, power generation stations, and other sites) is usually based on IEC 60870-5-101/-104 or DNP3. The new part IEC 61850-90-2 will describe how IEC 61850 can be used for the above needs.

Experts from ERDF, Siemens, Solvay and RTE have published a paper that describes requirements, concepts and practical experiences related to the communication with control centers:

“Substation to control centre communication based on IEC 61850: requirements, concepts and practical experiences” (Cigre 2012)

SUMMARY

“Featuring object-oriented data models and a standardized configuration language, IEC 61850 represents the state-of-the-art communication standard for substation automation systems. On the other hand, the control centres increasingly promote object-oriented data models and standardized interfaces for data exchange based on IEC 61968 / IEC 61970 (CIM – Common Information Model). For the interconnection of substations and control centres the use of generic signal-oriented communication protocols i.e. IEC 60870-5-101/-104 or DNP3 is still current practice. In order to overcome the limitations of those legacy protocols in terms of data conversions, elaborated data exchanges and proprietary configurations and to foster the use of a seamless object-oriented communication, IEC TC57 is extending the current IEC 61850 specification to close the gap between substations and control centres. The paper gives an introduction into the topic, presents the relevant use cases and derived requirements. Furthermore it discusses communication and modeling aspects in regards of the use case specific requirements. These concepts are evaluated against industrial power system operator needs. Foreseen consequences for standardization and practical realization of projects are identified.”

The report concludes:

“The experience from projects and systems in operation have proven the benefits of IEC 61850 substation to control centre communication.”

Click [HERE](#) for the full paper [pdf]

Posted by [Karlheinz Schwarz](#) at [7:50 AM](#) [No comments:](#) 

Labels: [CIM](#), [control center](#), [DNP3](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [legacy](#), [Substation](#)

The Canadian Smart Grid Standards Roadmap and IEC 61850

“The Canadian Smart Grid Standards Roadmap” is a remarkable document that focuses on the real needs for the future of Smart Grid Technologies and standards.

It is no surprise that IEC 61850 is a key standard in this roadmap. The roadmap comes with a list of 17 recommendations on what to do in the future. Two of the six recommendations for Transmission and Distribution (T&D) systems refer to IEC 61850:

Recommendation T&D3:

To support Smart Grid interoperability requirements, the CNC/IEC should encourage the adoption and application of **IEC 61850** for the purpose of communications **between substations, between substations and control centre**, and for transferring **synchrophasor data**.

Recommendation T&D4:

The CNC/IEC should encourage the development of guidelines and standards for utilities to migrate from existing, commonly used technologies, to the architecture described in IEC 61850. At the same time, the CNC/IEC should recognize that the large, existing investment by utilities in the older technologies will require **gateway solutions** and **protocol converters** during the initial transition period.

- In addition, the CNC/IEC should encourage **extending this standard to distribution automation equipment and distributed energy resources**.

Other IEC TC 57 Standards are listed as well: IEC 62357, IEC 61970 and 61968 (CIM), IEC 62351 (Security), as well as IEEE 1815 (DNP3).

Click [HERE](#) for the full Roadmap [pdf, 0.9 MB].

Posted by [Karlheinz Schwarz](#) at [7:36 AM](#) [No comments:](#) 

Labels: [CIM](#), [DER](#), [distribution](#), [distribution automation](#), [DNP3](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC 62351](#), [Roadmap](#), [security](#)

Tuesday, May 13, 2014

Want to see IEC 61850 in action? Attend the next Free Workshop

Beck IPC offers two **Free of Charge Workshops end of May 2014 in German and in English**.

The interest in applying IEC 60870-5-104, DNP3, IEC 61850, IEC 61400-25 ... using products of Beck IPC is growing skyrocketing!

The **third** free of charge Workshop in German is scheduled for:

Datum: **27. Mai 2014**

Ort: Wetzlar, etwa 70 km nördlich von Frankfurt

Zeit: 10:00 Uhr - 17:00 Uhr

[Programm und Anmeldung](#) (Deutsch).

the **second** free of charge Workshop in English is scheduled for:

Date: **28. May 2014**

Location: Wetzlar (Germany), some 70 km north of Frankfurt

Time: 10:00 h - 17:00 h

[Program and registration](#) (English).

Registration information for both events can be found under the above links.

[Karlheinz Schwarz \(NettedAutomation GmbH\)](#) will conduct the workshop. You will learn a lot about the Standards and the many possibilities to apply the various com.tom platforms.

The attendees of the former workshops have appreciated the deep inside view in the standards and how they can be used.

See you there.

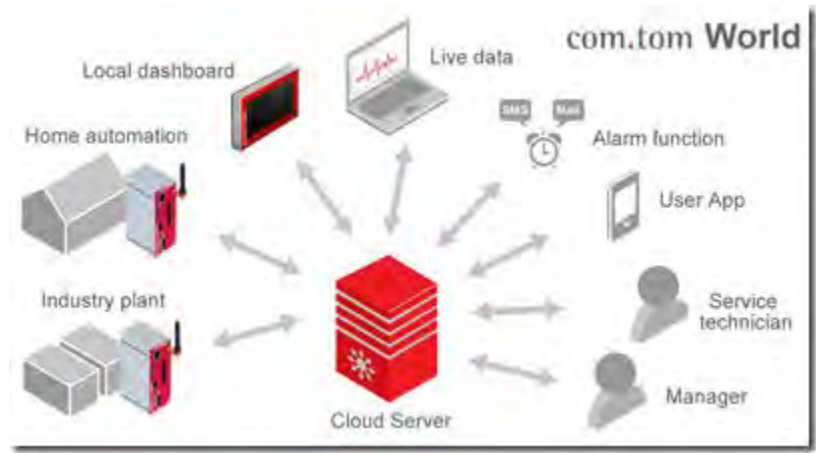
Posted by [Karlheinz Schwarz](#) at [10:54 AM](#) [No comments:](#) 

Labels: [Beck](#), [Beck Chip](#), [Beck IPC](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Smart Grid](#), [smart solution](#), [starter kit](#), [Training](#), [workshop](#)

Process Data exchange – IEC 61850, DNP3, IEC 60870-5-104, and Portal Solution

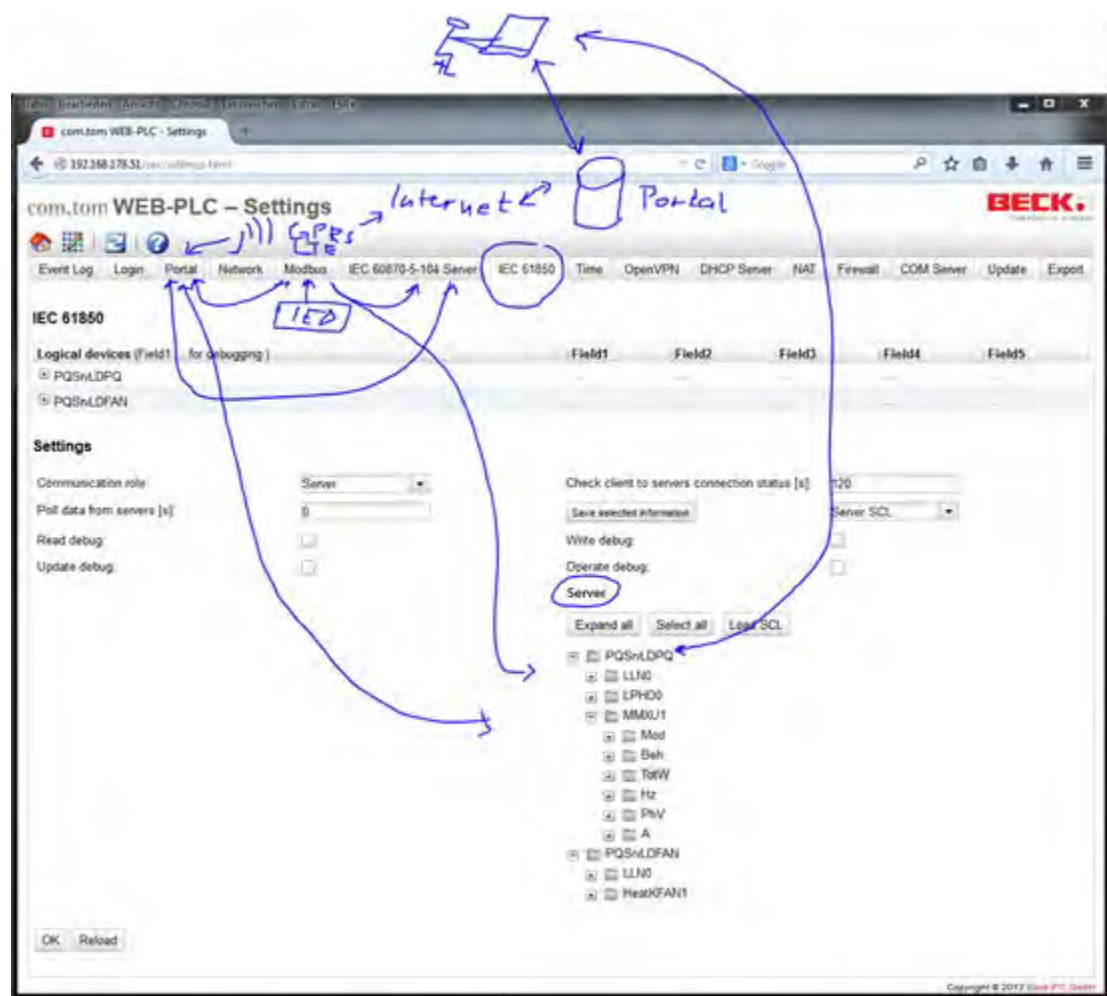
The discussion about communication mechanisms and how to get access to the most crucial information is going on. It seems to be clear that there are different requirements for different applications that need to exchange information with a specific IED (at any hierarchy level). There is not a single size that fits all. Modern IEDs will support multiple protocols to support various needs.

One mechanism is using a **cloud server** – often called a Portal. A simple and beautiful solution is provided by the com.tom (communication to machines) IEDs offered by Beck IPC:

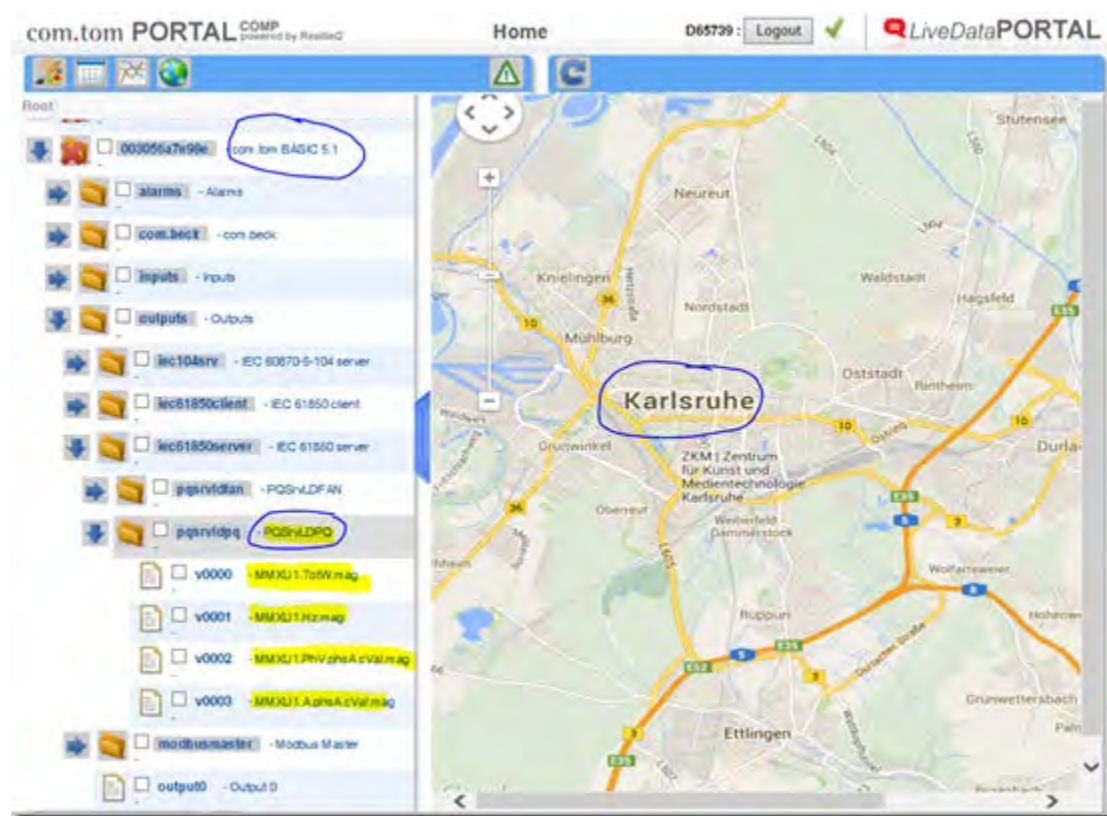


See: <http://com-tom.de/about.php>

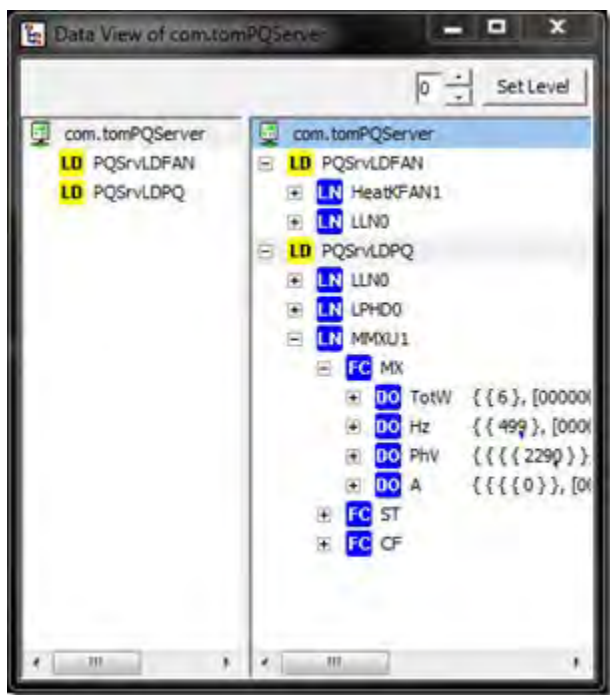
The com.tom IEDs are supporting multiple protocols like **IEC 61850, IEC 60870-5-104, Modbus, DNP3, ... and a Portal**. See the following figure for some details (it shows the web browser connected to the web server at the com.tom):



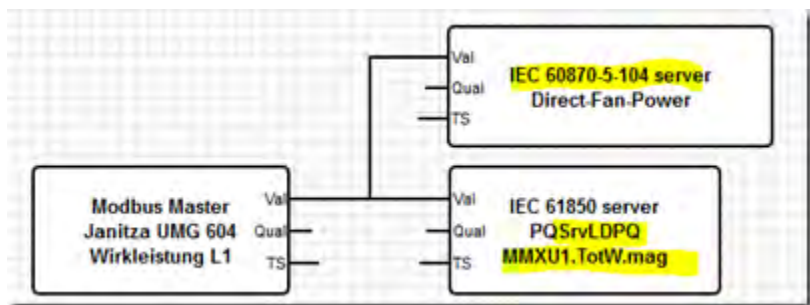
The Input and Output signals (including those configured with IEC 61850!!) will automatically be made available at the Portal as soon as the com.tom is online (through a router: by Ethernet, WiFi, GPRS, UMTS, ...):



The Logical Device “PQSrvLDPQ” is visible in the **Web Browser** (first figure), on the **Portal** (second figure), in the **IEDScout** (see next figure), and in **IEC 60870-5-104** (last figure):



The values are also accessible through IEC 60870-5-104 through a binding of the process values (coming through Modbus) to 104 messages (configured by the WEB PLC on the com.tom):



The different possibilities serve various needs.

It is quite interesting to see such a simple IED supporting these many possibilities – even supporting security (openVPN, firewall, ...).

More to come.

Posted by [Karlheinz Schwarz](#) at [10:37 AM](#) [No comments:](#)

Labels: [Beck IPC](#), [Cloud](#), [com.tom](#), [DNP3](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#), [Portal](#)

Progress in using IEC 61850 in California and all over

Some 12 years ago I have presented a paper “Seamless Communication with IEC 61850 for Distributed Power Generation” at the DistribuTech 2002 in Miami (FL):

“... The driving force behind the standardization is to effectively and efficiently perform seamless device data integration and sharing information based on a rich, fine-grained data-stream about the state of the “power world” in any given instant. Every node in the network would have to be awake, responsive, flexible, and – most important – interconnected with everything else: **A distributed energy web. ... It is not sufficient to develop distributed generation systems that only produce electric power. ...**”

Click [HERE](#) for a copy of the full paper on “Seamless Communication with IEC 61850 for Distributed Power Generation” presented at the 2002 DistribuTech in Miami (FL).

Now, just a few (12) years later you could see **this vision to become a reality**, e.g., in California and other places all over.

Crucial needs and suggested solutions (IEC 61850, DNP3, ...) discussed in the USA and especially in California are documented in the following interesting papers:

Click [HERE](#) for the SGIP Paper: “Distributed Energy Management (DER): Advanced Power System Management Functions and Information Exchanges for Inverter-based DER Devices, Modelled in IEC 61850-90-7” [pdf, 1.1 MB]

Click [HERE](#) for the paper “CEC/CPUC Smart DER Information and Communication Technologies (ICT) Strategies and Alternative Configurations” [Word, 1.7 MB]

Click [HERE](#) for the paper: “CEC/CPUC Candidate DER Capabilities: Recommendations for Updating Technical Requirements in Rule 21” [pdf, 1.2 MB]

It is interesting that the third paper refers to German experiences with distributed power systems: “ ... For instance, most of the smaller DER systems could be pre-set with default values that may not need to change for many years. However, if the settings need to be updated, or new functions should be activate, or other communication capabilities are necessary, the utilities would not have to replace DER systems (as has occurred in Germany).

For this reason, the preferred approach to **Rule 21 is that key DER functions, default settings for those functions, and basic communications technologies would be mandated** but not necessarily activated. "

Posted by [Karlheinz Schwarz](#) at [4:11 AM](#) [No comments:](#) 

Labels: [DER](#), [DNP3](#), [IEC 61850](#), [Smart Grid](#), [USA](#)

Web Services for IEC 61850: MMS/XER over XMPP?

[Some 18 months ago](#) I have reported on a standardization project within IEC TC 57 defining web services as a second SCSM (Specific Communication Service Mapping) for IEC 61850. In the meantime it seems very likely that a mapping to XMPP ([Extensible Messaging and Presence Protocol](#)) will be used as the only mapping in the future IEC 61850-8-2.

The secretary of IEC TC 57 has presented a slide (slide 5) with the following requirements during a public event at the Hannover Messe 2014:

- "Part 8-2 Specific communication service mapping (SCSM) – Mappings to web protocols
- Comply with the new edition of IEC 61850-7-1, IEC 61850-7-2, IEC 61850-7-3, and IEC 61850-7-4
- Support the existing application data model defined in IEC 61850-7-410, 7-420 and 61400-25-2
- Identify which web services specification should be considered to deploy cyber-security, in conjunction with IEC TC 57 WG 15 work
- complementary to the existing SCSM (8-1), not competing"

He reported on the status of work: "Konsens bei XMPP als Lösung" (consensus to apply XMPP as solution).

Click [HERE](#) for the complete presentation of the secretary of IEC TC 57 during the Hannover Messe 2014 [German, pdf]

MMS messages encoded in XML ([XER – XML Encoding Rules for ASN.1, ISO 8825-4](#)) may be used as payload of the XMPP messages.

What would that mean for IEC 61850-8-1 (MMS ASN.1 BER encoded messaging) implementations? First: the 8-1 solutions would continue to be used. Second: an additional ASN.1 encoding rule would add some software at the encoding layer ... and finally the addition of the "transport or middle layer" XMPP would offer a new "transport mechanism". That's it.

This way most of the IEC 61850 related software (API, datasets, reporting, logging, control, system configuration language, modeling and models, ...) would be used unchanged!

By the way, using ASN.1 XER in addition to BER has been proposed and discussed some 20 years ago within ISO TC 184 SC5 WG2. It was too early.

Since MMS is independent of encoding, there seems to be no (technical) question to using XER.

Posted by [Karlheinz Schwarz](#) at [1:14 AM](#) [No comments:](#) 

Labels: [ASN.1](#), [BER](#), [Encoding](#), [IEC 61850](#), [IEC 61850-8-1](#), [iec 61850-8-2](#), [SCSM](#), [Web Service](#), [webservice](#), [XER](#), [XML](#), [XMPP](#)

Saturday, May 10, 2014

E-Energy and Standards – German Experiences with International Standards

One of the crucial results of the six German E-Ernergy projects (2008 –2013) is this: Application of international standardized interfaces – mainly IEC 61850!!

A new 80 page brochure (in German) with the following title is available:

Smart Energy made in Germany

Erkenntnisse zum Aufbau und zur Nutzung intelligenter Energiesysteme im Rahmen der Energiewende

Click [HERE](#) to download the brochure in German published in May 2014 [pdf, 3.5 MB]

Click [HERE](#) to download an interims report in English published in 2012 [pdf, 5 MB]

Many German engineers have contributed to the standardization in IEC and DKE: The results are **INTERNATIONAL Standards**.

There are **Made in Germany Products** implementing **International Standards** IEC 61850, IEC 60870-5-104, DNP3, ... CoDeSys, WEB-PLC, ...



and **Peopleware Made in Germany:**



Click [HERE](#) to download the following brochure:



Posted by [Karlheinz Schwarz](#) at [3:39 AM](#) [No comments:](#)

Labels: [Beck](#), [Beck IPC](#), [com.tom](#), [DNP3](#), [education](#), [IEC 60870-5-104](#), [IEC 61850](#), [seminar](#), [Training](#)

Monday, May 5, 2014

IEC 61850 Profiles and associated Interoperability Tests for Hydro Power Plants

Hydro Power Plants require very complex information models and information exchange services. IEDs are usually acting as client and server in order to receive and send comprehensive reports. The suite of hydro power standards in the series IEC 61850 (IEC 61850-7-510, IEC 61850-10-210, ...) define therefore **many application specific naming elements like logical device names, prefixes and suffixes of logical nodes and complete data sets** (additional means, e.g., in addition to IEC 61850-7-4).

These additional definitions reduce the number of options to a good extent! It helps to reach a high level of interoperability.

IEC 61850-10-210 TS:
Communication networks and systems for power utility automation - Part 10-210: IEC 61850
Interoperability tests – Hydro profile

See document 57/1468/CD
Commenting closes 2014-08-08

The hydro experts in IEC 61850 have understood that Profiles are an absolute MUST if we want to reach interoperability! A simple (but good) example is the Implementation Guideline "9-2LE" of the UCA Usersgroup.


Another good example of profiles can be found at the VHPReady Website:

http://www.vattenfall.de/de/file/VHP-READY-3.0-englisch.pdf_30408907.pdf

This specification contains two profiles:

1. IEC 60870-5-104 (with all signals specified)
2. IEC 61850 (with all signals specified)

Vendors can not just rely on IEC 61850 and define their own instance models of the needed logical nodes. The **logical device names, prefixes and suffixes of logical nodes and complete data sets** are already defined – to prevent use of options!!

Posted by [Karlheinz Schwarz](#) at [6:59 AM](#) [No comments:](#) 

Labels: [hydro power](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [profile](#), [Vattenfall](#), [VHP Ready](#)

Friday, May 2, 2014

Could IEC 61850 be used for I/O applications as AS-i bus or Profibus DP?

Definitely one of the crucial objectives of IEC 61850 is to model, collect, and exchange Input and Output data! Many of the I/O technologies listed below (in a job description I just found today) are simply providing the exchange of bits and bytes over a communication link:

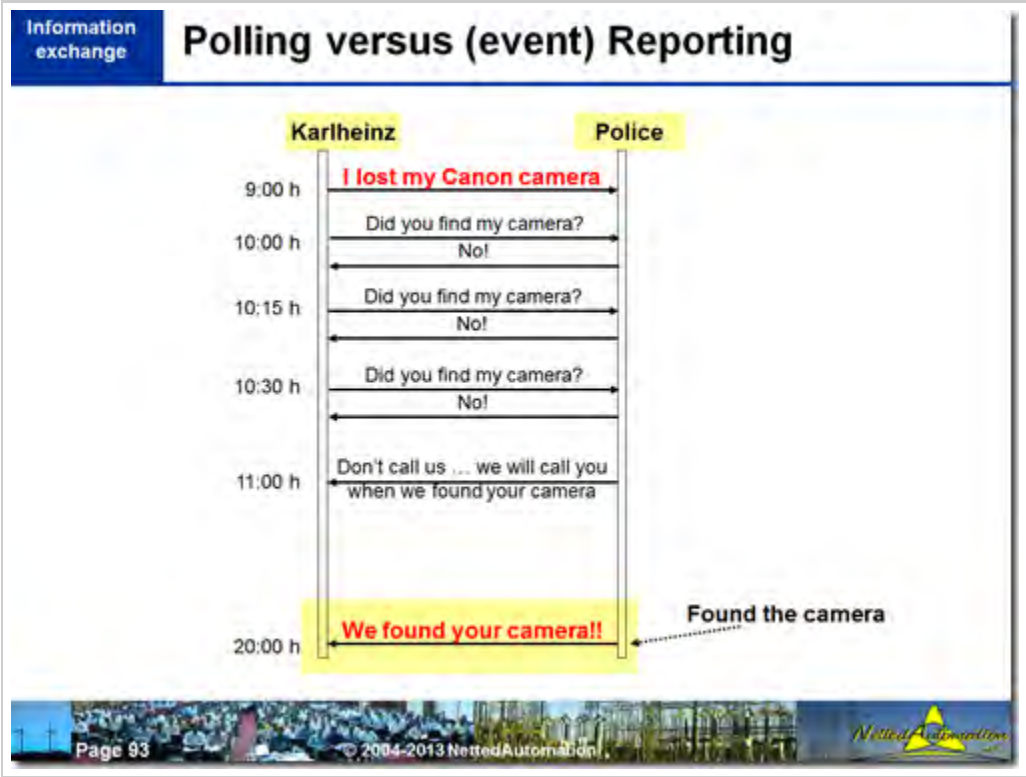
A well known company is looking (maybe) for you if you have – among other qualifications – **“Experience with I/O technologies** including FF, HART, WirelessHART, Profinet / Profibus DP, Ethernet IP / DeviceNet, Modbus / Modbus TCP, **AS-i bus, IEC 61850**, Wireless, Remote I/O technologies.”

IEC 61850 is much more than a I/O technology: BUT it is also a (very smat) I/O technology!! Sure it is! Why not?

So, is IEC 61850 competing with AS-i? No! I have written the first draft of the AS-i standard (IEC 62026-2) ... some 20 years ago. It could provide the data we model and communicate to a higher level in an automation system. Data about a simple switch status or whatever. In the same way a Modbus device could provide I/O-data to an IEC 61850 server that provides input to a higher layer IEC 61850 or ...

Yes, many signals are simply I/O data. IEC 61850 can handle them all ...

What is the main difference between IEC 61850 and many of the field busses? Simply this: IEC 61850 applies an event-driven approach with DataSets and Controlblocks while most field busses run cyclic polling by a master device. The master polls for values ... one field device after the other ... again and again ... IEC 61850 works like this:



IEC 61850 is usually (if used that way!) communicating **useful information** rather than **bunches of Data** – that just may tell the receiver: nothing has changed, nothing has changed, nothing has changed, ... stop here and make it smarter. This could easily applied when Ethernet infrastructure is in place anyway.

This is one of the major paradigm shifts in process information exchange ... that will take decades to understand by ...

Posted by [Karlheinz Schwarz](#) at [2:34 PM](#) [No comments:](#) 

Labels: [AS-i](#), [event-driven](#), [fieldbus](#), [IEC 61850](#), [polling](#), [process data](#), [Profibus](#)

Thursday, April 17, 2014

DRAFT Release 3.0 of the “NIST Framework and Roadmap for Smart Grid Interoperability Standards” out for comments

The next release of the famous framework and roadmap for Smart Grid Interoperability Standards has been drafted and published for comments on April 15, 2014.

The entire 255 pages draft version of the [NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 3.0 \(Draft\)](#), is available online here.

"We worked closely with the **European Union** to **harmonize the NIST conceptual model with the one the EU is developing**," says NIST's Paul Boynton. "We want both models to reflect each other, which is important so that **manufacturers on both sides of the Atlantic** will be able to **sell devices overseas**."

NIST seeks comments on the draft NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 3.0. In particular, comments on technical, editorial, or general issues.

Comments must be received on or before 5:00 p.m. Eastern Time on May 30, 2014.

Click [HERE](#) for further information on the process ... how to comment ...

One of the core contents deals with standards that support the vendors to build interoperable devices that could be applied in **North America, Europe, and all over (!)** is Table 4-1 (Identified Standards). The list grew from 34 to 74 standards from Release 2. The list refers to the following standards of primary interest in the context of this blog:

- #12 IEC 60870-6-503 TASE.2 Services and protocol
- #13 IEC 60870-6-702 Functional profile for providing the TASE.2
- #14 IEC 60870-6-802 TASE.2 Object Models
- #15 IEC 61850-1
- #16 IEC61850-2
- #17 IEC61850-3
- #18 IEC61850-4
- #19 IEC61850-5
- #20 IEC61850-6
- #21 IEC61850-7-1
- #22 IEC61850-7-2
- #23 IEC61850-7-3
- #24 IEC61850-7-410
- #25 IEC61850-7-420
- #26 IEC61850-8-1
- #27 IEC61850-9-2
- #28 IEC61850-10
- #29 IEC61850-90-5
- #30 IEC 61968/61970 Suites
- #31 IEEE 1815 (DNP3)
- #64 IEC 62351-1
- #65 IEC 62351-2
- #66 IEC 62351-3
- #67 IEC 62351-4
- #68 IEC 62351-5
- #69 IEC 62351-6
- #70 IEC 62351-7
- #?? IEC 61850-7-4 is missing – commented on it already.

15 out of 74 entries are referring to IEC 61850 standards! IEC 61850 conformant products and based systems are playing already a major role in the North American market – in the public utility world and in the power distribution in **factories and production plants**.

All in a sudden (as it seems to me!) managers in production facilities have figured out that electric power is very crucial for them – to save money or to increase profits.

Posted by [Karlheinz Schwarz](#) at [11:52 PM](#) [No comments:](#) 


Labels: [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC 62351](#), [interoperability](#), [interoperability tests](#), [NIST](#), [NIST Roadmap](#)

Sunday, April 13, 2014

Very simple explanation of the Heartbleed bug

One of the most serious bug in computer and communication technologies: Heartbleed.

Click [HERE](#) for an easy description to explain it to your ... whoever.

Posted by [Karlheinz Schwarz](#) at [11:16 AM](#) [No comments:](#) 

Labels: [bugs](#), [security](#)

Tuesday, April 8, 2014

Brief Report from the Hannover Messe (after second day)

This is the fifth Hannover Fair for Beck IPC demonstrating IEC 61850 solutions. In 2010 Beck presented the first “[IEC 61850 @ Chip](#)”. Now – four years later – the market is looking for easy to use and reasonable priced IEC 60870-5-104, DNP3, IEC 61850, IEC 61400-25, ... solutions!

The booth at the Hannover Messe in 2014 is quite small – but visited by many experts from experts users and manufacturers of many application domains from all over: Power

transmission, distribution, renewable power, virtual power systems, building automation, asset management, ...

... Beck IPC is partner of the Smart Grid Forum:



... the booth was visited by almost 100 experts during the first two days:



The key products are the [com.tom devices](#) that could be used to collect the process data, process them and communicate the results through IEC 60870-5-104, IEC 61850, IEC 61400-25, cloud portal, ... Gateways between these protocols.

In case you want to see the most simple IEC 60870-5-104, IEC 61850, ... in action, please visit the above booth C35/7 in Hall 13.

I look forward to meeting you at the above booth.

Posted by [Karlheinz Schwarz](#) at 12:48 PM No comments: 

Labels: [Beck Chip](#), [Beck IPC](#), [embedded system](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Smart Grid](#), [smart solution](#)

Skyrocketing growth: Beck IPC offers New Free of Charge Workshops end of May 2014 in German and in English

The interest in applying IEC 60870-5-104, DNP3, IEC 61850, IEC 61400-25 ... using products of Beck IPC is growing skyrocketing!

The **third** free of charge Workshop in German is scheduled for:

Datum: 27. Mai 2014
Ort: Wetzlar, etwa 70 km nördlich von Frankfurt
Zeit: 10:00 Uhr - 17:00 Uhr
[Programm](#) (Deutsch).

the **second** free of charge Workshop in English for:

Date: 28. May 2014
Location: Wetzlar (Germany), some 70 km north of Frankfurt
Time: 10:00 h - 17:00 h
[Program](#) (English).

Registration information for both events can be found under the above links.

Posted by [Karlheinz Schwarz](#) at [12:20 PM](#) [No comments:](#) 

Labels: [Beck](#), [Beck Chip](#), [Beck IPC](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Smart Grid](#), [stack](#), [starter kit](#), [Training](#), [workshop](#)

Tuesday, April 1, 2014

Progress in publishing IEC 61850-90-2 Substation to Control Center Communication

The IEC TC 57 WG 19 is working on the final draft Technical Report for the communication between Control Centers and underlying systems like Substations, Power Plants, and other applications:

IEC Draft TR 61850-90-2:

COMMUNICATION NETWORK AND SYSTEM FOR POWER UTILITY AUTOMATION –
Part 90-2: USING IEC 61850 FOR THE COMMUNICATION BETWEEN SUBSTATIONS AND CONTROL CENTRES

Big utilities are waiting for the publication of this part. They are looking for a seamless communication at various levels.

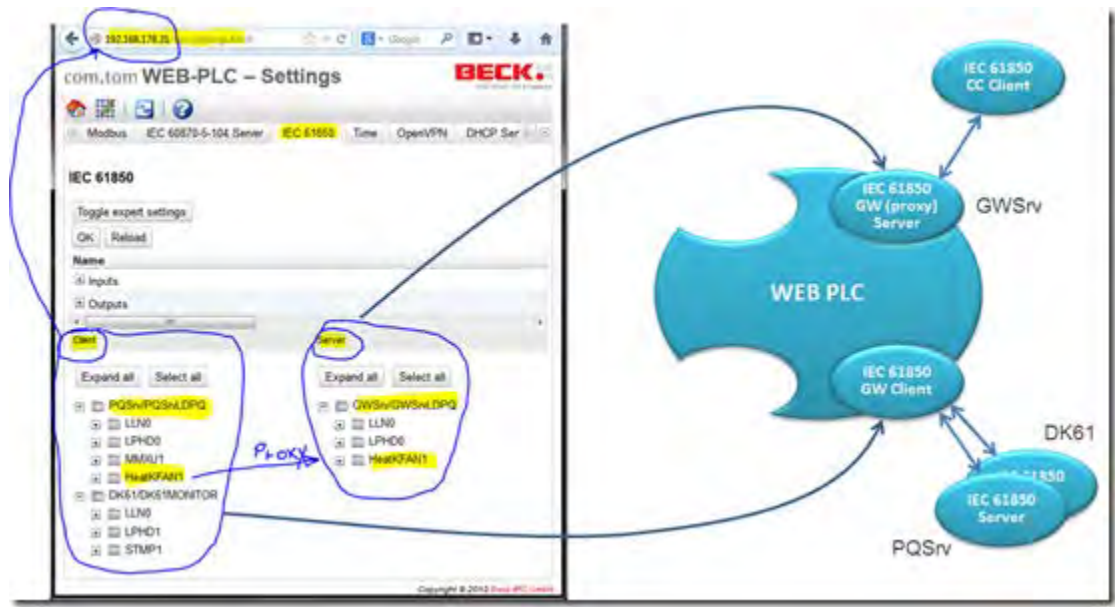
This technical report provides a comprehensive overview of the different aspects that need to be considered while using IEC 61850 for information exchange between substations and control or maintenance centres or other system level applications. In particular, this technical report:

- Defines use cases and communication requirements that require an information exchange between substations and control or maintenance centres
- Describes the usage of the configuration language of IEC 61850 6
- Gives guidelines for the selection of communication services and architectures compatible with IEC 61850
- Describes the engineering workflow
- Describes the links regarding the Specific Communication Service Mapping (SCSM)

The utility industry is waiting for the final version. Today, an expert of a big utility stated the following: *“From my view, having the alternative to **IEC 60870-5-104 and IEC 61850-90-2** for the communication between the substation and the control center my **recommendation will be in favour of the 90-2** which allows you to use all 61850 services available comparing with 104 which is more restricted.”*

I fully agree with that statement.

By the way, an easy to implement com.tom WEB-PLC based gateway from IEC 61850 (for the down-ling from a gateway) to IEC 61850 (for the up-link to a control center) will be shown during the Hannover Messe next week (07-11 April, hall 13 booth C35/7):



The gateway/proxy server provides all crucial features of IEC 61850.

I look forward to showing you the gateway – meet you there.

Posted by [Karlheinz Schwarz](#) at [1:42 AM](#) [5 comments:](#)

Labels: [control center](#), [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [proxy gateway](#), [Substation](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Friday, March 28, 2014

Be Smart – See IEC 60870-5-104 and IEC 61850 in Action at the Hannover Messe 2014

The Hannover Messe 2014 will continue to offer mature solutions for many needs in the power delivery system – generation, transmission, distribution, usage, ... in the public grids as well as in production facilities, ships, harbors, transportation, ... Energy is all over! Without energy I could not write this post ... nobody would receive the crucial message for a meeting in Hannover.

What you could see there, is described by Günther H. Oettinger, EU Commissioner for Energy in his welcome message of the brochure for the “**Smart Grids Forum**” :

“ ... The critical importance of smart grids is reflected in the **Smart Grids display area** [Hall 13, stand C35] stand at HANNOVER MESSE’s Energy show. The display area presents technologies that can intelligently integrate and ... The Smart Grids display area at HANNOVER MESSE facilitates this dialogue and knowledge-sharing with key input from noted experts from industry, the energy sector, science, research and government. It is my pleasure as EU Commissioner for Energy to take over the patronage of the Smart Grids 2014 and I wish all partners stimulating and profitable discussions at this important exhibition area of the HANNOVER MESSE.”

Some 50 speeches will open your eyes for the needs and solutions. Well known experts from all over will present and discuss the Smart Grid from different perspectives.

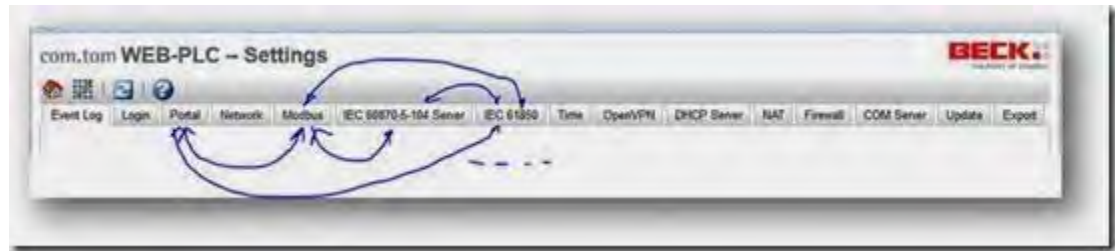
Click [HERE](#) for the Brochure on the Smart Grid Exclusive themed presentations.

There is also an integrated exhibition of companies that present the latest solutions for smart(er) grids. One of them is **Beck IPC at booth C35/7** – just next to the Forum.

Beck IPC and **NettedAutomation** show the latest developments in using cloud computing, portal for energy applications, smart controller devices supporting Logic, Modbus, M-Bus, IEC 60870-5-104/101, DNP3, IEC61850, IEC 61400-25, ... to build highly integrated and distributed applications including **gateways** between all solutions:



The easiest solution is to use a WEB-PLC and manage the signals to be communicated by the various appropriate communication protocols:



Click [HERE](#) for an introduction to the use of the WEB-PLC for the above protocols [pdf] with the title:

"The Beautiful Simplicity of the Integration of Modbus, DNP3, IEC 60870-5-104, and IEC 61850 into a powerful WEB-PLC operating on an Embedded Controller"

Click [HERE](#) for an overview on IEC 61850 supporting solutions.

I look forward to meeting you at the Hannover Messe Hall 13, Booth C35/7.

Posted by [Karlheinz Schwarz](#) at 2:02 PM No comments:

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Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

Labels: [Beck Chip](#), [Beck IPC](#), [Gateway](#), [hanover fair](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Smart Grid](#), [smart solution](#)

Friday, March 21, 2014

The Beautiful Simplicity of the Integration of IEC 60870-5-104 and IEC 61850

The experience has shown that manufacturers **are still shying away from the high costs and long time required for the development of new products based on standards** like IEC 61850, IEC 60870-5-104, and IEC 61400-25 (Wind Turbines) because the implementations and applications are quite complex.

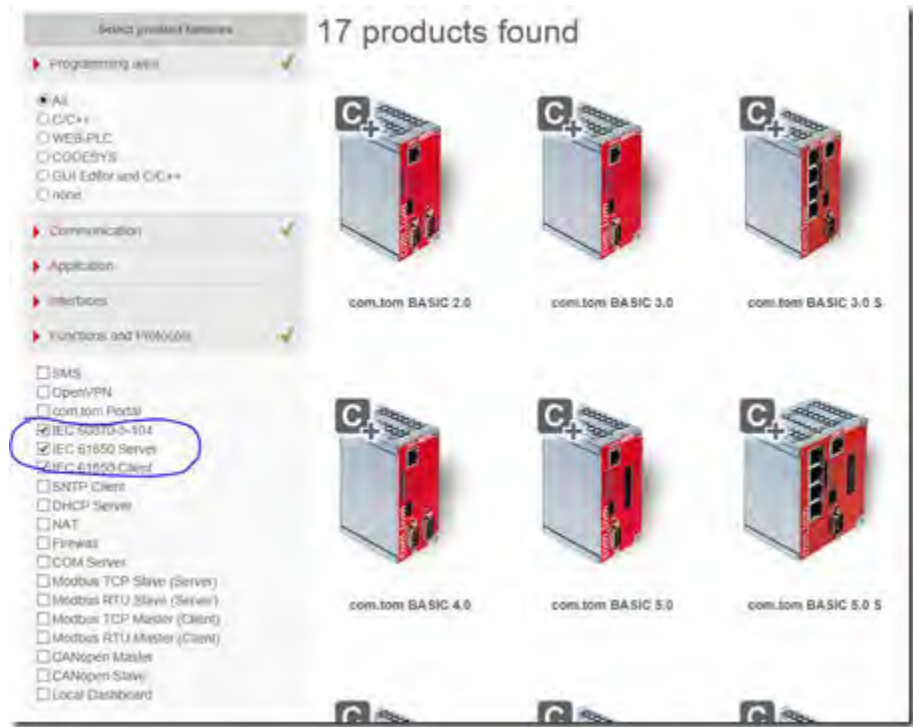
For these reasons, a team at NettedAutomation developed a web-based integration tool based on Beck IPC’s com.tom WEB-PLC that **significantly streamlines** the application of these and other standards and the implementation of **simple logic functions** that consume and generate data communicated with a variety of protocols. The solution can be used to build various kinds of IEDs for monitoring, control, data concentrators, data aggregators, and gateways.

An 18 page paper describes „The Beautiful Simplicity of the Integration of Modbus, DNP3, IEC 60870-5-104, and IEC 61850 into a powerful WEB-PLC operating on an Embedded Controller“

Click [HERE](#) to download the paper [pdf, 2.2 MB]

The com.tom with IEC 60870-5-104 and IEC 61850 are available – see the following website:

<http://www.com-tom.de/products.php>



These standards are available on most com.tom ... DNP3 is available soon. The programming with CoDeSys (IEC 61131-3) and C/C++ is also available.

Posted by [Karlheinz Schwarz](#) at [1:44 PM](#) [No comments:](#)

Labels: [Beck Chip](#), [Beck IPC](#), [CoDeSys](#), [com.tom](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [logic](#), [Modbus](#)

Saturday, March 15, 2014

Bandwidth Usage – IEC 61850 Object References versus Indexes in Messages

Beck IPC and NettedAutomation conducted two workshops on the latest development of IEC 61850 and IEC 60870-5-104 monitoring and automation IEDs and gateways. Experts from 12 companies (users and vendors) attended the workshops. The attendees appreciated the inside view into the standards and how easy it is to implement standard conformant IEDs.

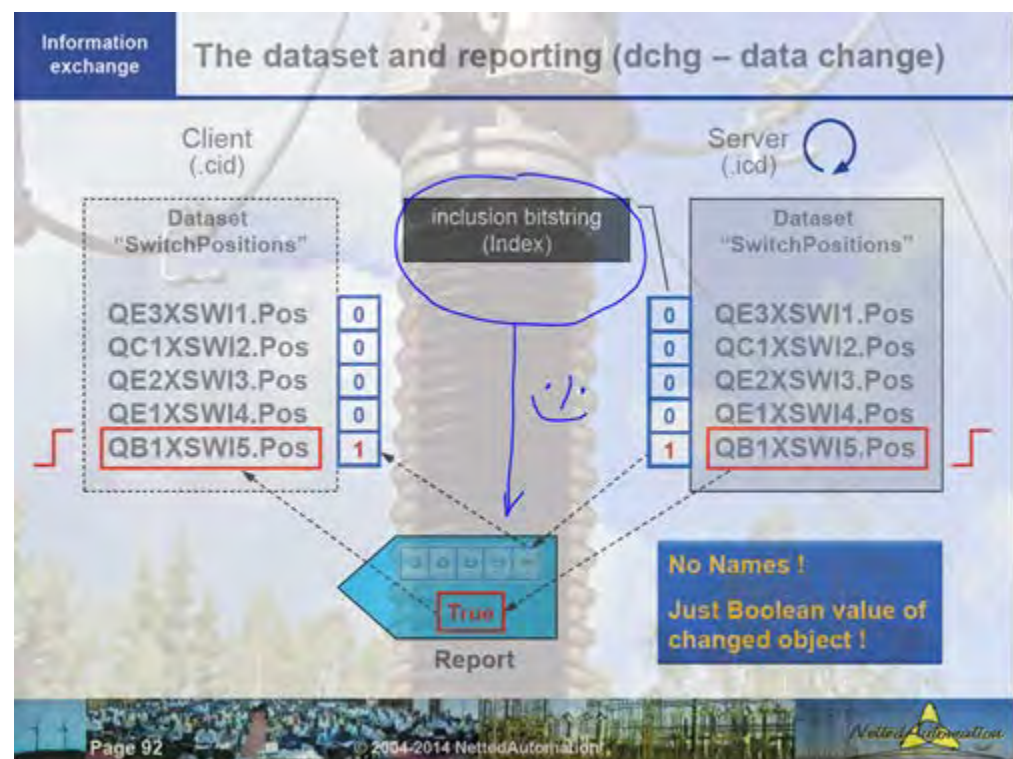
One attendee responded the day after:

“Dear Mr Schwarz, I had a safe return fortunately. Thanks again for your documents and your very interesting presentations yesterday. It is very likely that I contact you in the near future for some questions/help.”

During the first workshop there was a very crucial question on the long names that are used as references to signals (data attributes) like: “MyLogicalDevice/QE1XSWI5.Pos”: How do these long names impact bandwidth needs and consumption? It seems to be quite in-efficient to use IEC 61850 for low bandwidth communication channels! Or?

Here is the solution for Reporting (Meldungen) in IEC 61850: The Report Message uses DataSets to describe the semantic content of the message and the syntactical position of

each member of the DataSet. The example below shows five members. The order of the members in the DataSet is important!



A single change in a one of the signals represented by a hierarchical reference, e.g., “MyLogicalDevice/QE1XSWI5.Pos” causes a spontaneous report message with the value of exactly this member (Boolean=True in our example). The POSITION of the member within the DataSet is marked in an inclusion bitstring (or Index) in the message. For the five members we need one octet for the bitstring. The message also carries the name of the DataSet “SwitchPositions”.

The Client can interpret the semantic of the single Boolean (=True) by just looking into the DataSet configuration. The member number 5 means: “MyLogicalDevice/QE1XSWI5.Pos” (of the server). The client needs to understand the syntax (position of the member in the DataSet) and the semantic of the received value(s). The client uses the Configured IED Description (.cid) to understand the shipped package (report).

Any question. Please keep in touch.

For GOOSE and Sampled Value messages it is even more efficient: by just sending the values of all members of a DataSet (in the order of the DataSet) there is no need to provide any identifier (name or index) in the messages. The semantic is determined by the order of the corresponding DataSet. So, subscribers need to receive in the GOOSE or SV the reference of the DataSet used. The efficiency much better than what many people expect – people that know the efficient encoding of IEC 60870-5-104 or DNP3.

That’s it. You want to learn more about IEC 61850 and related standards – and how to implement them, please check the program for the [next hands-on training on 07-09 May 2014 in Frankfurt/Germany](#).

Posted by [Karlheinz Schwarz](#) at 1:48 AM 2 comments:

Labels: [DNP3](#), [Encoding](#), [fieldbus](#), [IEC 60870-5-104](#), [IEC 61850](#), [Reporting](#)

Tuesday, March 11, 2014

The number of the day: 110

The international fieldbus standard series IEC 61158 (*Industrial communication networks – Fieldbus specifications*) and IEC 61784 (*Industrial communication networks – Profiles*) comprise 110 parts – as listed in the FDIS of part IEC 61158-1 (*Fieldbus specifications – Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series*). IEC 61158 comprises 82 parts and IEC 61784 has 28 parts.

The part 1 of IEC 61158 states that “The IEC 61158-6 (application layer) series defines a number of **distinct and non-interoperable fieldbus application protocols**.” This is true for most of the specified solutions: they are not interoperable.

The fieldbus standard series defines **50 different** (usually non-interoperable) profiles ...

In contrast IEC 61850 defines:

- **ONE** set of interoperable information models independent of protocols,
- **ONE** configuration language mostly independent of protocols,
- **ONE** set of abstract services,
- **THREE** sets of protocols for **three different applications** – **ONE** for client/server, **ONE** for GOOSE, and **ONE** for Sampled Values.

Devices that implement IEC 61850 are usually interoperable – there are exceptions, of course. The standard is intended to reach a very high level of interoperability. Lesson learned from the *Industrial communication networks*: prevent the **proliferation of standardized solutions**.

http://en.wikipedia.org/wiki/International_standard describes the purpose of international standards:

“ ... **Technical barriers** arise when **different groups** come together, each with a large user base, doing some well established thing that between them is **mutually incompatible**. Establishing **international standards** is one **way of preventing or overcoming this problem**. ...”

This is exactly what the experts that define IEC 61850 are doing for almost 20 years – to the benefit of the global energy delivery market! This objective is well received and appreciated all over.

Posted by [Karlheinz Schwarz](#) at [12:27 AM](#) [No comments:](#) 

Labels: [fieldbus](#), [IEC 61158](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#)

Friday, March 7, 2014

IEC 61850 at the Hannover Messe 2014

The Hannover Messe will be open from **7-11 April 2014**. You are invited to visit the **Beck IPC Booth in Hall 13 Stand C35/7**. One crucial display will be the wide range of small and efficient multi purpose devices ([com.tom](#)) with embedded controllers.

You will see IEC 60870-5-104, IEC 61860, Modbus, ... with integrated security (openVPN, ...) in action. The com.tom with a WEB-PLC will be presented by NettedAutomation to show the **beautiful integration of standards-based automation and monitoring devices as well as gateways**.

A comprehensive video clip with an Introduction to IEC 61850, Models, Configuration, Application of a real power quality monitoring with a Janitza PQ Monitor connected with Modbus, WEB-PLC, and Remote access to a com.tom has been posted yesterday. This video helps to get a clue what the standard is all about and how easy it is to get a **“non-IEC 61850 device “wrapped” in a nice sugary coating of IEC 61850”**.

You will see this and many other applications in action at the Hannover Fair.

Format: mp4 with a resolution of 1180 x 884

- [Complete Video \(110 MB and 37 Minutes\)](#)


I have split this long video into three parts with the same content:

- [Part 1 \(of 3\) Start, IEC 61850 Information Models, and Demo setup \(40 MB and 10 Minutes\)](#)

- [Part 2 \(of 3\) How to use the Configuration Language SCL \(33 MB and 11 Minutes\)](#)

- [Part 3 \(of 3\) Implementation with com.tom WEB-PLC \(47 MB and 17 Minutes\)](#)

A video on building a gateway from IEC 61850 to IEC 60870-5-104 will be presented soon.

Posted by [Karlheinz Schwarz](#) at [10:25 PM](#) [1 comment:](#) 

Labels: [Beck IPC](#), [Gateway](#), [hanover fair](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [PLC](#), [power quality](#), [SCL](#)

Thursday, March 6, 2014

Brief EPRI Report on Standards of DistribuTech 2014

EPRI has published a Brief Report of DistribuTECH 2014.

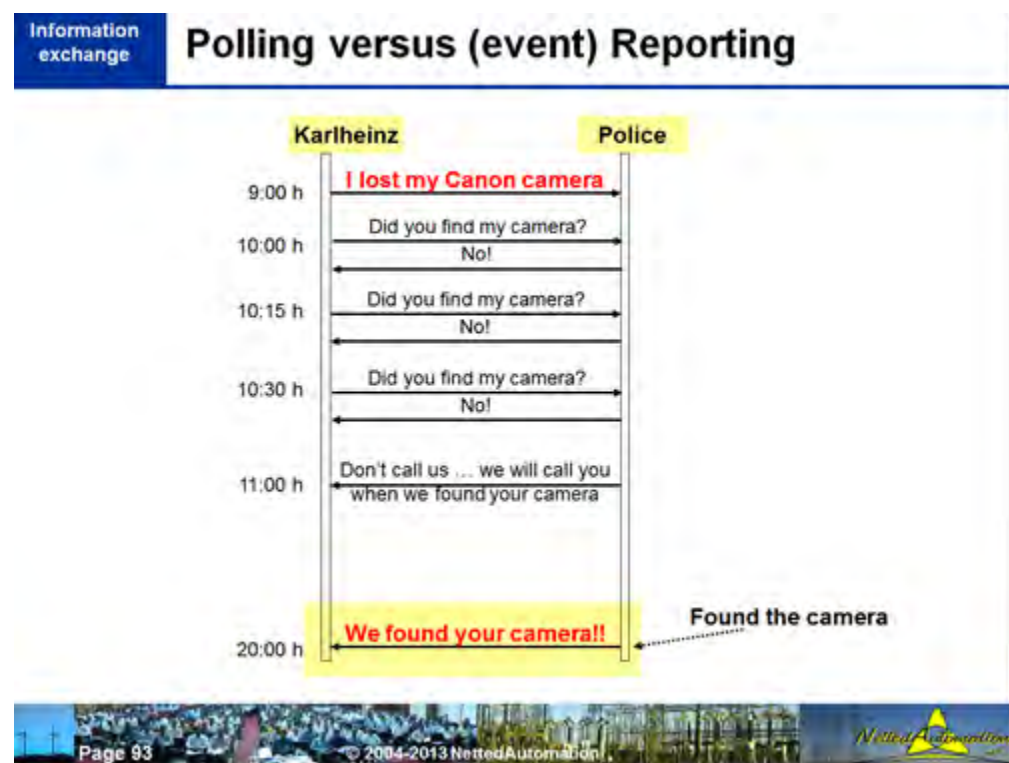
It seems that a hot topic was “DATA” ... data from everywhere of everything! Sure there is a need to share the pool of “Big Data”. I have heard about a SCADA project that receives Terra Bytes of “big Data” from a huge wind power park trough IEC 61400-25. This seems to be “Big Data” and “little information” ... good for hardware manufacturers.

The EPRI Brief reports from the DistribuTech 2014:

“This was also another good year for standards. The **vendor** community has heard loud and clear that standards are a preference of **electric utilities** and the vendors have done a good job of promoting where they are using standards including DNP3, IEC 61850, IEC 61968/61970 (the CIM), MultiSpeak, and more. One relatively new standard that had a strong presence was OpenADR (Open Automatic Demand Response).”

Click [HERE](#) for the complete report.

I hope that they are looking at **useful information** rather than **bunches of Data** – that just may tell the receiver: nothing has changed, nothing has changed, nothing has changed, ... stop here and make it smarter:



This is one aspect of the philosophy of IEC 61850 – which needs to be understood by more people ... it will take some time to understand this.

Posted by [Karlheinz Schwarz](#) at [12:31 AM](#) [No comments:](#)

Labels: [Distributech](#), [EPRI](#), [IEC 61400-25](#), [IEC 61850](#), [monitoring](#), [polling](#)

Tuesday, March 4, 2014

Have you heard about Fuzz Testing of Protocols?

We have to learn new terms every day. One new term is now used quite often: Fuzz testing.

What is it? In [Wikipedia you can read](#):

“Fuzz testing” or fuzzing is a software testing technique, often automated or semi-automated, that involves providing invalid, unexpected, or random data to the inputs of a computer program. The program is then monitored for exceptions such as crashes, or failing built-in code assertions or for finding potential memory leaks. **Fuzzing is commonly used to test for security problems in software or computer systems.**”

So, it is no surprise to read about fuzz testing and protocols used in the power industry. One discussion is about the fuzz testing and DNP3.

Click [HERE](#) to read what experts discuss [Post on Digitalbond website on DNP3].

I have discussed quite often the issue of security and improving the quality of protocol implementations and applications, e.g.,

[Is Security really a big Issue in the Power Industry?](#)
[Security Measures in Power Grids – often ignored](#)

There is another (related issue): Who is in charge to define the detailed test-cases for conformance testing IEDs?

- Is it a users group? Maybe.
- Is it a test lab accredited by a users group? Hopefully not!
- Is it the vendor of IEDs? This would cause some issues in the future.

The **organization that has published a specification** and that is responsible for the maintenance **MUST** define the details of test cases and decide what should be tested.

In the case of DNP3 it is IEEE, because DNP3 is now published as IEEE standard 1815. In case of IEC 61850 it is the IEC TC 57 and especially the working groups 10, 15, 17, 18, and 19.

This means: Users have to get more involved in the standardization work and in the testing activities to make sure that the testing follows the standards – and not vice versa. Sure: issues found during testing have to be fed back to the standardization groups.

Posted by [Karlheinz Schwarz](#) at [9:01 AM](#) [No comments:](#)

What does Self-Description in IEC 61850 and IEC 61400-25 mean?


The other day I was asked to explain the self-description to a larger group of SCADA and Asset management experts. The requirement was, to do it in some 3 minutes. I have many ways to explain it: slides, live presentation, or just a white-board.

I decided to produce a short video clip – because I have the right equipment on my desk and convenient tools to produce a video.

The result is now online and can be viewed.

Click [HERE](#) to view the 4 minutes clip.

I have planned to provide more video clips showing benefits of IEC 61850 and IEC 61400-25 and IEC 6070-5-104, ...

Posted by [Karlheinz Schwarz](#) at 8:26 AM 1 comment: 

Labels: [Beck](#), [Beck Chip](#), [IEC 61400-25](#), [IEC 61850](#), [IEDScout](#), [self-description](#), [video](#)

Friday, February 28, 2014

What are the Benefits of IEC 61850?

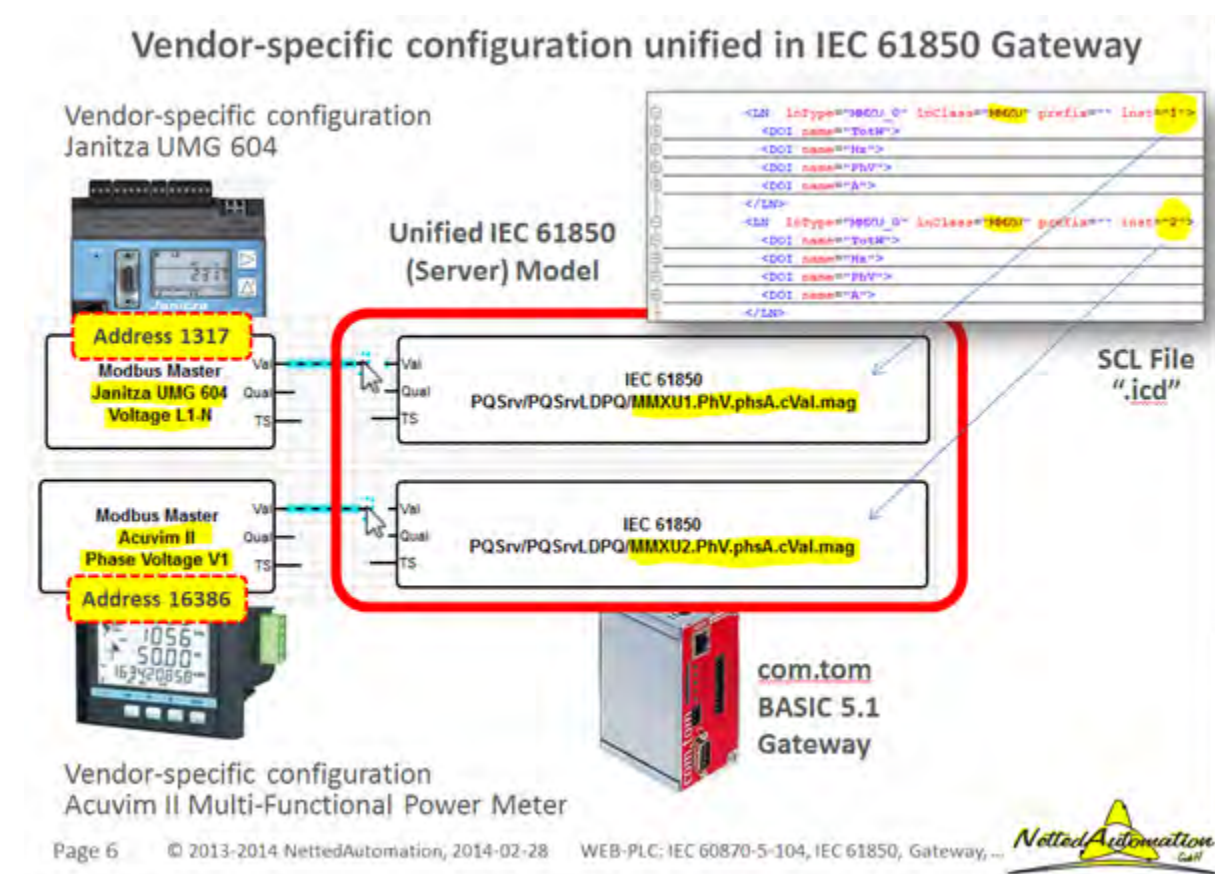
The question “What are the benefits of IEC 61850” has different flavors and multiple answers – it depends on what are you looking for. If you are looking just at the **communication protocol**, there are answers like:

1. The client/server protocol (MMS) is a unified solution standardized some 25 years ago. It is a stable standard – unlikely to change in the future and accepted all over for many years.
2. The GOOSE messaging is very unique and provides real-time information exchange in the msec range – accepted all over
3. The Sampled Values messaging provides a unique solution for exchanging samples of currents, voltages, vibration measurements accepted all over.

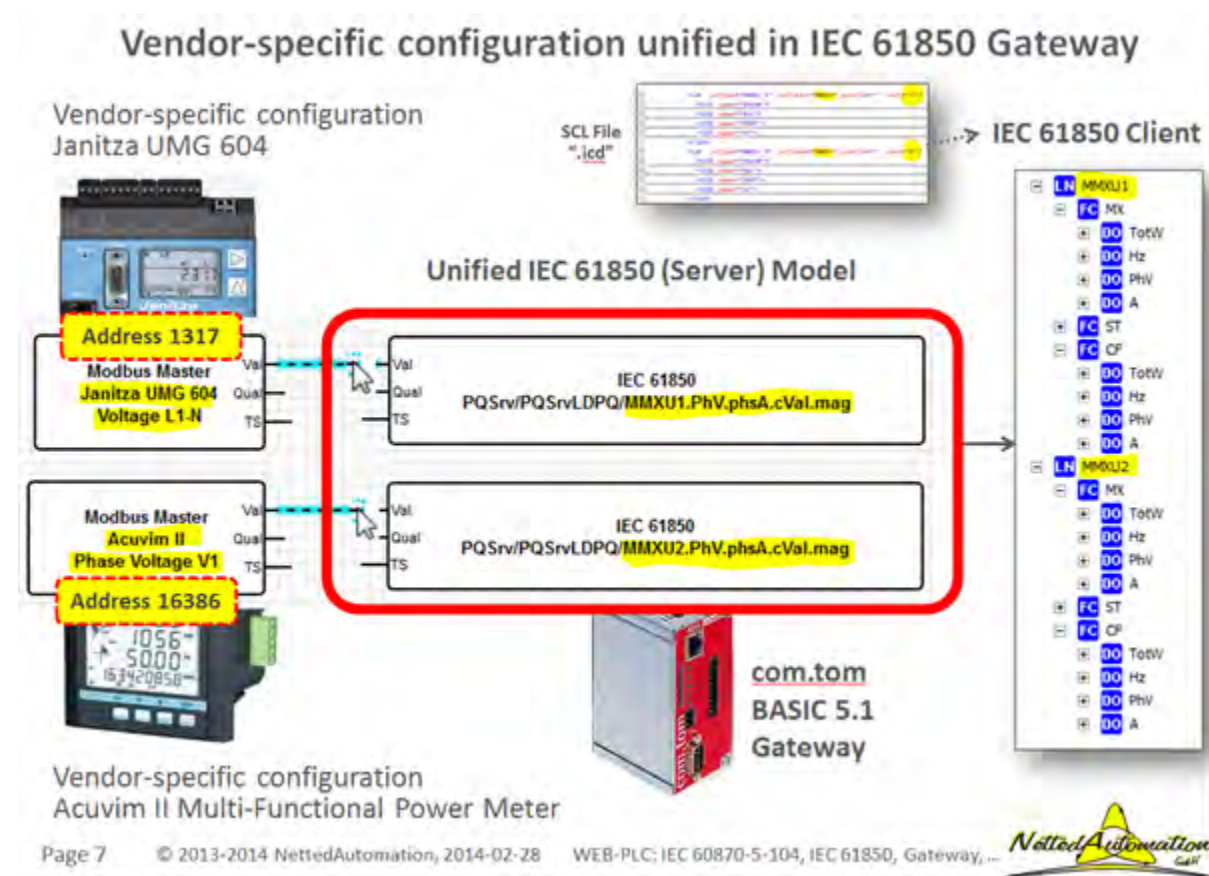
If you are looking at the **information models**, there are really many crucial models defined and in use. No other standard (I am aware of) has such a rich set of information models that expose process information in a standardized way – all over accepted.

There is – of course – the crucial issue on the **configuration language**. In this post we will discuss the benefit of a **unified model** that allows to hide the different vendor-specific signal lists for Modbus communication in two different power quality meters. In the end, the unification of specific information profiles (or subsets) for, e.g., the electrical measurements makes IEC 61850 different compared to any other solution I know.

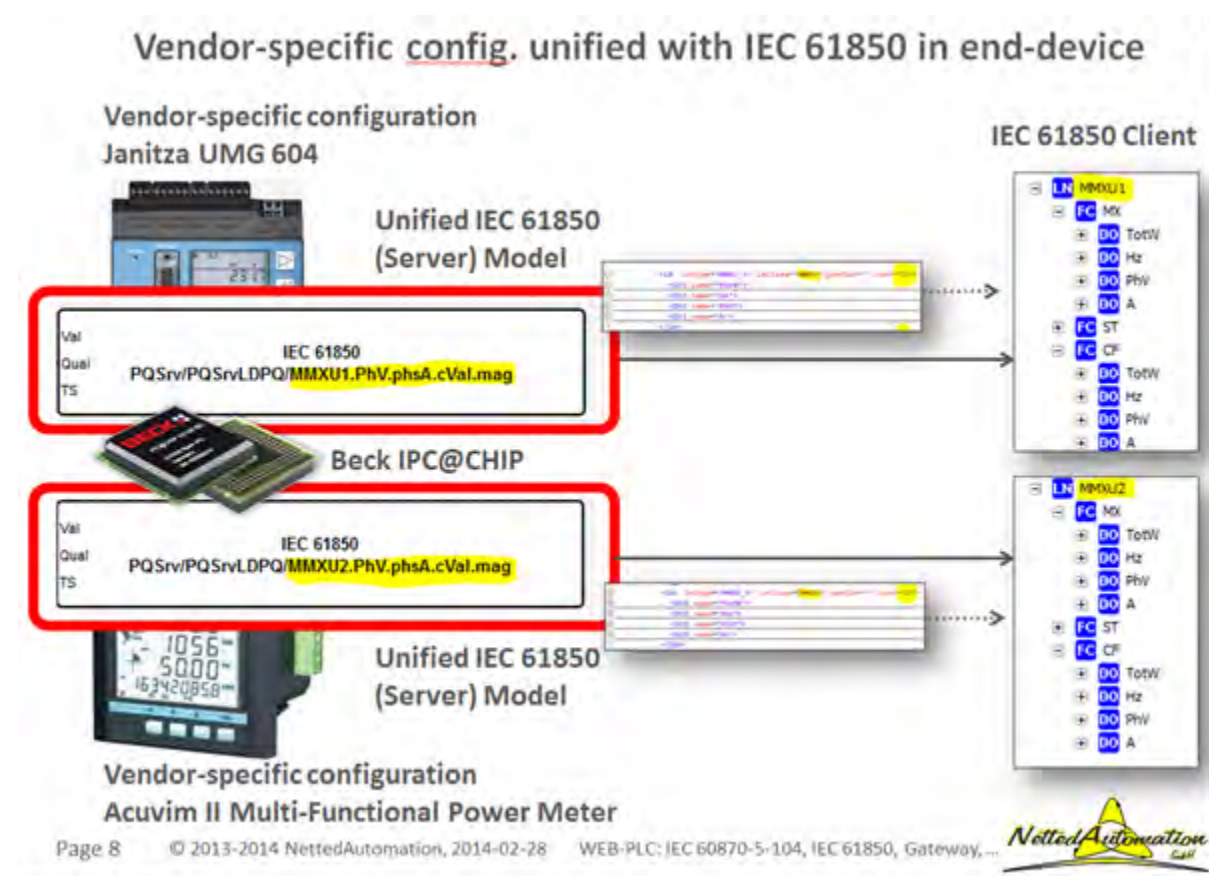
The power quality monitors used are: Janitza UMG 604 and Acuvim II. Both meters provide many measurements of the electrical system. The signals can be communicated by Modbus. Usually each vendor has a different approach to define the lists of signals – and especially the indexes used for the vary same signal is quite different and have to be mapped manually to any application – again and again. There is no way to agree on a single unified Modbus signal list that can be applied all over. The next figure shows the two devices, their signal “phase voltage” with different identifiers and indexes.



The **unification of the information model** is implemented in a simple gateway (com.tom BASIC 5.1). The gateway is based on a WEB-PLC that maps the incoming Modbus signals to IEC 61850 models. The IEC 61850 model uses the same logical node class and type. The type MMXU_0 is the subset of the MMXU class used in this application (of four data objects – as can be seen in the icd file). The instance MMXU1 can easily be “copied” to build a second instance: for the Acuvim II meter. Both instances use a unique MMXU logical node type (contained in the icd file). The model can be used to configure the IEC 61850 server device and an IEC 61850 client (in this case the IEDScout) as shown in the next figure.



The gateway solution is reasonable in case just a limited number of applications need the information communicated by IEC 61850. The next step could be to integrate the “gateway” into the meter housing, as shown in the next figure:



The “heart” of the gateway (we use) is the Beck IPC@CHIP controller that could be applied as a subsystem in the meter. It manages the complete IEC 61850, IEC 61400-25, IEC 60870-5-104 or DNP3 communication.

The IEC 61850 models are the same as before in the case of using a separate gateway box. From a client point of view there is only one difference: there are two IP addresses and two IED names to take into account.

The configuration of the client could benefit from the unified information model contained in a standardized machine readable format (.icd). When you google for power meters with a Modbus interface (or any other fieldbus-like) interface you will get as many different signal list as solutions. In our case we can easily unify the information that comes from many different meters.

By the way, the unified model can be fed not only by a Modbus communication interface. Any other signal list communicated by the myriad of solutions could easily be unified! It does not matter how many different protocols you have to take into account – the very same IEC 61850 profile could serve them all. **Define it once and use it for ever and all over.**

The WEB-PLC based solution explained here is available – I have tested the concept with several devices: meters, monitoring devices, control devices. This approach could be applied right away – and you pay while you go. To get started with a extra box is in the range of some hundred Euro plus some time to understand the approach and learn how to get started with the product. The IPC@CHIP including IEC 61850 client and server (GOOSE and SMV), IEC 60870-5-104 server, and Modbus client costs less than 100 Euro – too cheap to ignore.

Let people define new protocols and ... IEC 61850 can unify them all! The next days I will post a report on a hierarchical system with a Janitza UMG 604 and fan heater as the process, a com.tom device to monitor and control the process (with an IEC 61850 server), an a com.tom on top that could be used as a (proxy) gateway to the underlying com.tom (providing an IEC 61850 client, IEC 60870-5-104 server and an IEC 61850 server). The gateway interoperates in a plug&play manner with the underlying IEC 61850 IEDs.

I don't fear the following situation:



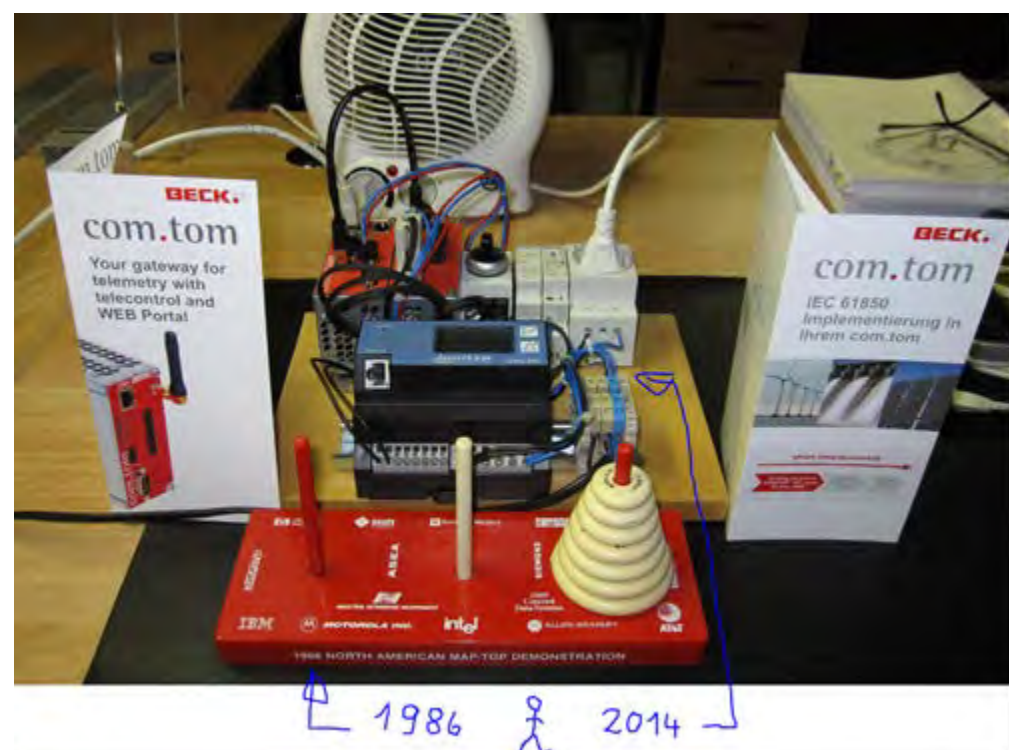
nor this ...




It is a change for IEC 61850 to unify the proliferation!

More to come shortly – stay tuned to this blog.

I had to wait almost 30 years to have a real simple and easy to use “MAP” solution running on my desk:



The MAP/TOP Demonstration in 1986 was too early! Definitely!

Posted by [Karlheinz Schwarz](#) at [2:47 AM](#) [No comments:](#) 

Labels: [Beck](#), [Beck Chip](#), [configuration](#), [configuration change](#), [fieldbus](#), [Gateway](#), [IEC 61400-25](#), [IEC 61850](#), [Information Model](#), [MAP](#), [Modbus](#), [PLC](#), [plug and play](#), [profile](#), [SCL](#)

Wednesday, February 26, 2014

DIN und DKE: Brücken bauen zwischen Forschung und Normung


DIN und DKE führen am 26. Mai 2014 in Berlin einen "Workshop für Forscher und Multiplikatoren zur Relevanz von Normung und Standardisierung für den Forschungstransfer" durch.

"Der Workshop wird das Thema aus verschiedenen Perspektiven beleuchten und die Möglichkeiten der Zusammenarbeit zwischen Forschung, Normung und Standardisierung präsentieren. Projekte aus den Bereichen Risikomanagement, Logistik, **Energiewende und Smart Grid** werden über ihre Anwendung von Normung und Standardisierung als Verwertungsinstrument berichten."

[Hier](#) für mehr Informationen klicken.

Aus Sicht der Normenreihen IEC 60870-5-104, IEC 61968, IEC 61970, IEC 61850 und IEC 61400-25 kann auch die Forschung als Verwertungsinstrument für Normen eingesetzt werden. Für verfügbare und – vor allem – international anerkannte Normen sollte die Forschung die Ergebnisse verwerten und für Anwendungen einsetzen, die helfen, die Energiewende und Smart(er) Grids voranzubringen.

Doppel- und Dreifachnormung durch die Forschung ist kaum zielführend!

Posted by [Karlheinz Schwarz](#) at [12:13 AM](#) [No comments:](#) 

Labels: [Energiewende](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [Smart Grid](#)

Wednesday, February 19, 2014

IEC 61400-25-4 Mappings: IEC 610870-5-104 AND/OR IEC 61850-8-1 MMS?

As an engineer I have been involved in many discussions on protocols – for the last 30 years. Sometimes it seems to be better to just ignore the arguments pro and contra a specific solution. The mapping in IEC 61850 uses ISO 9506 (MMS) as the "transport layer" of the messages required for IEC 61850 client-server applications.

In **IEC 61400-25-4** (WIND TURBINES – Part 25-4: Communications for monitoring and control of wind power plants – Mapping to communication profile) there are the following five options defined:

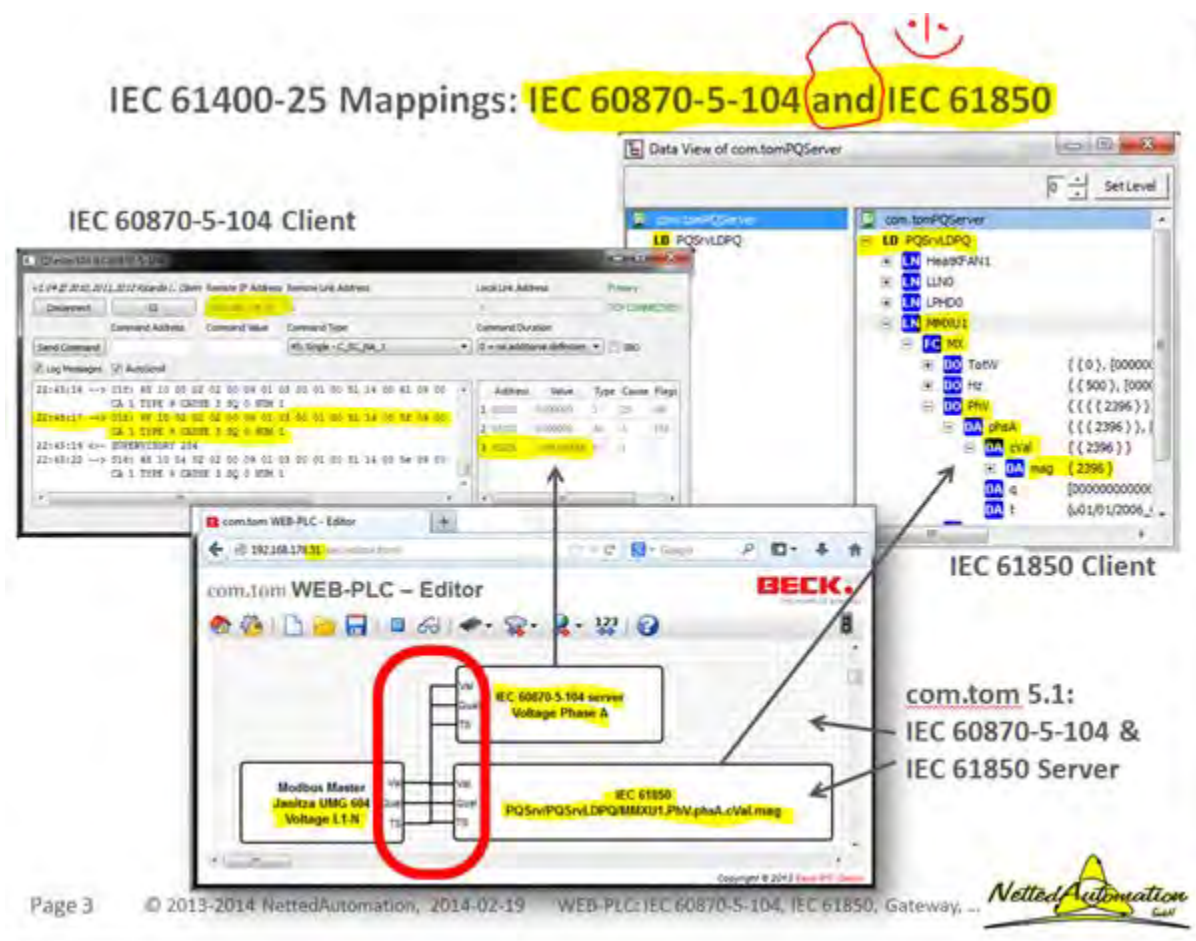
- Web-services
- OPC XML DA
- IEC 61850-8-1 (MMS)
- IEC 60870-5-101/104
- DNP3

Depending on the company you will find one or the other solution. Most applications use MMS – not all.

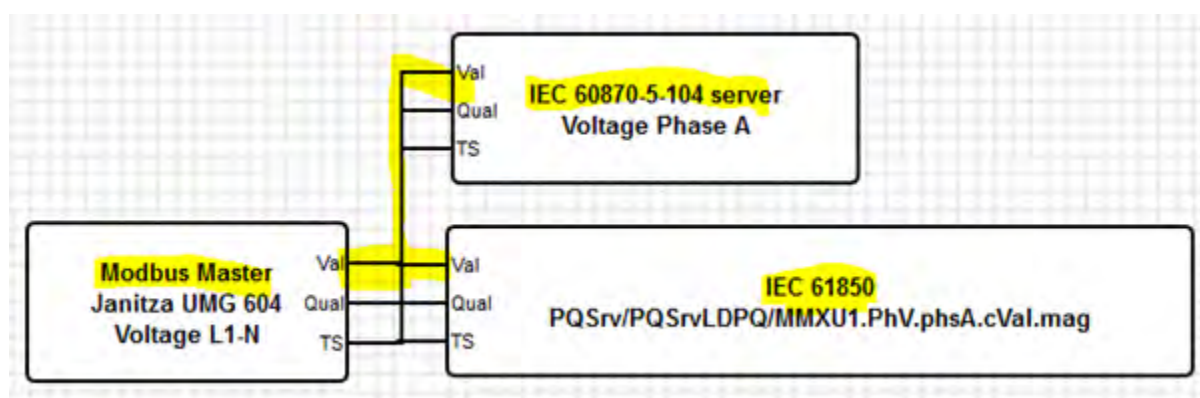
Yesterday I attended a presentation of a big (well known wind turbine manufacturer). The presentation showed the use of IEC 60870-5-104 to communicate information defined in IEC 61400-25-2 (Information Models). The fourth option expressively allows to use 104. So, does this mean the market will split in five parts? Why should this happen?

The following application running on the WEB-PLC of the Beck IPC com.tom shows that it is quite easy to support one or the other solution or BOTH – at the same time.

The com.tom 5.1 provides two servers: IEC 60870-5-104 **AND** IEC 61850. The decision which signal to communicate by which protocol is engineered by drawing a line (on a standard web browser!) from the source information (coming from the Janitza UMG 604 power quality analyzer) to the corresponding output signal: IEC 60870-5-104 **and/or** IEC 61850:



The two clients on top (left QTester104, right IEDScout) can tap the same information. It is no question anymore: **either ONE or the OTHER**. The communication of the signals can be decided by **drawing a simple line – without programming a single line in C/C++ or IEC 61131-3**. Sure, the applications to be run on the com.tom family of products can also be programmed in IEC 61131-3 (CoDeSys) and C/C++ ... which means: it is more work.



The WEB-PLC Object at the bottom right in the above figure can be an IEC 61400-25-2 object like: WGEN1.PhV.cVal.mag. For the platform these are all just names. I will provide more examples soon.

This solution shows that there is no need to fight for one or the other solution: just use whatever fits with your needs. DNP3 will be available soon ... Modbus RTU is already used (see above).

Posted by [Karlheinz Schwarz](#) at 2:32 PM No comments:

Labels: [client](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [open source](#), [protocol](#), [server](#)

Workshop of USE61400-25 Users Group in Hamburg was a very big Success

The [workshop on IEC 61400-25](#) (IEC 61850 extensions for wind turbines) at Senvion (former RePower, Hamburg) was a very big success! The **40 attendees** appreciated the high level of presentations on several aspects of the standard: Information Models, Modeling, Information exchange services, Mappings, Applications, solutions, testing, and certification.

The [USE61400-25 Users Group](#) was very active in promoting the standard and how to reach a high level of interoperability and – of course – conformity!

It is very likely that this workshop has inspired several people present that are not yet members of the Users Group.

Membership in this Users Group provides an excellent platform to exchange experiences, educate experts, to support the standardization process, and the testing of devices.

Check the Users Groups website for news – you will find also news about the wind power applications on this blog. Several people thanked me for the great content they find on this blog! You are welcome!

Stay tuned.

Posted by [Karlheinz Schwarz](#) at [1:08 PM](#) [No comments:](#) 

Labels: [education](#), [IEC 61400-25](#), [IEC 61850](#), [open source](#), [USE61400-25](#), [Users Group](#), [wind power](#)

Saturday, February 15, 2014

New VHPReady Industrieforum to push IEC 60870-5-104 and IEC 61850

The specification “Virtual Heat and Power” (VHPReady) has been developed by Vattenfall and published as Version 3. The specification is a **profile** for a specific application. It has gained crucial industry support. The specification is the major input for the newly established “**Industrieforum VHPReady**” this week Wednesday during the E-World conference in Essen.

The Virtual Power Plant combines block-type combined heat and power (BCHP) plants and heat pumps to create an interconnected, flexible system with centralized control. It is the first power plant which is capable of generating power during heat generation using the connected BCHP plants while making good use of excess wind and solar electricity by way of heat pumps.

The two communication options are: IEC 60870-5-104 and IEC 61850.

Founding members of the [Industrieforum](#) are well known organizations and companies:

- Fraunhofer FOKUS
- 2G Energy AG
- 50Hertz Transmission GmbH
- [Beck IPC GmbH](#)
- Bosch Software Innovations GmbH
- Energy2market GmbH
- E.ON Connecting Energies GmbH
- IT&I GmbH
- LichtBlick SE
- Optimax Energy GmbH
- PHOENIX CONTACT Electronics GmbH
- SSV Software Systems GmbH
- [Vattenfall Europe Wärme AG](#)
- WAGO Kontakttechnik GmbH & Co. KG
- [Younicos AG](#)

Download the VHPReady 3.0 specification in [English](#) [PDF, 650 KB] and in [German](#) [PDF, 650 KB].

Some discussions can be found here:

- [English Version](#) of Vattenfall’s “VHP READY – Virtual Heat & Power Ready” available
- [Is IEC 61850 still there?](#)
- [IEC 61850 ready for VHP-Ready](#) (Virtual Heat and Power Ready)

Posted by [Karlheinz Schwarz](#) at [5:13 AM](#) [No comments:](#) 

Labels: [Beck](#), [IEC 60870-5-104](#), [IEC 61850](#), [profile](#), [Vattenfall](#), [VHP Ready](#), [virtual power plant](#)

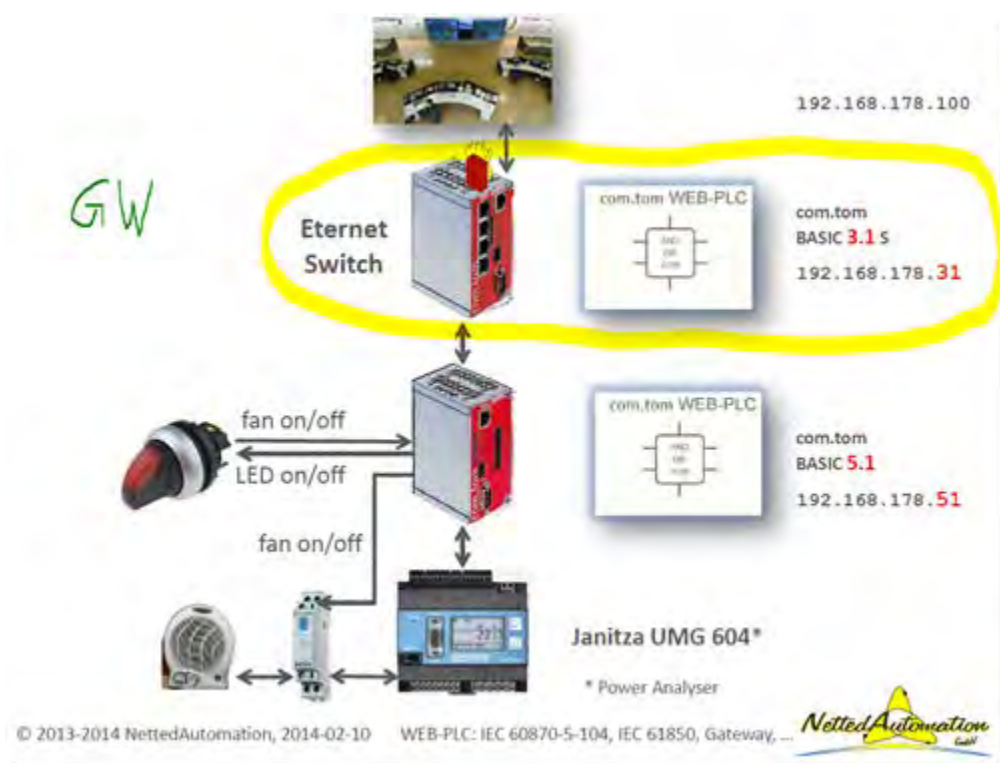
Friday, February 14, 2014

Siemens reported using IEC 60870-5-104 for DEMS

Siemens DEMS 3.0 stands for third version of their “Decentralized Energy Management System”. It uses IEC 60870-5-104 for communication with power generators, storage devices or loads. The use of open communication and other solutions built-in reduce the engineering cost for virtual power plants by 60 percent – according to Siemens.

What could you do to apply the same cost reduction – or more – if you have to integrate IEDs that provide IEC 61850 information, information exchange and configuration language? Or how to connect a DEMS 3.0 system to IEC 61850?

Here is – I guess – the easiest and shortest time-to-market solution ... without writing a single line of program code: The gateway using a so-called com.tom (**communication to machine**). The topology of an example is shown in the following figure. The gateway is implemented in the upper box.



All WEB PLC objects (inputs and outputs) related to IEC 61850 models are automatically generated from the corresponding SCL files. There is no need to do any manual configuration as long as you have the ICD files of the devices. The object names of the WEB PLC are derived from the object references of the IED/LN.DO.DOA and so on. You see the path names in the I/O list.

192.168.178.31/home.html COM.tom Basic 3.1 S

com.tom WEB-PLC – Home

Name	Value
Inputs	
Modbus Master	
IEC 60870-5-104 server	
Operate-Remote-Fan	0
IEC 61850	
PQSn/PQSnLDPQ/MMXU1.TotW.mag	0
PQSn/PQSnLDPQ/MMXU1.Hz.mag	499
PQSn/PQSnLDPQ/MMXU1.PhV.phsA.cVal.mag	2308
PQSn/PQSnLDPQ/MMXU1.A.phsA.cVal.mag	0
PQSn/PQSnLDPQ/HeatKFAN1.OpSt	0
DK61/DK61MONITOR/STMP1.AIm	0
DK61/DK61MONITOR/STMP1.DTmpDtAlm	0
DK61/DK61MONITOR/STMP1.Trip	0
DK61/DK61MONITOR/STMP1.Tmp.mag	25
Outputs	
Modbus Master	
IEC 60870-5-104 server	
Status-Remote-Fan	0
IEC 61850	
PQSn/PQSnLDPQ/HeatKFAN1.OpCtl.Oper	0
DK61/DK61MONITOR/STMP1.TmpAlmSpt.setMag	0
DK61/DK61MONITOR/STMP1.DTmpDtAlmSpt.setMag	0
DK61/DK61MONITOR/STMP1.TmpTripSpt.setMag	0
ComTom/ComTomLDcomtom/WEBPLC_GGIO1.Ind1	0
Device Information	
OpenVPN	

manually →

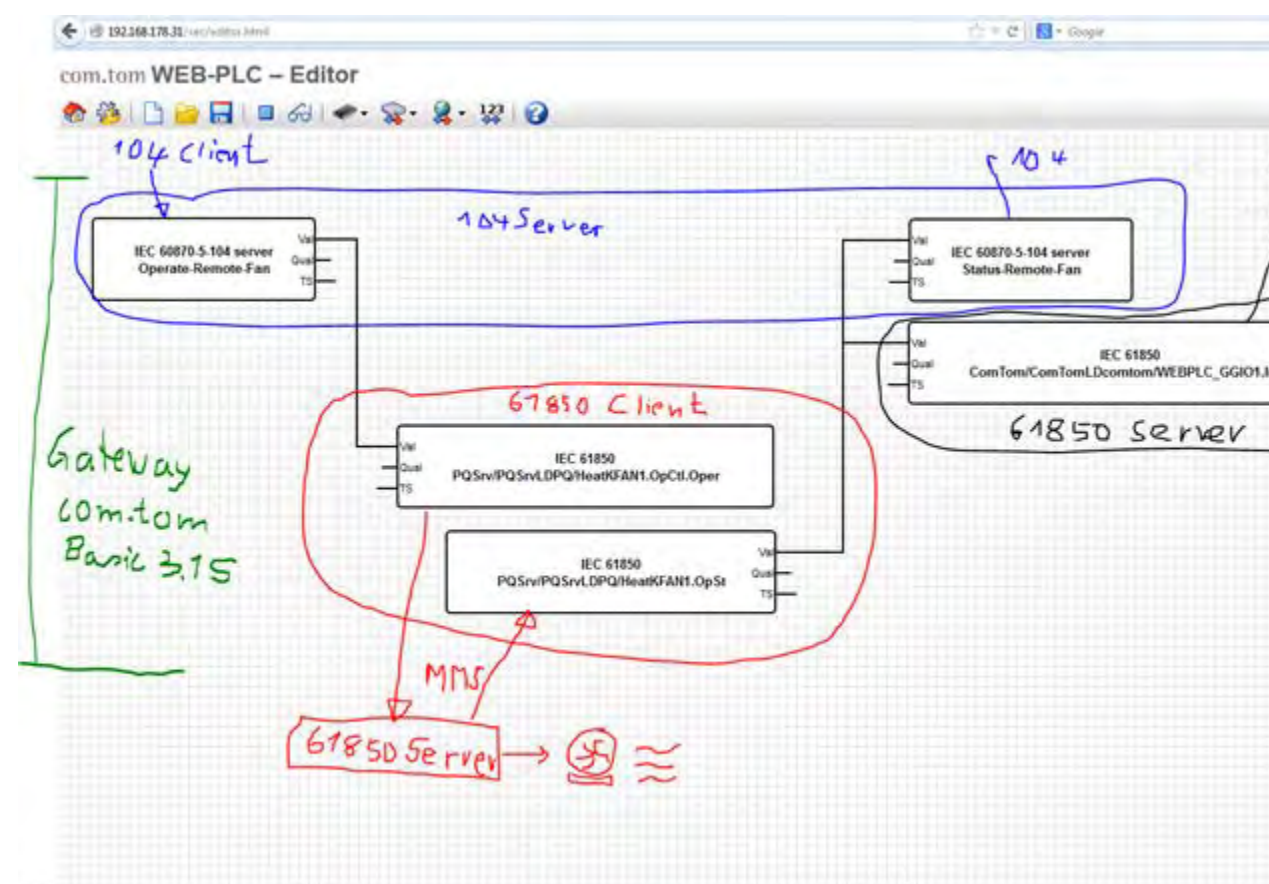
All IED/LN.DO derived automatically from CID Files

IED1

IED2

IED3

All WEB PLC objects can be used to build applications like linking any input with any output (applying the same type – of course): single point input to single point output. The following diagram shows a simple gateway functionality to receive a command via IEC 60870-5-104, route it through an IEC 61850 client to an underlying IEC 61850 server that switches a fan on or off. The status of the FAN LN (using an extended Data Object OpSt) reports the status of the fan. This status is received from the underlying IED via an IEC 61850 report and routed to an IEC 61850 server and an IEC 60870-5-104 server in the gateway.



After “drawing” this diagram, all you need to do is to store the diagram to the gateway (com.tom Basic 3.1 S) and start the program. That’s it.

You may also have figured out the the com.tom Basic 3.1 S integrates an 5-port Ethernet Switch and another independent Ethernet port. This allows to build secure proxy servers/gateways.

The WEB PLC with IEC 60870-5-104, DNP3, Modbus, IEC 61850, ... is a very easy, low cost and fast-to-market product that can be applied for many applications running on these communication solutions and for gateways. The application is freely configurable by drawing lines.

If you need complex functions, you can write them in C/C++ or IEC 61131-3 (CoDeSys) and wrap them for immediate use at the WEB PLC. For more complex applications you can program the application in C/C++ or CoDeSys and use the same communication.

Whatever protocol standard is used for a system (IEC 60870-5-104 for Siemens DEMS 3.0) you can easily integrate other devices that run DNP3, Modbus, IEC 61850, ... with the com.tom WEB PLC gateway.

You want to learn more about the gateway, [please contact us](#).

Click [HERE](#) for information about the com.tom family. The com.tom Basic 3.1, for example, costs 368 Euro plus some license costs for IEC 60870-5-104 and IEC 61850 – this includes already the 5-port Ethernet Switch!

Posted by [Karlheinz Schwarz](#) at 12:40 AM No comments:

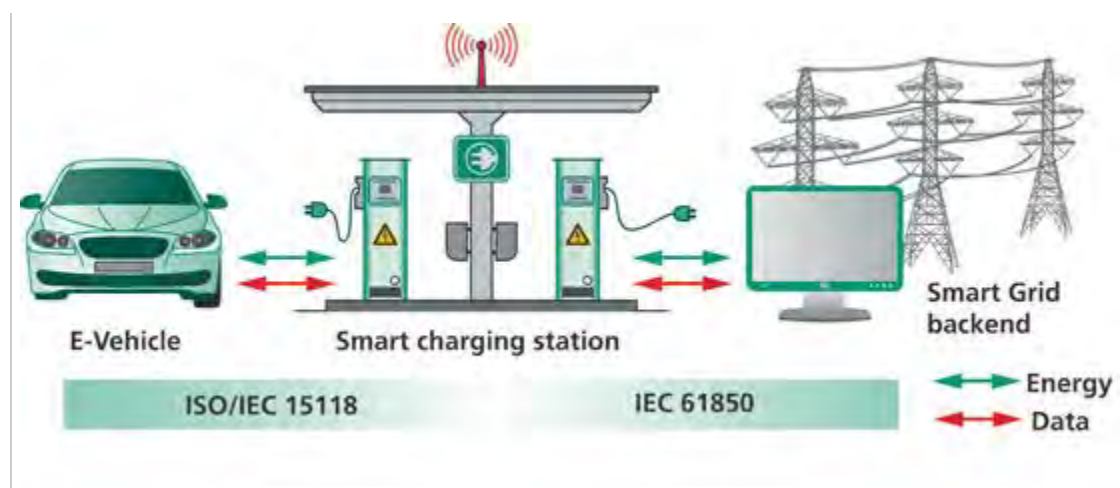
Labels: [CoDeSys](#), [condition monitoring](#), [Ethernet](#), [Ethernet switches](#), [Functionblock](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [logic](#), [logical node](#), [SCL](#), [Siemens](#)

Thursday, February 13, 2014

Seamless e-vehicle to Smart Grid Connectivity through IEC Standard Communication

To prevent e-vehicles from overloading power grids while charging, seamless connectivity is required. To help address this issue, Fraunhofer ESK (Munich, Germany) is developing underlying communication methods for a uniform energy management system. At the Hannover Trade Fair (April 7-11, 2014, booth C10, exhibit hall 13), ESK researchers will be demonstrating how the charging station serves as an interoperable node between the e-vehicle and the network control center using the ISO/IEC 15118 and **IEC 61850** standards. Having already implemented both communication interfaces, ESK engineers can now illustrate how the concept works in practice.

With its solution, the institute helps charging station and e-vehicle manufacturers and grid operators to implement the communication standards and test their products for standards compliance.



"Our experience has shown that charging station manufacturers are still shying away from the standard because the implementation is too complex," explains Dr. Erik Oswald from Fraunhofer ESK in Munich. "For this reason, we developed a reference installation that significantly streamlines the implementation."

Yes, I agree ... I have seen it. It is that easy.

Click [HERE](#) for the full report from nano werk.

Click [HERE](#) for a presentation on more details, provided by ESK.

Click [HERE](#) for a list of further presentation material.

Congratulation to the experts involved!

Posted by [Karlheinz Schwarz](#) at [8:39 AM](#) [No comments:](#)

Labels: [E-Mobility](#), [ESK Fraunhofer](#), [IEC 15118](#), [IEC 61850](#), [Smart Grid](#), [smart vehicle to grid](#)

Wednesday, February 12, 2014

ENEL pushes for IEC 61850 MMS and GOOSE in Smart Grids

Several times I have reported about the use of IEC 61850 in DER Management projects in the distribution networks of ENEL in Italy.

Several Pilot projects have shown the benefit of using a standardized solution: IEC 61850 **MMS (client/server)** and **GOOSE** messaging.

A brief report can be found in the pacworld magazine issue September 2013. The key applications are: voltage control and

Voltage control

The massive introduction of distributed generators changes the constraints in hosting capacity calculation. In fact the hosting capacity of a MV network, with a high presence of DG, is not usually limited by conductors capability but by voltage increase caused by the distributed generators.

Historically and up to now, the voltage control was done by modulating the On Load Tap Changers (OLTC) of each HV/MV transformer by means of a method called "current compound." The goal was assuring a good voltage level at both ends of the feeders. This method works until the voltage profile is monotone decreasing, but with the introduction of DG a different approach is required.

Fast Fault Selection

According to the Italian standards regulating the connection of customers to MV networks, (CEI 0-16), in case of a short circuit along a feeder, the circuit breaker at the line departure is opened after a time delay of 170- 250ms.

The scope of this delay is protection coordination between the distributor MV line breakers and also the customer fault-clearing devices.

Taking advantage of this time delay and of the short latency of message exchange of modern telecommunication networks, a new automatic fault clearing system can be implemented.

Conclusions

After the experimentation phase and pilot projects, it is very likely that Enel MV networks will be equipped with the new devices and the new functionalities will become operative.

Also the user power plants will be equipped with the devices and in particular with a control system implementing IRE functions. In fact all the customer devices should not be provided by the distributor but they should become **unified interfaces built-in all commercial power plant control and protection systems**.

Click [HERE](#) for the 3 page report.

Click [HERE](#) for a 118 page report from SMA on a communication needs and solutions – including IEC 60870-5-104, DNP3, and IEC 61850 [PDF, German, 17 MB].

Posted by [Karlheinz Schwarz](#) at [6:36 AM](#) [No comments:](#)

Labels: [distribution automation](#), [ENEL](#), [fault passage indication \(FPI\)](#), [GOOSE](#), [IEC 61850](#), [Italy](#), [MMS](#), [voltage control](#)

Saturday, February 8, 2014

ABB: “Smart Planning” by “Consultancy Light”

Many advanced technologies for managing electric power delivery systems are implemented for high voltage transmission systems operated by big utilities. The smaller utilities (mainly distribution system operators) usually just follow the “rules” set by the big utilities. To this end: the power and the technology are “flowing top-down”.

The power is now flowing “top-down” **and** “bottom-up”. The technology needed in the future power system automation requires more than just “copying” the technologies from the big utilities. May requirements are very unique to the power delivery automation – the tools and approaches to keep the power reliably flowing at distribution level are under high pressure.

ABB has started a new group in Germany to offer a three step “Smart Planning” to meet the new challenges in distribution networks:

- 1. Classification of a distribution network
- 2. If the load limits are almost reached, the network monitoring phase starts
- 3. Voltage control and other technologies (e.g., smart Transformers) are considered

This prevents to start with expensive and detailed network calculations as applied in high voltage transmission systems.

Click [HERE](#) for the ABB press release on “**Smart Planning**” [PDF, German, 12 KB].

This “**Smart Planning**” requires a huge amount of new process measurements (3 phase voltage and current, temperature, power quality measurements, etc) and calculated values. IEC 61850 has the right “smart” international solution that backs this new planning approach.


Get all your data engineered,configured and communicated with IEC 61850. Start now with the basic information shared between the process and the applications to feed control, protection and optimization software with “smart” information. Prevent exchanging tons of data – look for useful and crucial information and not for data. Prevent flooding your control center with useless data flowing “bottom-up” – distributed control will extend the centralized systems of today. It is a combination of centralized and de-centralized monitoring and control that will keep the system stable.

Cooperate with “smart people” to get “smart” power distribution systems”.

Click on the following links if you want to learn how to get there:

[TÜV SÜD Seminars](#) [DE], [NettedAutomation hands-on Training](#) [EN], [Beck IPC Workshop](#) [EN, DE]

The future of power distribution networks **needs Teamwork** – to make the Dream work ... the dream of a sustainable power system. This team is more than just the experts of a huge manufacturer. Utility experts **and** consultants need to work together with the vendors’ experts.

Posted by [Karlheinz Schwarz](#) at [1:19 AM](#) [No comments:](#) 

Labels: [education](#), [embedded system](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Smart Grid](#), [smart people](#), [smart solution](#), [Training](#)

Friday, February 7, 2014

MultiSpeak – CIM Harmonization initiated at International Level

IEC TC 57 has published a new document (57/1437/CD - IEC 61968-14 TS Ed.1) trying to figure out the need for harmonization between the international standard series IEC 61968 (CIM) and MultiSpeak:

IEC 61968-14 TS:
Application integration at electric utilities
- System interfaces for distribution management - Part 14:
MultiSpeak - CIM harmonisation

Commenting period closes 2014-05-02

[Please contact your national TC 57 mirror committee](#) for a copy of the document.

I guess that more and more people all over realize the benefit of International Standards – good for utility customers. Here is an excerpt of the Introduction of the new document:

“Multiple standards that cover the same information domain present a problem for the vendor community when developing products, and for the customers that would use these products. The classic challenge becomes one of determining which standards to support or how best to support one or both standards. The problem for the customer is integrating products that follow different standards to work with each other.”

Fortunately the situation for IEC 61850 is quite different: Most of the definitions in the standard series are very unique ... with little or no competition. That’s one of the reasons why the standard is liked all over.

Posted by [Karlheinz Schwarz](#) at [11:53 AM](#) [No comments:](#) 

Labels: [CIM](#), [harmonization](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [Multispeak](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Friday, February 7, 2014

IEC 61850 and IEC 61400-25 are very successful in China

How is IEC 61850 and IEC 61400-25 adopted in China?

The other day a senior engineer of a well-known company in China told me the following: “Actually China is running faster than a horse in power systems communications, **more like a leopard!** Now IEC 61850 LAN Bus is everywhere in newly built substations. Even more IEC 61850 Process is running way too fast ... We are involved in many Wind Generation control projects over the last 2 years, many of these use IEC 61850.”

Posted by [Karlheinz Schwarz](#) at [11:37 AM](#) [No comments:](#) 


Labels: [China](#), [IEC 61400-25](#), [IEC 61850](#)

Monday, February 3, 2014

Download IEC 61850 Blog Content as single PDF Document (February 03, 2014)

For those readers of the blog that want to get the complete content as a single pdf document, it is just a click away ... it contains all 888 posts from 2008 until 2014-02-03. Once you have downloaded the file you can easily browse the content ... search ... mark ... copy ...

[Download all posts of the IEC 61850 blog in a single pdf](#) [10 MB, 666 pages DIN A4]

Posted by [Karlheinz Schwarz](#) at [9:22 PM](#) [No comments:](#) 

Labels: [blog](#), [download](#)

Beck IPC offers a second Free of Charge Workshop on March 12, 2014 in German and first in English

The first **Application and Gateway Workshop** of Beck IPC on IEC 60870-5-104, DNP3, IEC 61850, IEC 61400-25, ... was conducted last Thursday (30 January 2014). The attendees appreciated the new approach of getting started with these solutions.

The second Workshop in German is scheduled for:

Datum: 12. März 2014
Ort: Wetzlar, etwa 70 km nördlich von Frankfurt
Zeit: 10:00 Uhr - 17:00 Uhr
[Programm](#) (Deutsch).

the first in English for:

Date: 13. March 2014
Location: Wetzlar (Germany), some 70 km north of Frankfurt
Time: 10:00 h - 17:00 h
[Program](#) (English).

Click [HERE](#) for more details and registration information for both events.

Check the posts below for some details on the solution.

Posted by [Karlheinz Schwarz](#) at [9:13 AM](#) [No comments:](#) 

Labels: [Beck](#), [Beck Chip](#), [DNP3](#), [Gateway](#), [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [PLC](#), [plug and play](#), [workshop](#)

Saturday, February 1, 2014

Beautiful Simplicity of Gateways and Applications

One of the crucial challenges in applying open information and information exchange standards is the complexity (or better the comprehensiveness) of the standard series IEC 60870-5-104, DNP3, IEC 61850, IEC 61400-25, and IEC 62351 ...

Check the beautiful simplicity of using gateways and application logic integrated into the com.tom platforms based on the WEB PLC (BASIC 3.1 S and 5.1). The following figure shows the general architecture of crucial gateways in the energy domain that allow to add Logic

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- ▶ [2013](#) (130)

News on IEC 61850 and related Standards

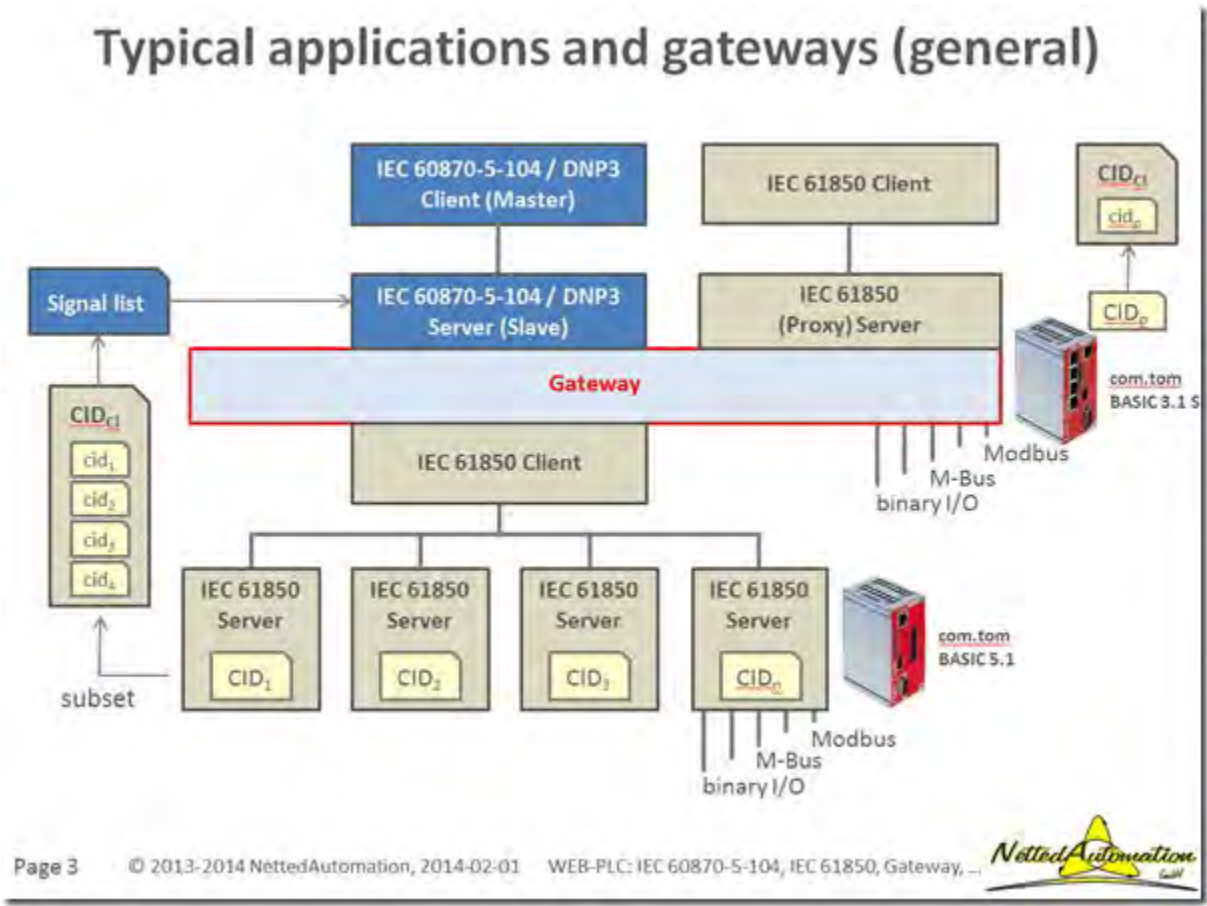
IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Saturday, February 1, 2014

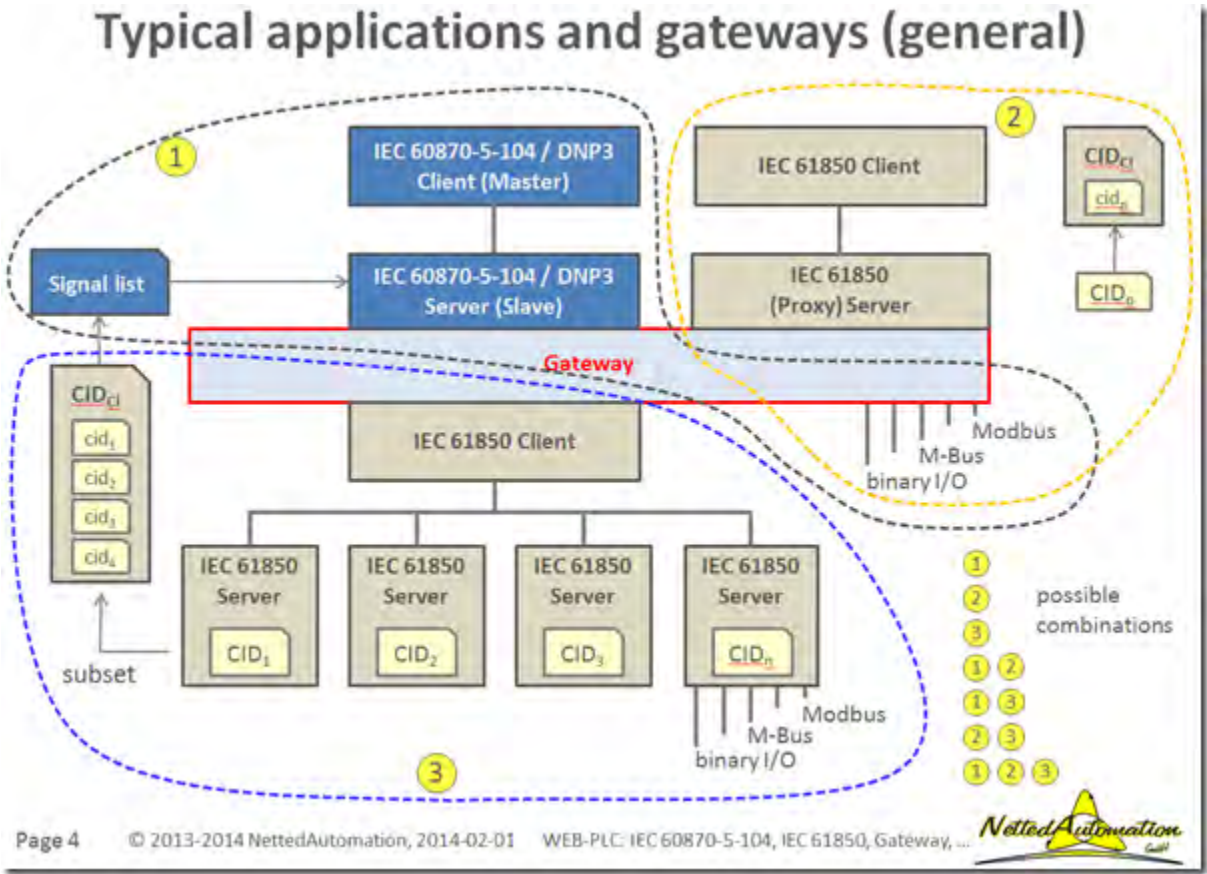
Beautiful Simplicity of Gateways and Applications

One of the crucial challenges in applying open information and information exchange standards is the complexity (or better the comprehensiveness) of the standard series IEC 60870-5-104, DNP3, IEC 61850, IEC 61400-25, and IEC 62351 ...

Check the beautiful simplicity of using gateways and application logic integrated into the com.tom platforms based on the WEB PLC (BASIC 3.1 S and 5.1). The following figure shows the general architecture of crucial gateways in the energy domain that allow to add Logic functions as well:



The main parts are the communication defined by (1) IEC 60870-5-105 (DNP3), (2) IEC 61850 Proxy, and (3) IEC 61850. These can be applied in seven different combinations:



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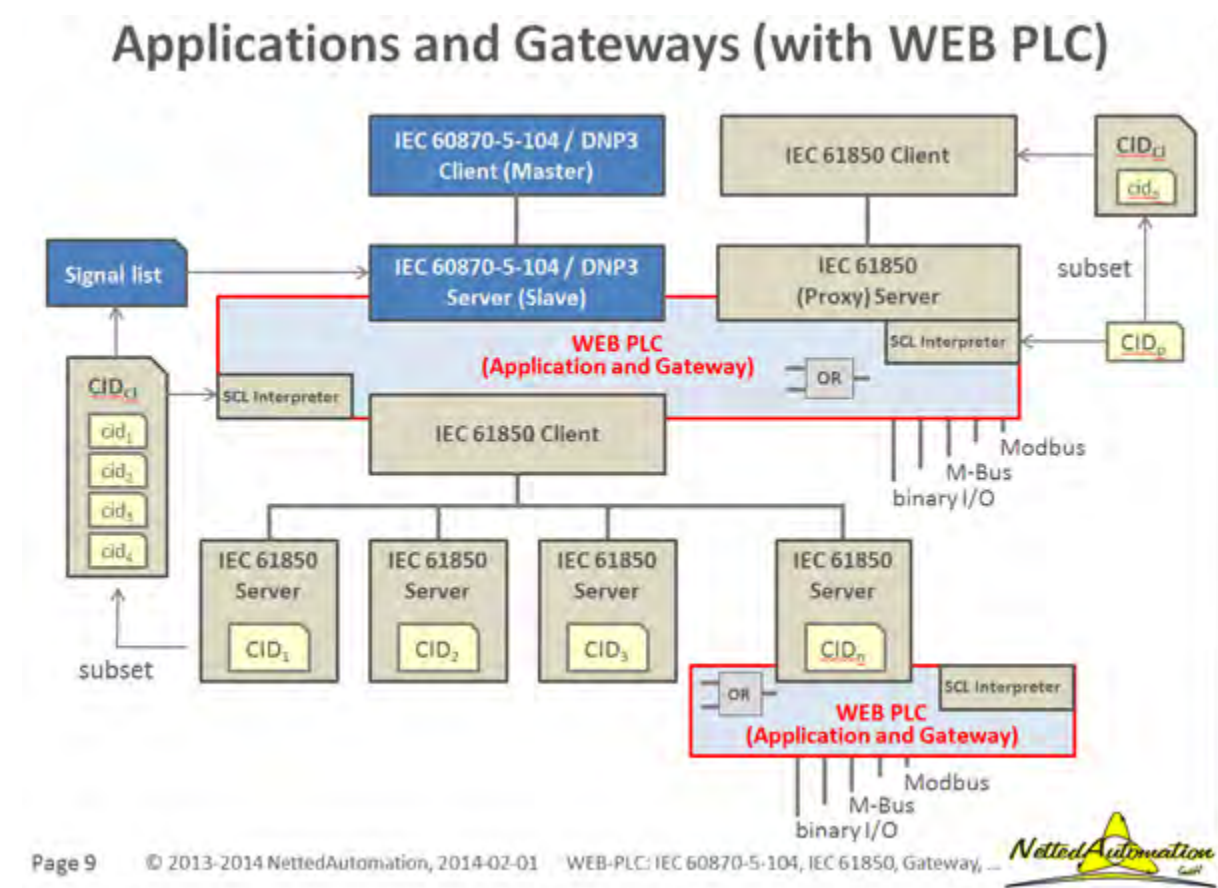
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-  2014 (12)
 -  February (1)
 - [Beautiful Simplicity of Gateways and Applications](#)
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-  2009 (162)
-  2008 (82)

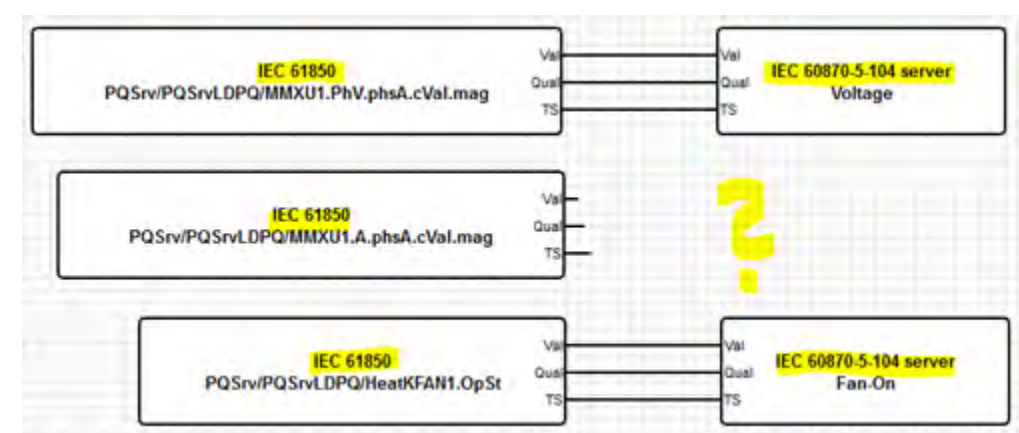
Contributors

-  [Michael Schwarz](#)
-  [Karlheinz Schwarz](#)

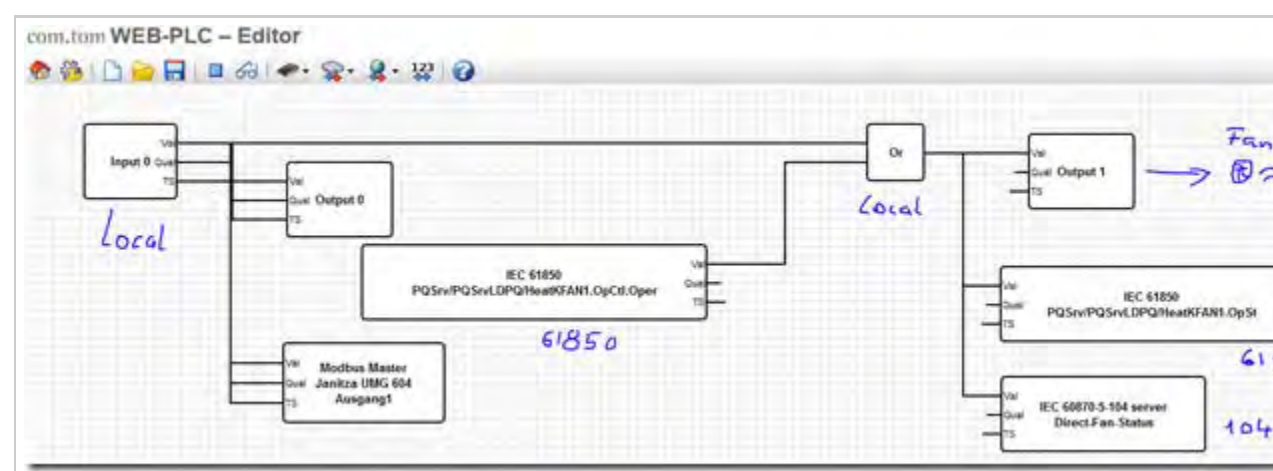
The WEB PLC (a key feature of the com.tom) can be used to configure LOGIC and Gateways:



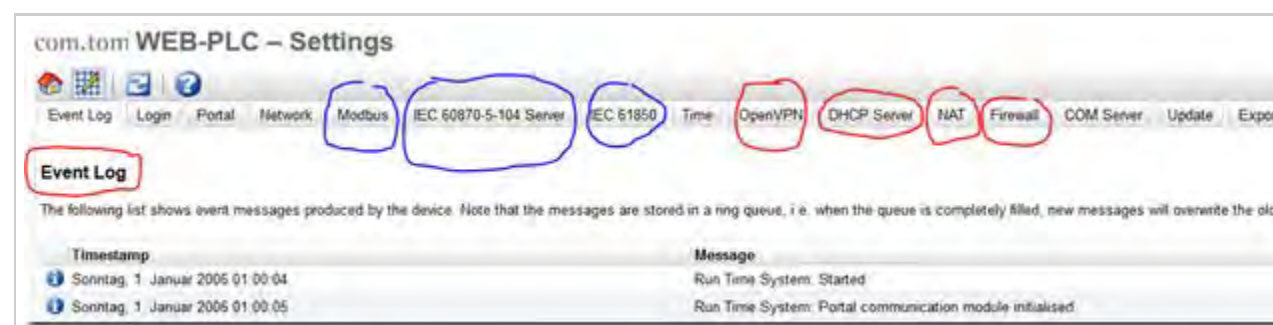
The WEB PLC unifies all input and output signals – independent of their origin or destination. Once you have them listed in the WEB PLC, you just need to draw a line between any input and output ... and put logic gates in between:



Combine any signal with another signal (input with output) and your logic – using local input 0 and local output 1 and 2 as well as 61850 input (HeatKFAN1.OpCtl.Oper), 61850 output (HeatKFAN1.OpSt – extended Data Object), and 104 status of Fan:



This WEB PLC and the integration of many protocols, security (openVPN), firewall, ... makes your life really easier.



With the com.tom and WEB PLC you are entering into the comfort zone of secure energy information and information exchange.

Click [HERE](#) to get started with the WEB PLC [pdf, 800 KB]

Posted by [Karlheinz Schwarz](#) at [5:26 AM](#) [No comments:](#) 

Labels: [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [logic](#), [PLC](#), [ready to go](#)

Friday, January 31, 2014

New Work Proposal: IEC 61850 – Modbus Mapping

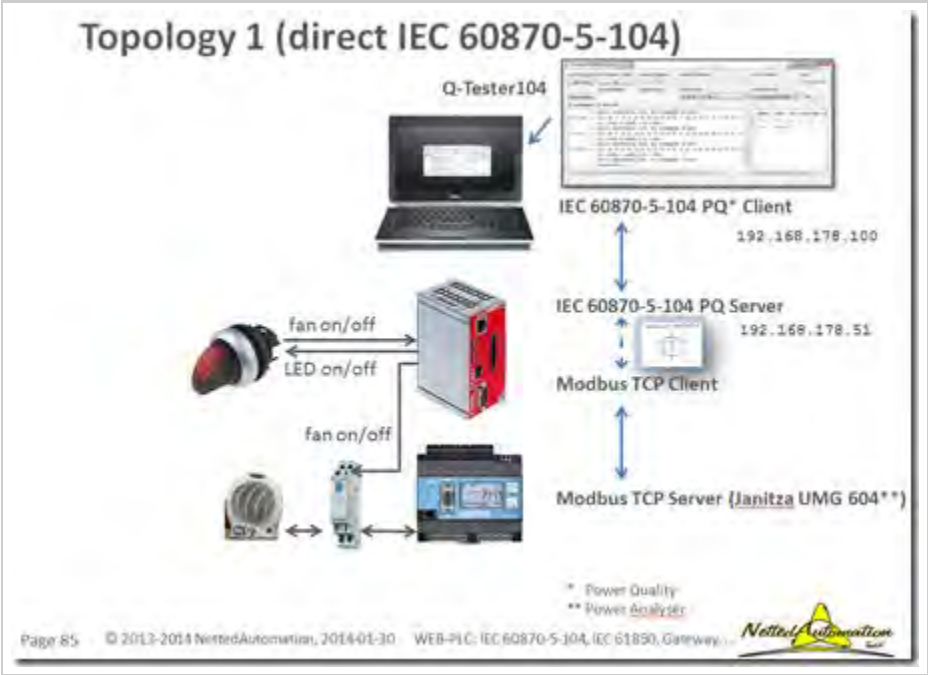
The Korea Electrotechnology Research Institute (KERI) has proposed a new work item: Guideline for mapping information between IEC 61850 and IEC 61158-6 (ModBus).

Document: 57/1434/NP
Closing date for voting: 2014-04-25

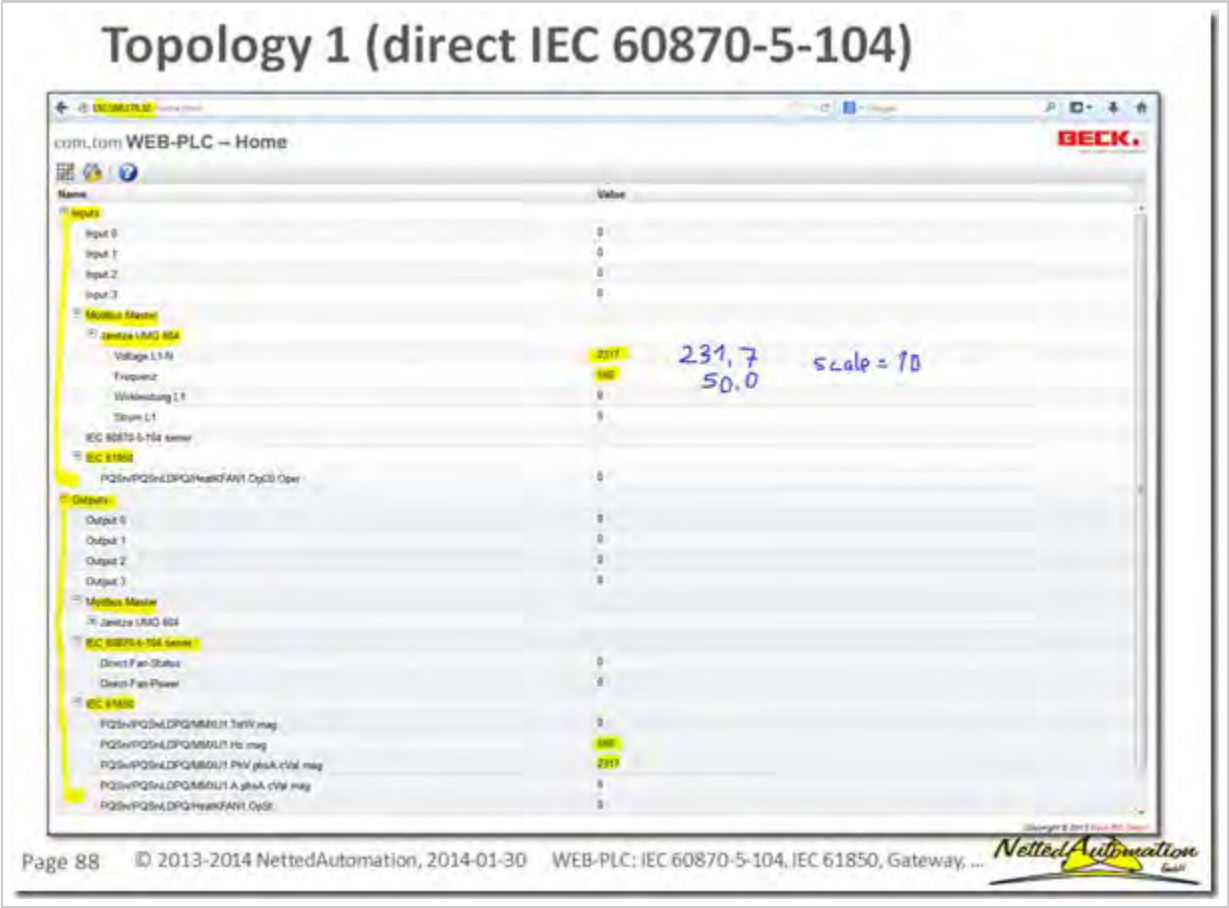
Quite interesting proposal!

We conducted yesterday (during a Workshop at Beck IPC in Wetzlar/Germany) a very easy tool to map between Modbus, IEC 60870-5-104, IEC 61850, ... using a graphical webbased configuration tool needs just a web browser:

1. Topology for mapping between Modbus and 104:

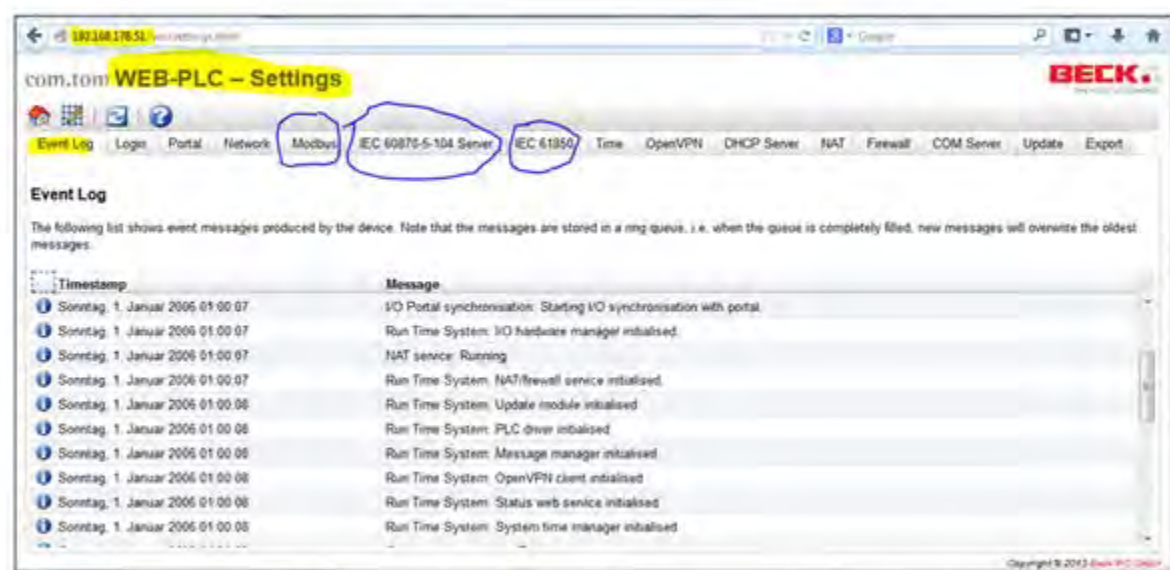


Signals (Inputs and Outputs) that can be used by the WEB PLC:

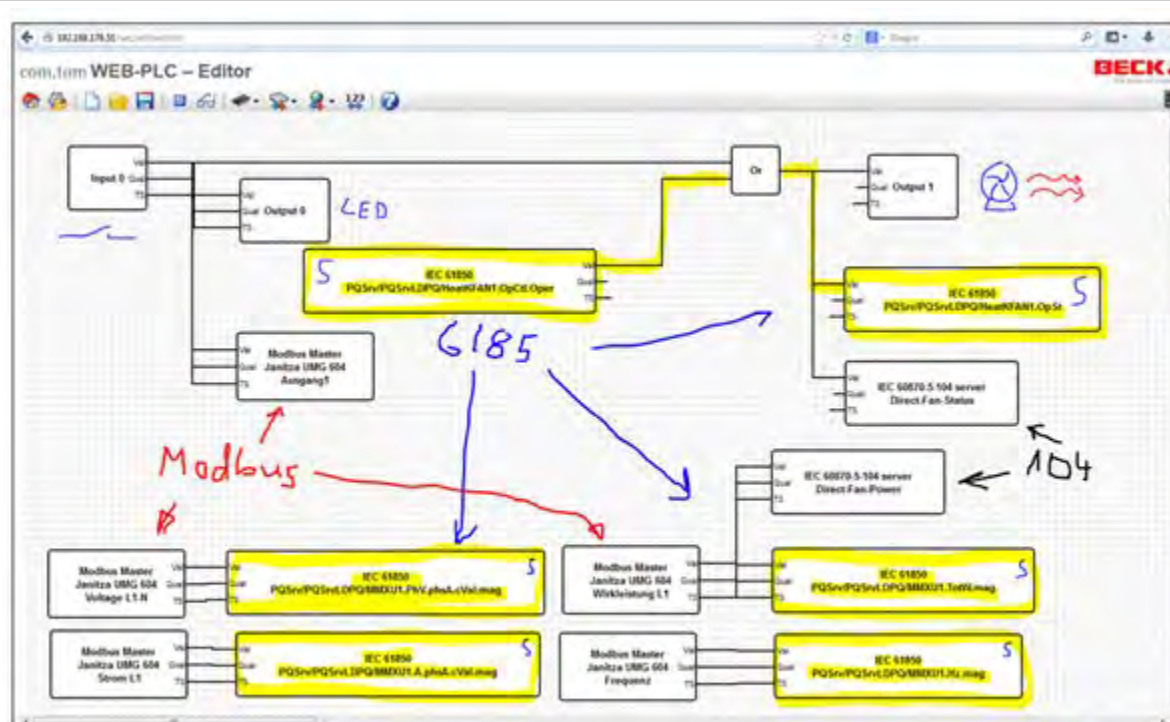


Available communication solutions (Modbus, IEC 60870-5-104, IEC 61850, OpenVPN, ...):

Topology 1 (direct IEC 60870-5-104)



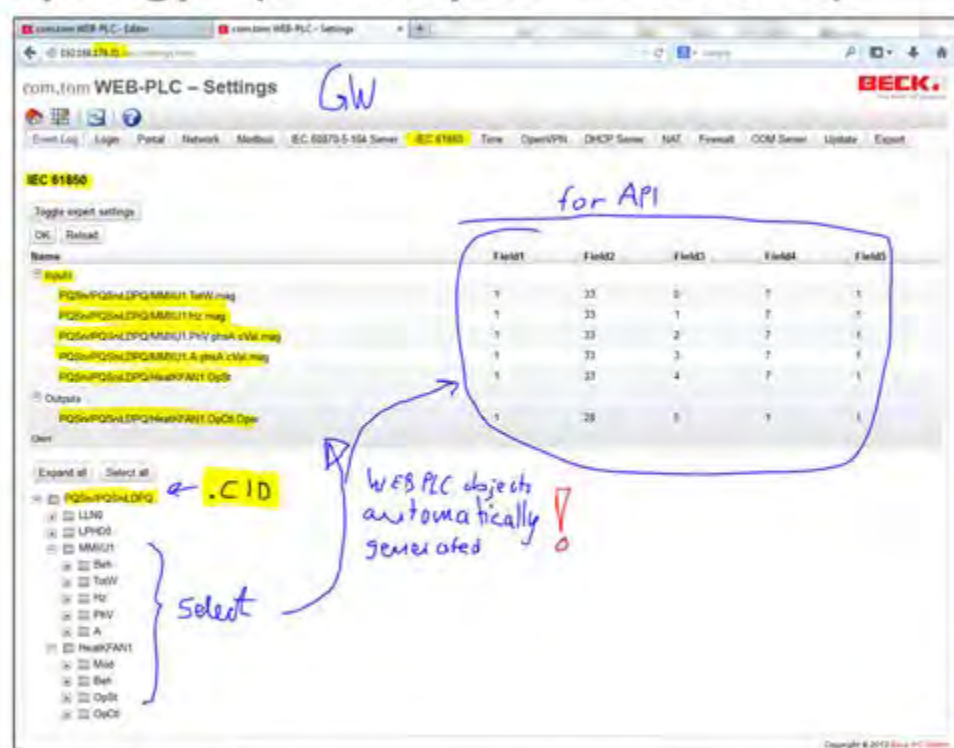
Function chart of objects and simple logic:



The interest in such a **simple solution that does not requires any programming** – except drawing lines between input/outputs, functions and outputs/inputs – is very high. Wrappers are available to integrate C/C++ or CoDeSys programmed functions (Function Blocks).

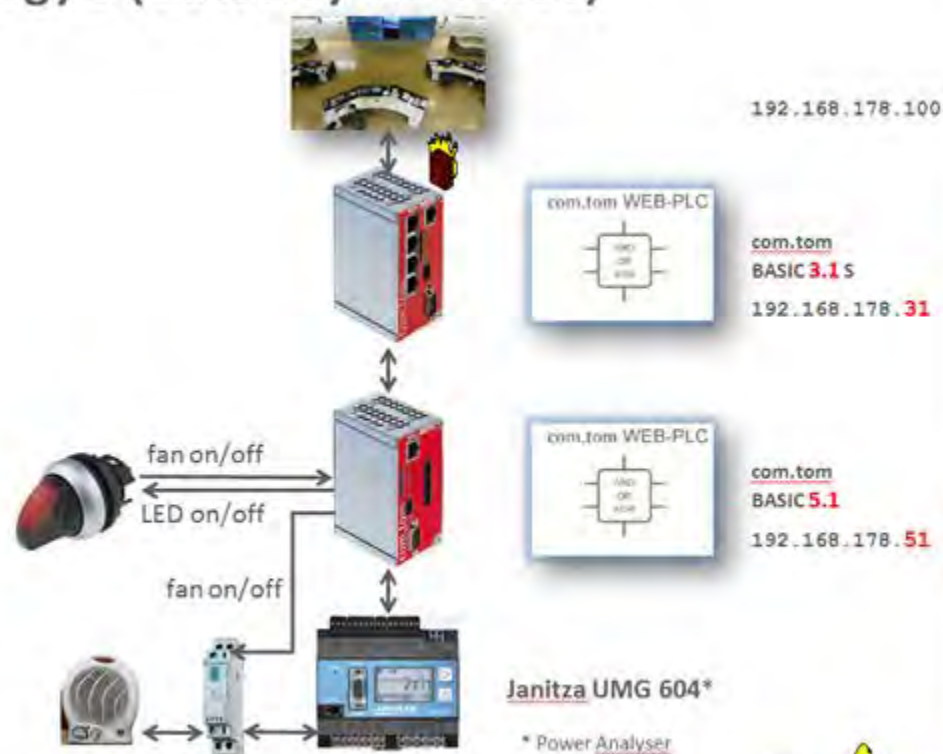
The IEC 61850 information models are interpreted and the PLC inputs and outputs are automatically generated and shown as a tree ...

Topology 3 (Gateway 104 - IEC 61850)



Finally we demonstrated a Gateway: Process → Modbus and other I/Os → IEC 61850 → IEC 60870-5-104 (DNP3):

Topology 3 (Gateway IEC 61850)



The IEDs [com.tom BASIC 3.1S](#) (with 5 Port Ethernet Switch and second Ethernet Port integrated) and [BASIC 5.1](#) have been used for the system (process, process monitoring and control, gateway and CC communication).

A **second Workshop in German** will be conducted on March 12, 2014. The **first Workshop in English** is scheduled for March 13, 2014.

Click [HERE](#) for more details on the workshops. Register soon – the space is limited ... and interest high.

Posted by [Karlheinz Schwarz](#) at [8:44 AM](#) [No comments:](#) [✉](#)

Labels: [Beck](#), [com.tom](#), [condition monitoring](#), [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#)

Draft Version 3.0 of NIST Smart Grid Framework


NIST just published the draft version of the “**NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 3.0**” and asks for review.

Click [HERE](#) to visit the page with the link to download the draft [pdf, 6.4 MB]

The standard series IEC 61850 is a very crucial standard referred to throughout the

document!

Check also the [SGIP Catalog of Standards Information Library](#).

Posted by [Karlheinz Schwarz](#) at [12:40 AM](#) [No comments:](#) 

Labels: [Framework](#), [IEC 60870-6](#), [IEC 61400-25](#), [IEC 61850](#), [NIST](#), [NIST Roadmap](#), [Smart Grid](#), [smart people](#), [USA](#)

Wednesday, January 29, 2014

Wind Data North America, 4-6 March 2014, Houston, Texas

The standard IEC 61400-25 (extension of IEC 61850 for wind power) is making its way into the North American Wind Power market.

The **first Wind Data North America forum** will be held on 4-6 March 2014 in Houston, Texas, USA.

On day one there is an interesting presentation of one of the leaders in this domain:

IEC 61400-25 A New Wind Turbine Communication Standard

- Why is a standard needed?
- Overview and background of the IEC 61400-25
- Current status of the standard
- Recent field experiences

Senior Representative, **Senvion (former RePower)**

Click [HERE](#) for the program and details.

Posted by [Karlheinz Schwarz](#) at [10:04 PM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [REpower](#), [Senvion](#), [USA](#), [wind power](#)

TÜV SÜD: IEC 61850 Grundkurs am 20. und 21. Februar 2014 in Essen

Der TÜV SÜD führt am 20. und 21. Februar 2014 in Essen einen zweitägigen Grundkurs zu IEC 61850 durch:

Weitere Orte und Temine:

Berlin
11.03. - 12.03.

Essen
20.02. - 21.02.

Frankfurt
16.06. - 17.06.

Hamburg
02.06. - 03.06.

Leipzig
10.09. - 11.09.

Stuttgart
03.04. - 04.04

[HIER](#) klicken, um alle notwendigen Informationen zu erhalten.

Posted by [Karlheinz Schwarz](#) at [9:44 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [seminar](#), [TÜV SÜD](#)

Tuesday, January 28, 2014

Current and forcasted Solar and Wind Power in the TransnetBW Network


The TransnetBW is the fourth largest German Power Transmission operator (TSO) – in the southwest of Germany where my hometown (Karlsruhe) is.

The day started very sunny. In case you want to see how much solar and wind power is fed into the grid, you can visit the following websites:

Solar Power in TransnetBW (historical, currrent and forcasted values): Click [HERE](#).
Wind Power in TransnetBW (historical, currrent and forcasted values): Click [HERE](#).
Solar Power in Germany (historical and current values): Click [HERE](#).

Currently we have 3.6 GW PV power production in Germany ... some 10 per cent of the installed capacity of 34 GW.

This all requires a lot of measurements and management ... and communication like IEC 60870-5-104, IEC 61850, IEC 61400-25, and DNP3.

Posted by [Karlheinz Schwarz](#) at [1:34 AM](#) [No comments:](#) 

Labels: [DNP3](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [photo voltaic](#), [PV](#), [renewables](#), [wind power](#)

Sunday, January 26, 2014

The Most Concrete Control Room Flooding

Have you ever seen a control room flooded by concrete stuff: wet concrete!

Three rows of relay equipment were submerged in the concrete click [HERE](#) for a Report and [HERE](#) for number of pictures. Where: The other day in London's Underground.

This concrete could extend the life time of the relay control room by decades ... ;-)

It just could happen.

Keep all doors and back-doors closed – not only the firewall.

Posted by [Karlheinz Schwarz](#) at [9:43 AM](#) [No comments:](#) 

Labels: [control center](#), [control systems](#), [security](#)

Tuesday, January 21, 2014

Wie sicher ist unsere Stromversorgung?

Eigentlich sehr sicher! Mit etwa 16 Minuten durchschnittlichen Versorgungsunterbrechungen pro Jahr stehen wir doch gut da! Ist das alles? Die Sicherheit der Stromversorgung hat sehr viele Aspekte, die im Allgemeinen der Bevölkerung wenig bekannt oder bewusst sind!

Wenn Sie diesen Blogpost lesen, dann sind Sie Experte in Fragen der Stromversorgung und haben eigene Erfahrungen. Es ist unter Umständen hilfreich, wenn wir uns auch zu anderen Themen als IEC 61850 und IEC 60870-5-10x austauschen. Der Stromausfall ("Leck" an einer Kabelmuffe in einem 35 Jahre alten Kunststoff-isolierten Kabel) vor unserer Haustüre (im wahrsten Sinne des Wortes) Mitte November 2013 hat mich animiert, etwas tiefer in Fragen der Versorgungssicherheit hineinzuschauen. Hier finden Sie ein paar Themen, die mir förmlich ins Auge gesprungen sind.

Störung in unserer Straße

Die Stadtwerke Karlsruhe haben sich mit großem Eifer und Sachverstand bemüht die schadhafte Stelle zu finden und reparieren:





Aufgrund der etwa siebenstündigen Versorgungsunterbrechung war mein Büro wirklich dunkel – und ich hatte Zeit die gesamte Operation aus nächster Nähe zu verfolgen. Einen ausführlicheren Bericht werde ich bei Gelegenheit einstellen.

Kabelprobleme

Laut FGH sind im Bereich der Niederspannung 400 V ca. 850.000 km Kabelsystem, 90% der Leistungslängen (60.000,-€ pro km) verlegt: das entspricht einem Wert von 51 Milliarden €.

Nach dem "Technischen Bericht 300" der FGH zeigt sich, "dass 3/4 aller Versorgungsunterbrechungen **durch Schäden an den Kabeln verursacht werden**. Auch wenn berücksichtigt wird, dass ein großer Anteil dieser Schäden auf unvermeidbare Beschädigungen von außen verursacht wird, verbleibt ein maßgeblicher Anteil dieser Schäden aufgrund Alterung und mangelnde Qualität der Kabelisolation." Nach meiner Beobachtung der obigen Störung und der anschließenden Recherche komme ich zum Schluss, dass die elektrische Infrastruktur zum Teil sehr "alt" aussieht!

Versorgungsunterbrechungen

"Deutsche Elektrizitätsnetzbetreiber übermitteln der Bundesnetzagentur gemäß § 52 Energiewirtschaftsgesetz jährlich einen Bericht über die in ihrem Netz aufgetretenen Versorgungsunterbrechungen des Vorjahres. Dieser Bericht enthält Zeitpunkt, Dauer, Ausmaß und Ursache der Unterbrechungen. Für das Jahr 2011 meldeten 864 Netzbetreiber für 928 Netze ca. **206.673 Versorgungsunterbrechungen**." [Quelle Bundesnetzagentur](#).

In Deutschland lag die durchschnittliche Versorgungsunterbrechung **2012 nur bei bei 15,91 Minuten (SAIDI-Wert)**. Ist das viel oder wenig? Es kommt drauf an, wie die Unterbrechungen definiert sind. Auf der Website der Bundesnetzagentur kann man folgendes lesen:

"Beim SAIDI-Wert werden **weder** geplante Unterbrechungen **noch** Unterbrechungen aufgrund höherer Gewalt, wie etwa Naturkatastrophen, **berücksichtigt**. In die Berechnung fließen nur ungeplante Unterbrechungen ein, die auf atmosphärische Einwirkungen, Einwirkungen Dritter, Zuständigkeit des Netzbetreibers und aus anderen Netzen rückwirkende Störungen zurückzuführen sind. **Die Unterbrechung muss zudem länger als drei Minuten dauern**."

Wie werden die Kurzunterbrechungen oder Spannungs-Kurzeinbrüche oder –überhöhungen von wenigen Sekunden erfasst oder in Statistiken berücksichtigt? Gute Frage! Welche Auswirkungen haben solche und andere Störungen? Unter Umständen können elektrische Geräte zerstört werden – oder ihr Rechner schaltet ab und ihre Arbeiten sind möglicherweise verloren gegangen ... viele am Netz betriebenen Uhren werden ihnen nach einer Kurzunterbrechung keine verlässliche Uhrzeit mehr anzeigen und und ...

Wie stark hängt unsere Gesellschaft von der Stromversorgung ab?

Als Kind habe ich erlebt, als meine Mutter beim einem einem Stromausfall im Sommer von der elektrischen Waschmaschine, die ja stehen geblieben war, in die Küche kam und meinte: "Dann kann ich ja in der Zwischenzeit schon mal bügeln!"

Der TAB-Bericht:

Gefährdung und Verletzbarkeit moderner Gesellschaften – am Beispiel eines großräumigen Ausfalls der Stromversorgung

sollte unbedingt Pflichtlektüre aller Bundesbürger werden – vor allem der Ingenieure und insbesondere (!!) der Entscheidungsträger auf allen Ebenen.

Auszug: "Mit einem Beschluss des Ausschusses für Bildung, Forschung und Technikfolgenabschätzung wurde das Büro für Technikfolgen-Abschätzung beim Deutschen Bundestag (TAB) beauftragt, **die Folgen eines langandauernden und großflächigen Stromausfalls systematisch zu analysieren**. Zugleich sollten die Möglichkeiten und Grenzen des nationalen Systems des Katastrophenmanagements zur Bewältigung einer solchen Großschadenslage aufgezeigt werden.

Aufgrund der nahezu vollständigen Durchdringung der Lebens- und Arbeitswelt mit elektrisch betriebenen Geräten würden sich die Folgen eines langandauernden und großflächigen Stromausfalls zu einer Schadenslage von besonderer Qualität summieren. Betroffen wären **alle Kritischen Infrastrukturen**, und ein **Kollaps der gesamten Gesellschaft wäre kaum zu verhindern**. Trotz dieses Gefahren- und Katastrophenpotenzials ist ein diesbezügliches gesellschaftliches Risikobewusstsein nur in Ansätzen vorhanden."

Hier [KLICKEN](#), um den Bericht herunterzuladen [pdf, 2,9 MB].

Viel Spaß beim Lesen – vielleicht lesen Sie diesen Bericht nicht heute **Abend** ... möglicherweise könnte Ihr Schlaf fliehen!

Es bedarf enormer Anstrengungen unserer Generation, unseren Kindern und Enkelkindern eine intakte und noch lange stabile Energieversorgung zu übergeben! Was wäre, wenn in 10 oder 20 Jahren die Kabel und Transformatoren und ... ihren Dienst versagen? Eben mal neue Kabel legen und Transformatoren aufstellen wird technisch eine enorme Herausforderung sein – und wer soll die enormen Kosten tragen?

Posted by [Karlheinz Schwarz](#) at [10:52 AM](#) [No comments:](#) 

Labels: [alternde Infrastruktur](#), [Energieversorgung](#), [Sicherheit](#), [Verteilnetz](#)

Monday, January 20, 2014

Users Group USE61400-25 (Wind Power) offers a Workshop

On February 19th and 20th, 2014 the **general assembly 2014** of the user group USE61400-25 (Wind Power Industry) will be held at Senvion SE (former REpower Systems SE), Überseering 10, 22297 Hamburg, Germany. IEC 61400-25 is defining the extensions of IEC 61850 for Wind Power Applications.

<http://www.use61400-25.com/default.aspx?id=m1s2>

USE61400-25 announces the organization of the **1st global implementation workshop**.

This workshop is free of charge for all current USE61400-25 members. Non-members are cordially invited to join the workshop as well. Each non-member participating has to pay a participation fee of 300€.

The workshop will be held at the same location in Hamburg

18th February: 09:00 – 17:30
19th February: 09:00 – 12:00

Registration for Participation:
<http://www.use61400-25.com/default.aspx?id=m1s2>

Posted by [Karlheinz Schwarz](#) at [12:23 PM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [wind power](#), [workshop](#)

10th Anniversary: NettedAutomation offers Extended Training Opportunities in May and October 2014

You are invited to attend the special 10th Anniversary training course conducted by NettedAutomation GmbH. Karlheinz Schwarz of NettedAutomation has trained more than 3.600 Experts all over the word from 2004 to 2014!

Tap the long term experience ... you will be surprised to see how users have learned to receive benefits from the standards IEC 61850, IEC 61400-25, IEC 60870-5-104, DNP3, Modbus, ... I am ready to help especially utility employees to get started in the Marathon “IEC Standards”.

Traditionally we are offering a training in May and in October in **Frankfurt** (Germany). The dates in 2014 will be:

07.-09. May 2014
15.-17. October 2014

Click [HERE](#) for the Program and Registration information.

Note that we are offering a special Anniversary Price.

I look forward to seeing you there.

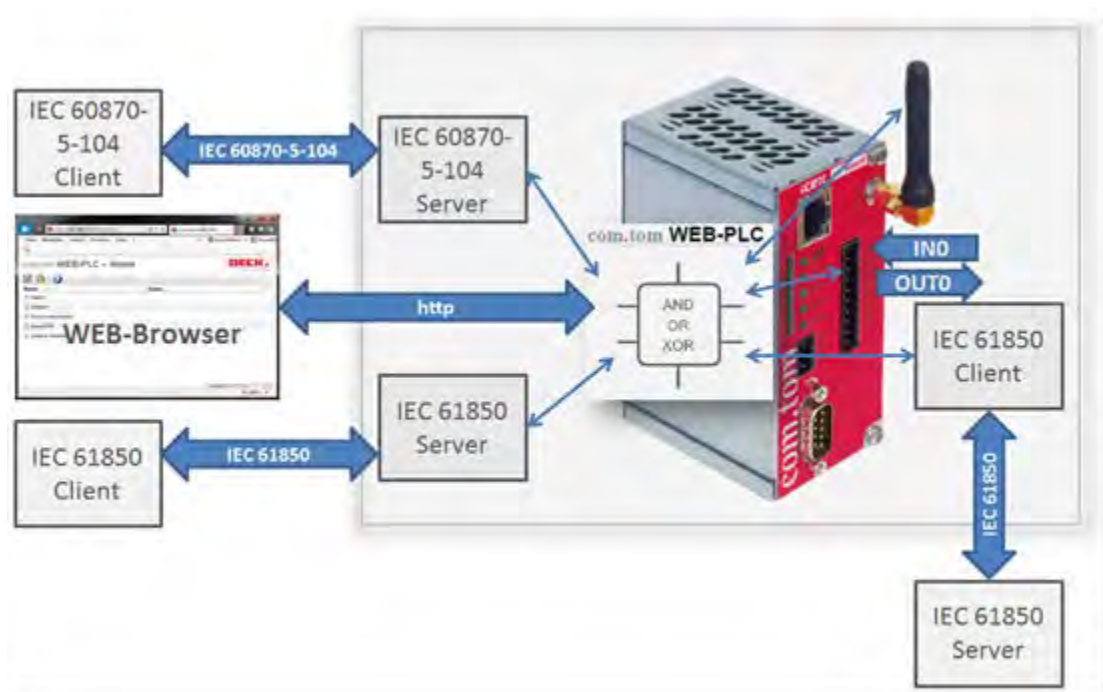
Posted by [Karlheinz Schwarz](#) at [11:23 AM](#) [No comments:](#) 

Labels: [DNP3](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Training](#)

Gateway Workshop IEC 61850, IEC 61400-25 und IEC 60870-5-104 on 13.03.2014

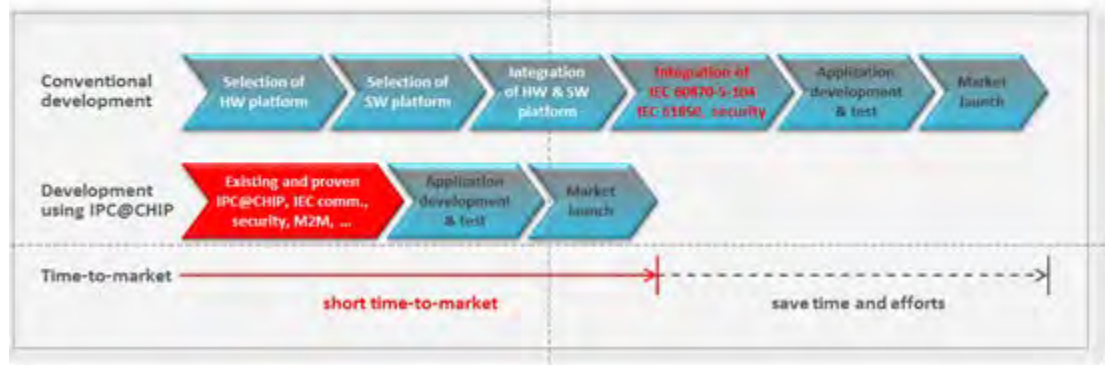
Beck IPC offers customers products and services for all aspects of advanced control technology and communication in industrial and energy applications.

A key product is the wide range of Beck IPC com.tom devices that are now extended with the protocols IEC 61850, IEC 61400-25, and IEC 60870-5-104 – extended with gateway functions.



The solutions allow for a very short-time-to-market application of these standards.

Short time-to-market with com.tom



The com.tom solution is a very powerful real-time operated and secure concept for many applications for monitoring and controlling of power system components like transformers, power quality monitors, wind power, photo voltaic, CHP, batteries to list just a few.

In case you are interested to learn how these standards are integrated into the com.tom platform, you are invited to attend the following one-day workshop on IEC 61850, IEC 61400-25, IEC 60870-5-104 implemented on the com.tom:

Date: 13. March 2014

Location: Wetzlar (Germany), some 70 km north of Frankfurt

Time: 10:00 h - 17:00 h

Cost: free of charge

The [workshop](#) will be held in **English** language.

Click [HERE](#) for Workshop in **German** on **30. January 2014**.

The workshop will be conducted by Beck IPC in cooperation with NettedAutomation GmbH. We are looking forward to seeing you there!

Please send you application by email to info@beck-ipc.com
Space is limited; please contact us as soon as possible.

Click [HERE](#) for the program.

Posted by [Karlheinz Schwarz](#) at [11:00 AM](#) [No comments:](#) [✉](#)

Labels: [Gateway](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Smart Grid](#), [workshop](#)

Saturday, January 18, 2014

Is IEC 61850 creating Opportunities for a Revolution?

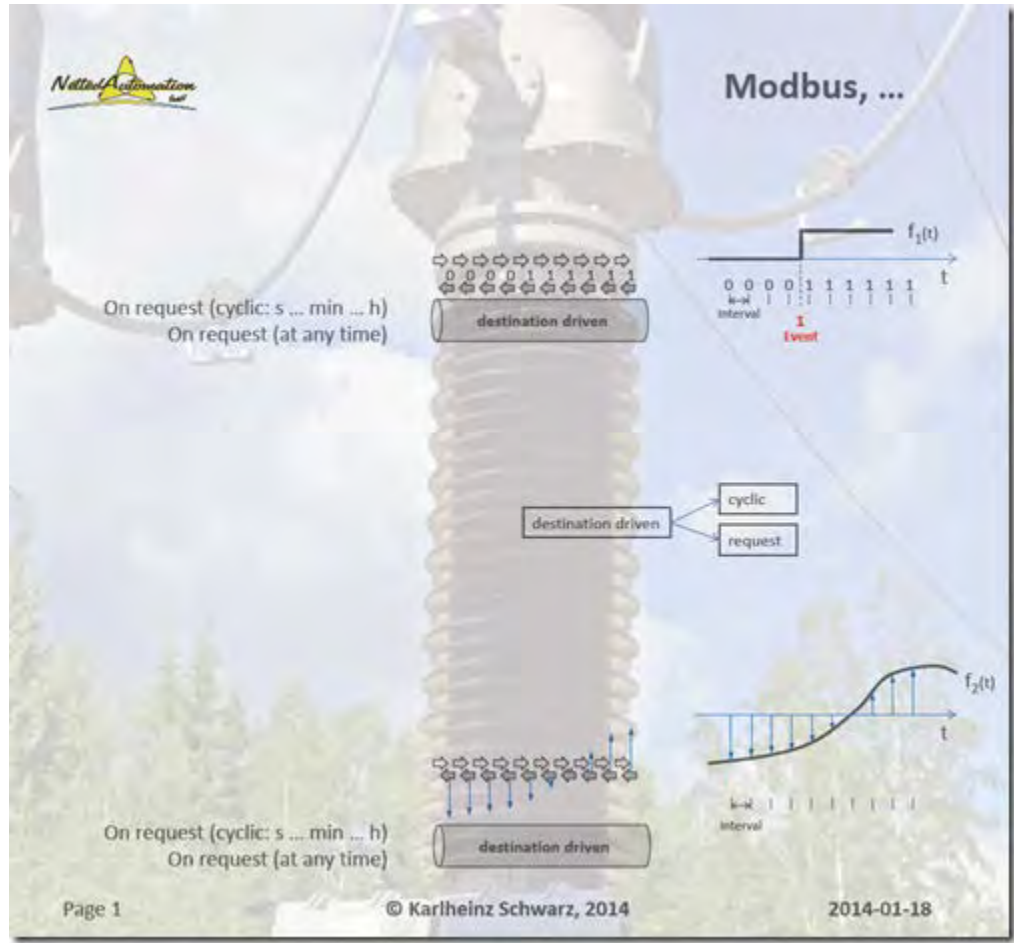
Don't ask for it – you may get it!

I read the other day a paper on IEC 61850 (written by known experts) that summarizes in the opening sentence: "**IEC 61850 is an approved international standard** for communications in substations that **is creating opportunities for a revolution** in the world of electric power systems protection and control."

According to [Wikipedia](#) "A **revolution** (from the Latin *revolutio*, "a turn around") is a **fundamental change** in power or organizational structures that **takes place in a relatively short period of time**."

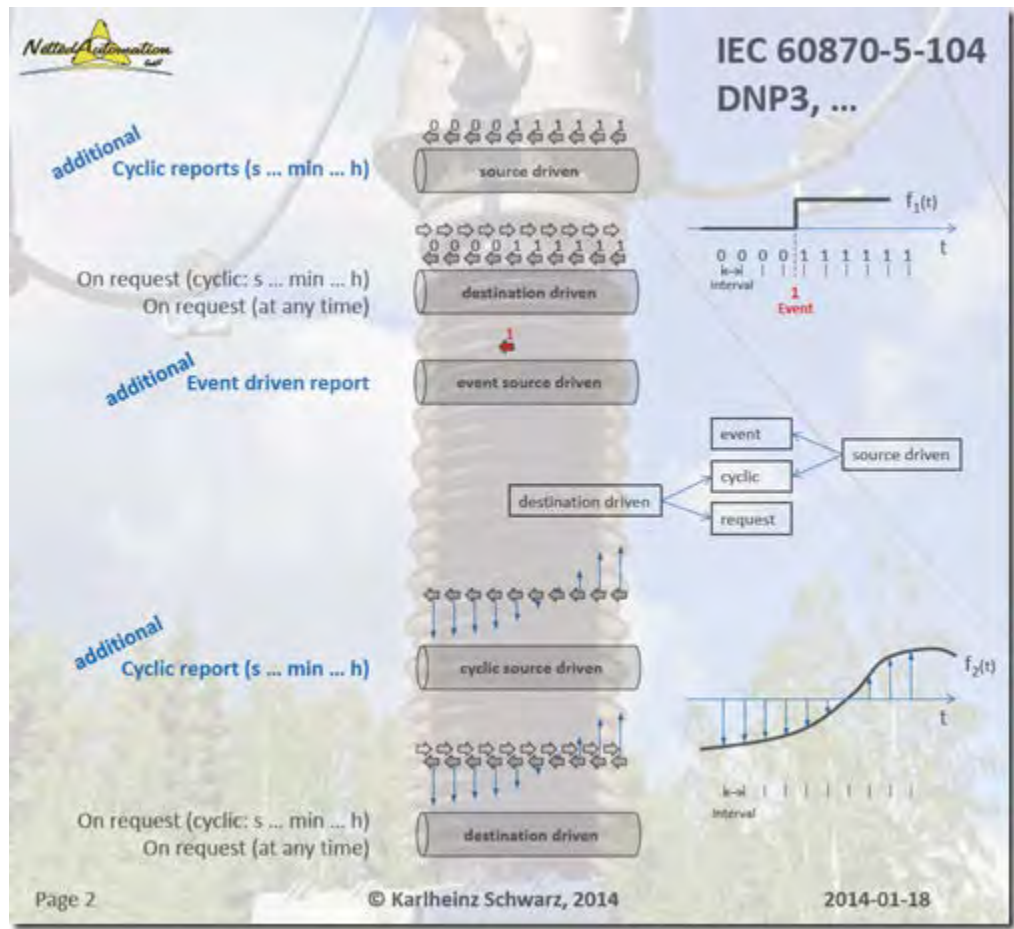
The core parts of the standard have been published some 10 years ago. The crucial underlying technology is even older. I have not yet seen many opportunities for a revolution in the **communication** – yes, some new communication possibilities have been implemented. The introduction of the standard is more a marathon than a sprint! There are very good new features related to engineering and configuration (SCL) – their application will even take much longer than the use of Ethernet, TCP/IP, MMS, ACSI, ... Anyway, the standard communication defined in IEC 61850-7-2 and -8-1 are excellent.

Let’s have a look on the communication “revolution”. The first figure depicts a very traditional way to exchange status changes, measurements and calculated analogue values, counted values, and so on: The destination (master or client) sends request messages to the source (slave, server) and receives the requested values. The request may be sent cyclically or at any time. The rate of these request-response transactions (controlled by the caller) has a crucial impact on the bandwidth use and real-time behavior.



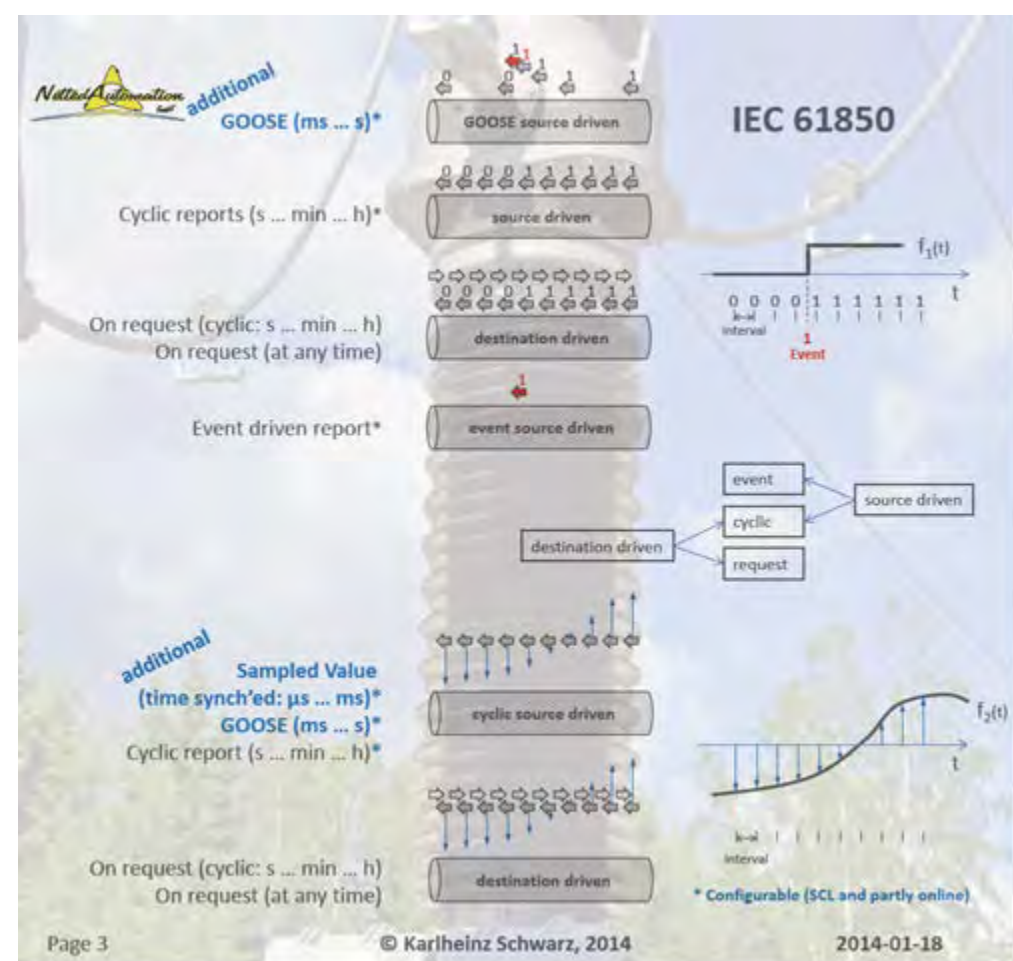
Depending on the needs there could be a huge difference in sending requests more or less often. [Read some hints on reporting versus polling.](#)

Now let’s have a look at the telecontrol protocols IEC 60870-5-104 and DNP3 (as well known and used examples). They offer additional possibilities: receiving cyclic reports from the source, receiving event driven reports (!) and cyclic reports of analogue values initiated by the source.



Finally we check the standard communication defined in IEC 61850. IEC 61850 offers all the above discussed possibilities – it has some optimization build in: DataSets (referring to a list

of values). The crucial add-on is the GOOSE messaging and Sampled Value exchange:



GOOSE is a combination of event-driven information exchange (event will be sent immediately) and cyclic transmission (event will be repeated immediately, a little bit later, ... any finally in a long cycle). Sampled values comprise an exchange of values that are taken in a time-synchronized fashion. The communication does not need to transmit cyclically – the values taken at the same instance of time are used for calculation.

So, the most crucial new communication services defined in IEC 61850 are GOOSE and Sampled Values – and the possibility to configure the behavior of reporting, GOOSE and sampled values through SCL and by online services.

There is one additional service in IEC 61850 that is quite new: Logging.

In many applications where IEC 61850 is used we see more of a slow evolution – not a revolution. I guess the power industry can not easily be revolutionized. That is a good situation – without that we would have to sit more often in the dark.

[Smart Grids is a 19th century invention.](#) The evolution that happened during this very long period of time is what has brought us today's secure and safe electric power delivery. Note: Haste produces Waste! Take your time ... and use IEC 61850 when it's time to do so ... not earlier! The evolution has to start in the heads by good education provided by people that understand that utilities don't want to get a revolution at all.

I hope we will not get a revolution!

Posted by [Karlheinz Schwarz](#) at 10:38 AM No comments:

Labels: [ACSI](#), [DNP3](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [Smart Grid](#), [smart people](#)

Monday, December 23, 2013

Best wishes for 2014

As a very busy year comes to an end, I want to THANK YOU ALL for the interest in Standards like IEC 61850, IEC 61400-25, IEC 60870-5-104, ... as well as your interest to discuss the many opportunities to use these standards and the challenges in the implementations and conformance tests.

More than 400 experts have been trained during 2013 in more than 20 courses all over. The attendees are really looking for more details and how to reach a higher level of interoperability. My long-term experience is growing quite fast ... especially in the area of interoperability issues ...

I wish you a healthy and successful year 2014 – especially that you can live in peace with your family, friends and all other people you have to meet in your life.

I look forward to working with you next year ... especially when you have any issue regarding IEC 61850, IEC ... interoperability.

Please take some time to relax and re-charge your batteries.

We are all doing fine ... just cut the lawn this afternoon (Dec. 23, 2013) ... it was quite warm here in Karlsruhe: 13 °C ... no snow and ice until 2014 !!

Best Regards,
Your Karlheinz Schwarz

Posted by [Karlheinz Schwarz](#) at [12:49 PM](#) [No comments:](#) 

Labels: [configuration change](#), [conformance test](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#)

SystemCorp Embedded Technology offers Support for IEC 61850 Edition 1 and Edition 2

This is a real good Christmas present: Version 2 of the IEC 61850 Protocol Integration Stack (PIS-10) from SystemCorp is now available!

Version 2 offers support for IEC 61850 Edition 1 and Edition 2 of the core documents (parts 6, 7-1, 7-2, 7-3, 7-4, 7-410, 8-1, ...). The solution supports users to integrate Server and Client as well as publisher and subscriber functionality into their own applications easily.

Click [HERE](#) for more details.


A new ICD Designer is available as well - new Features are:

- Add customized logical nodes
- Edition 1 and Edition 2 Support
- Export/Import DAID templates
- GOOSE Subscription - compatible with Siemens DIGSI
- Multiple Access Point
- Unicode Support
- Client CID File Designer
- Quick Validate* function for design

Click [HERE](#) for more details of the new ICD Designer.

NettedAutomation is preparing updated and enhanced demonstration examples for the PIS-10 DLL and for the Beck IPC@Chip platform by mid of January 2014.

Stay tuned to this blog to get the latest information also in 2014.

Posted by [Karlheinz Schwarz](#) at [12:31 PM](#) [No comments:](#) 

Labels: [Beck Chip](#), [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [SCL](#), [SystemCorp](#)

Tuesday, December 17, 2013

Workshop IEC 61850, IEC 61400-25 und IEC 60870-5-104 am 30. Januar 2014

IEC 61850, IEC 61400-25 und IEC 60870-5-104 in Aktion:

Beck IPC lädt zu einem Workshop "com.tom-Anwendungen für Überwachungs- und Steuerungsaufgaben" am 30.01.2014 ein

Beck IPC bietet auf der Basis der Beck IPC com.tom-Geräte einen short-time-to-market Schnelleinstieg in die Normenreihen IEC 61850, IEC 61400-25 und IEC 60870-5-104. Wenn Sie die geballte Kombination von bewährten Technologien wie embedded controller sowie genormtem und sicherem Informationsaustausch für den einfachsten, schnellsten und kostengünstigsten Einstieg in diese und andere Normen kennenlernen möchten, dann besuchen Sie am 30. Januar 2014 diesen Workshop.

Die [Lösungen sind geeignet für alle Anwendungen](#), in denen sowohl separate Protokolle benötigt werden als auch für Gateways zwischen den verschiedenen Protokollen.

Die Teilnahme ist kostenlos.

Der Workshop wird von Beck IPC in Zusammenarbeit mit NettedAutomation GmbH durchgeführt.

Ort: Wetzlar | Zeit: 10:00 Uhr – 16:00 Uhr

[Klicken Sie hier](#) für das Programm und die Anmeldeinformation

Posted by [Karlheinz Schwarz](#) at [11:45 PM](#) [No comments:](#) 

Labels: [Beck](#), [Beck Chip](#), [embedded system](#), [Fernwirktechnik](#), [Gateway](#), [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#)

IEC 61400-25-2 Edition -- Committee Draft for Vote available

IEC 61400-25-2 Edition 2 (88/461/CDV):
Wind turbines – Part 25-2: Communications for monitoring and control of wind power plants – Information models


The Committee Draft for Vote is out for **comments until January 24, 2014**. If you want to comment on the document, please contact your TC 88 National Committee: [Membership](#)

The main improvements are related to the following aspects:

- Harmonization with Common Data Classes in Edition 2 of IEC 61850-7-3.
- Harmonization with Logical node classes in Edition 2 of IEC 61850-7-4.
- Harmonization with Information models in IEC 61850-7-410, and -420.
- Reduction of overlap between standards and simplification by increased referencing
- Extension of Data objects for operation of smart grids (in US and other areas)
- Extended and enhanced semantics for existing data objects
- Taking the tissues into account

A complete harmonization with IEC 61850 is underway. As a matter of fact you could implement all crucial aspects of IEC 61400-25 with current IEC 61850 implementations. The full harmonization of IEC 61400-24-2 with IEC 61850 Edition 2 of the core parts (7-1, 7-2, 7-3, 7-4, 8-1, ...) is planned as a next step (edition 3 of IEC 61400-25-2).

IEC 61850 and IEC61400-25 are THE standard series for Power Systems.

Posted by [Karlheinz Schwarz](#) at [1:27 AM](#) [No comments:](#) 

Sunday, December 8, 2013

Vulnerabilities in RuggedCom ROS-based Devices


RuggedCom switches and serial-to-Ethernet devices are used to connect devices that operate in harsh environments such as electric utility substations and traffic control cabinets. Potential vulnerabilities in the web server’s authentication of the affected products might allow attackers to gain **administrative access to the web interface over the network** without authentication or unprivileged users to perform privilege escalation.

AFFECTED PRODUCTS

- RuggedCom devices with ROS version < ROS v3.12.2

RuggedCom and Siemens recommend upgrading to the current firmware version ROS v.3.12.2 which fixes the potential vulnerabilities.

Click [HERE](#) for more details.

Posted by [Karlheinz Schwarz](#) at [8:51 PM](#) [1 comment:](#) 

Labels: [Ethernet switches](#), [RuggedCom](#), [security](#), [Siemens](#), [vulnerability](#)

Sunday, December 1, 2013

BSI veröffentlicht ICS-Security-Kompendium für industrielle Automatisierungssysteme

Das Bundesamt für Sicherheit in der Informationstechnik (BSI) hat ein umfangreiches **Kompendium zur Sicherheit in industriellen Automatisierungssystemen (ICS)** veröffentlicht. Das Kompendium sollte jedem systemverantwortlichen Manager unbedingt als Weihnachtsgeschenk überreicht werden! Warum? Weil es einen Überblick über wichtige Notwendigkeiten und Lösungswege für mehr Sicherheit aufzeigt und das Bewusstsein für die zunehmenden “Angriffe” auf die kritischen Infrastrukturen unserer Gesellschaft schärfen will. Das Kompendium eignet sich sicher für den Einstieg in dieses wichtige Thema!

Es darf natürlich nicht beim Lesen bleiben – je nach Situation sollten zeitnahe Aktivitäten starten oder verstärkt werden.

[HIER Klicken](#) um das Kompendium herunterzuladen.

Posted by [Karlheinz Schwarz](#) at [11:10 PM](#) [No comments:](#) 

Labels: [BSI](#), [IEC 61850](#), [IEC 62351](#), [security](#), [Sicherheit](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Monday, November 25, 2013


TQ System offers new IEC 61850 Demo Kit

TQ System offers new IEC 61850 Demo Kit for an ARM9 module with i.MX28 from Freescale.

Click [HERE](#) to see the details of the platform.

The Manual of the Development Kit gives you some hints on the usability for getting started:

[IEC 61850 Server/Client Application Demo for TQ Systems](#)

Posted by [Karlheinz Schwarz](#) at [2:04 AM](#) [No comments:](#) 

Labels: [Arm processor](#), [Demo Kit](#), [Evaluation](#), [IEC 61850](#), [TQ](#)

Thursday, November 21, 2013

Reduced the Complexity of IEC 61850 to a Beautiful Simplicity

One of the crucial challenges using IEC 61850 is the complexity of IEC 61850 – maybe you have made this experience. There is a beautiful way to simplify. Interested to learn about this way? Read this post.

- IEC 61850 and IEC 60870-5-104 (DNP3) are well known and used standards for many application domains all over.
- IEC 60870-5-104 and DNP3 are the preferred solutions for Tele-Control and Tele-Monitoring. They provide simple exchange of status, measurements, counters, and control commands.
- These protocols are implemented in most control centers and SCADA systems.
- IEC 61850 is the preferred solution for information management for substation protection, monitoring, and automation.
- The need for collecting more condition monitoring information from process equipment like transformers, switch gears, cable, ... is preferably implemented by IEC 61850.
- One crucial challenge is: How can the huge amount of IEC 61850 based information easily be carried by IEC 60870-5-104 (DNP3)?
- A set of slides shows the beauty of a very simple and powerful gateway.

Want to see a live demo? Visit us at the SPS/IPC/Drives Fair in Nuremberg (Germany) on November 28-29, 2013, hall 9 / booth 341.



Click [HERE](#) for a free ticket. I look forward to meeting you there.
Click [HERE](#) for the complete slide set on the Beautiful Simplicity [68 pages, pdf, 3.9 MB].



The solution is based on the Beck IPC@CHIP solution:

Subscribe To IEC 61850 News Updates



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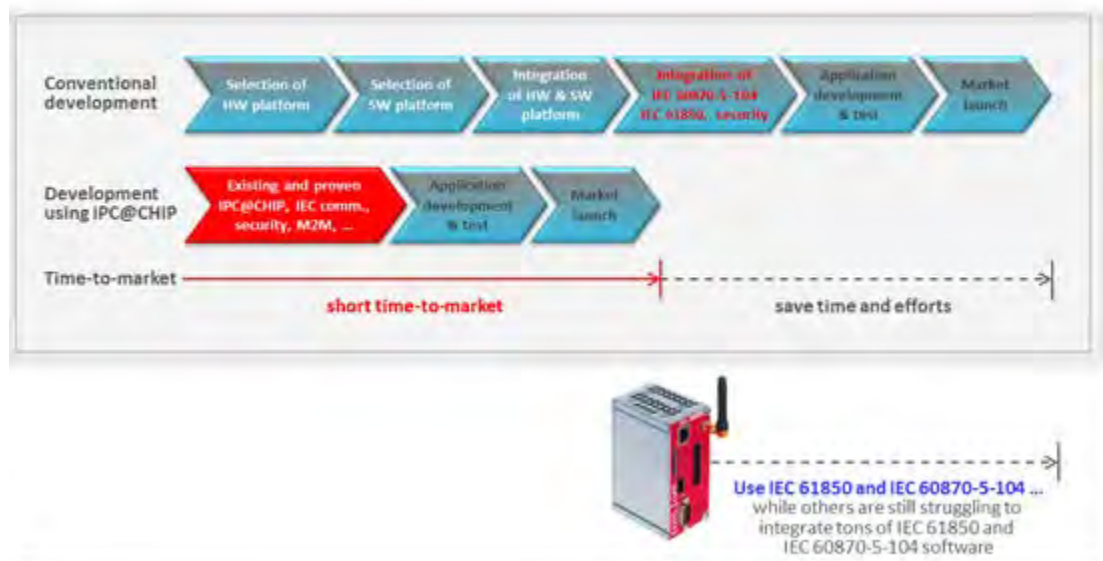
Blog Archive

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Contributors

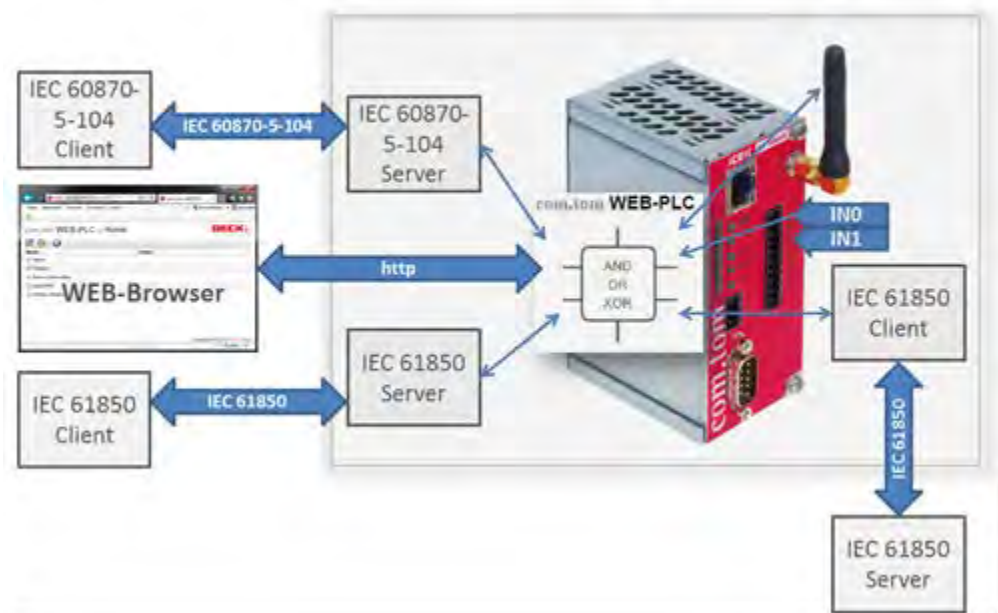
-  [Michael Schwarz](#)
-  [Karlheinz Schwarz](#)

Short time-to-market with com.tom



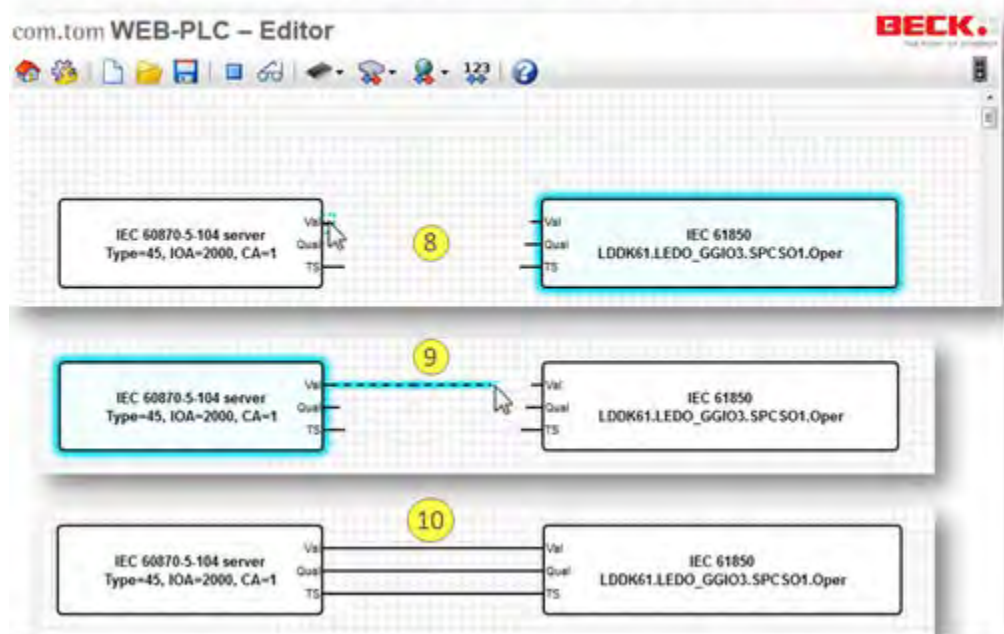
The core component is a WEB-PLC that is used to graphically program your Gateway based on Input and Output signals:

WEB-PLC in the center of the platform



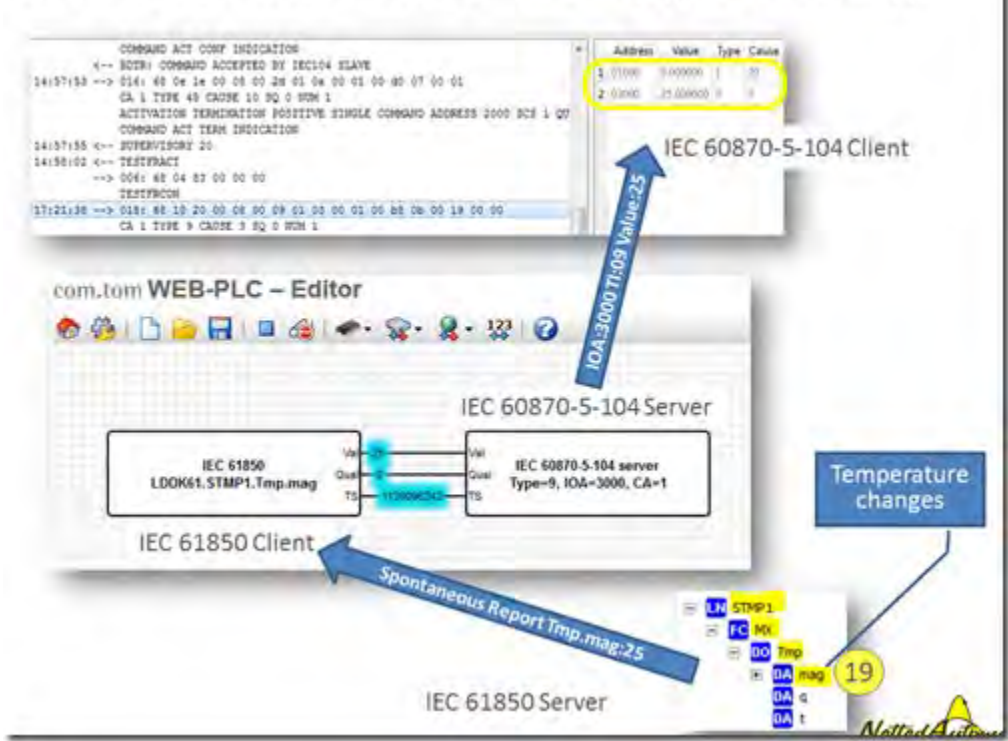
(almost) all you need to do is to connect graphically Inputs and Outputs with each other or other logic (AND, OR, ...):

WEB-PLC Editor: Connect Input with Output



Use the WEB-PLC for binary inputs and outputs or for reporting of measured values:

WEB-PLC: Forwards Measurement (spontaneously)



[com.tom Energy Flyer \[English\]](#)
[com.tom Energy Flyer \[Deutsch\]](#)

Any question? [Contact us.](#)

Posted by [Karlheinz Schwarz](#) at [1:12 PM](#) [No comments:](#)

Labels: [com.tom](#), [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 61850 edition 2](#), [PLC](#), [plug and play](#), [Programmable Logic Controller](#)

Tuesday, November 12, 2013

Do we need Blackouts to Expose Flaws in the Grid?

From the viewpoint of a engineers: No! There are many engineers or other technicians that are aware of the condition of the whole system – including the aging work force. From the viewpoint of many people in charge to make decisions to invest or not to invest: Yes!

The New York Times published yesterday an article about the biggest power outage in the history of Northern America: the 2003 blackout. Since then a lot has improved – enough to keep the power flowing at mid November 2013. Is it enough for the years to come? We will see if the improvements payoff or not.

The article states: “The improvements were **ideas that engineers had always liked**, but had trouble persuading utility executives and public service commissions **to pay for.**”

Click [HERE](#) to read the article.

I hope that the voice of the engineers will convince more decision-makers to allocate sufficient resources for keeping the aging power infrastructure running, the power flowing, the grass green, and the sky blue.

Some 10 years after the first substation automation systems have been equipped with IEC 61850 based devices, a lot of smart engineers see the need to invest into defining a **second layer** on top of the standards and the many options they provide. This second layer could be named: **Interoperability Profile Specifications**. The standards comprise several hundred of options (in models, services, and extensions) that lead to a proliferation of implementations. A growing number of engineers is struggling to let two or more devices from multiple vendors understand each other.

I look forward to seeing more decision-makers from all stake-holders to provide the needed resources for the development of **Interoperability Profile Specifications**.

I always say in my courses that IEC 61850 is very scalable – BUT YOU have to SCALE each and every device! Scaling needs to be done in a way that for a given application ALL devices apply THE VERY SAME SCALE!! The scales have to be negotiated and applied by all participants of a system.

When does the users community want to get there? If the answer is: as soon as possible – you should invite experienced people to help you.

Posted by [Karlheinz Schwarz](#) at [12:38 AM](#) [No comments:](#)

Labels: [conformance](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [subsets](#)

Friday, November 8, 2013

Is Security really a big Issue in the Power Industry?

It all depends on to whom you listen. I have discussed the security issue quite often. Hope that some people have listened to me. ;-)

These days you can see a lot of intensified discussions related to the use of DNP3 and especially the application at the control center (or master) side of the communication channel. One IED talks usually to one master station – but: One master station may talk to many many IEDs. DNP3 master stations are centralized components in SCADA systems used in many industries: power, gas, oil, water, waste water, ... in general automation.

One of the crucial issues is that it seems quite easy to send a specific message from a control center (master) to the substation to put the **slave** (RTU) into a infinite loop condition (blocking further information sharing) or a spontaneous message from a substation to the control center to put the **master** into infinite a loop condition (blocking further information sharing). In both cases the devices must be shut down and restarted.

Click [HERE](#) to read one of the latest discussions.

I experienced recently the following: an IEC 61850 Server sent a report message with a value derived from a DataSet member of type FCDA to a client (in a gateway for a big control system, DCS). The client (client application) stopped working properly ... just did not react anymore. As a result the client did not only “refuse” to work with this server – it also stopped communicating with other servers it was connected to.

Hm, by reporting just a value from a **FCDA** member (LN XX FC=ST DO=Pos **DA=stVal**) instead from a **FCD** member (LN XX FC=ST DO=Pos with three DA components: stVal, q and t) the client (client application) gives up to work ... what a surprise. I was really surprised!


One solution to overcome this situation could be to require more **conformance tests of clients** (and servers!). That would help a lot.

BUT at the end of the day you may run into similar issues even if the client has been successfully conformance tested and certified: The clients and servers implementing IEC 61850 will support a **subset** of the features the standard defines. Independent of a certificate it would be more important to get a **document that lists all the restrictions and specialties** of a client or a server. If you know that a client crashes when you report a value from a FCDA member of a DataSet, then you could (at least) work around that problem by just configuring FCD members!

Figuring out that the use of a FCDA member causes a gateway to crash may take days of analysis and discussions ... and is produces a lot of frustration before, during and after such a process.

Lesson learned: **Clients, Server, Publisher and Subscriber have to come not only with a certificate but also with comprehensive documentation.**

Dear Utility user: ask for sufficient documentation! We could help you to analyze the documentation to figure out ...

Posted by [Karlheinz Schwarz](#) at [3:06 AM](#) [No comments:](#) 


Labels: [client](#), [DNP3](#), [IEC 61400-25](#), [IEC 61850](#), [RTU](#), [security](#), [server](#)

Wednesday, November 6, 2013

IEC Smart Grid Tool now online

The IEC Central Office has published a comprehensive tool to facilitate identification and access to relevant standards for use cases and implementation of Smart Grid. This tool includes links to IEC standards as well as relevant standards from other organizations. The smart grid tool available at <http://smartgridstandardsmap.com/> will be useful for all other IEC groups engaged in systems level work.

You will find IEC 61850 all over on that “map” – no surprise.

Posted by [Karlheinz Schwarz](#) at [10:16 AM](#) [No comments:](#) 

Labels: [IEC](#), [iec 60870-5](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#)

Sunday, October 20, 2013


Open positions in the US related to IEC 61850

It seems that there is a growing interest in applying IEC 61850 in the United States. At least there are tenth of open positions that require knowledge and experience in IEC 61850.

One states for example: “Experience with IEC 61850 compliant substation automation applications including IED configuration utilizing MMS and GOOSE protocols and network architectures.”

Click [HERE](#) for an updated list of open positions related to IEC 61850.

More to come.

Posted by [Karlheinz Schwarz](#) at [11:18 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [smart people](#), [USA](#), [workforce](#)

Security Measures in Power Grids – often ignored

Vulnerabilities in the automation of power grids are more often on the radar screen of information and control system experts. It seems that some people are using the situation of aging infrastructures to make money with finger-pointing to the vulnerabilities of implementations of protocols like DNP3 or others. Or is it just fun to discover “holes” in the often low level secured information and communication systems?

Click [HERE](#) for a report (*Electrical Grid Is Called Vulnerable to Power Shutdown*) in The New York Times.

There are – in my view – two crucial issues (among other) when it comes to security measures for information exchange systems in power systems:

1. Lack in Expertise
2. Lack in Resources

There are a lot of discussions regarding aging infrastructures these days. I hope the discussions will have a real impact of securing our infrastructures, especially the **electrical power system delivery systems**!

Open standard protocols allow remote access to a lot of critical systems like substations or power generation sites. ENEL (Italian Power Company) operates some 400.000 Substations worldwide – some 100.000 are remotely monitored. So, 300.000 substations cannot be reached by protocols. Hundreds of protocols may be in use in the power industry. This makes it quite hard to easily break into most of the substations worldwide. With the application of standards like IEC 60870-5-104, DNP3, Modbus IP, or IEC 61850 this will change soon.

The most secure protocol is the protocol that has never implemented or used! With the acceptance of a few open protocols it is quite obvious that security measures HAVE to be put in place to secure the information exchange to some reasonable degree!

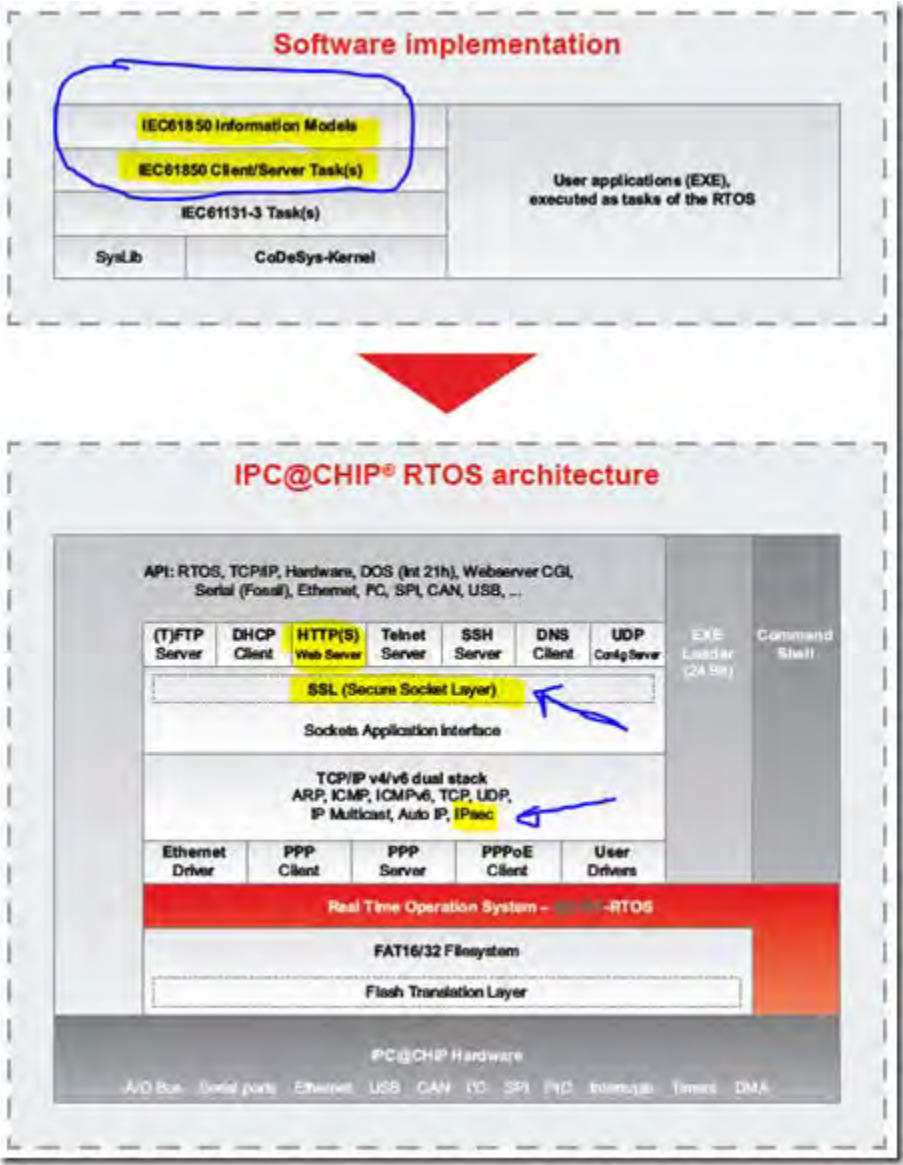
Stakeholders of power utilities have to become MORE aware of the situation of the vulnerabilities in the automation of power grids! A aging bridge may be closed – and you have to detour a bit ... but a blackout of a part of the electrical power delivery system due to a lack in security may end in a crucial disaster, leaving us out of power for hours and even days.

It is worth to spend more time and resources in securing all our infrastructures – first of all the electric power delivery system. Without power: no telecommunications, no transportation, no ...

The well known **IEC 61850 platform “BECK IPC Chip”** used in many applications provides secure communication as integrated part of the real-time operating system!

It is not sufficient to know that IEDs are available that provide a reasonable level of security: YOU MUST understand and USE such solutions!!

The architecture of the chip includes security measures:



Click [HERE](#) to request more information on the security measures implemented in the RTOS and applicable for IEC 6870-5-104 and IEC 61850.

There is no need to wait for secure IEC 61850 communication! It is here.

Posted by [Karlheinz Schwarz](#) at [12:55 PM](#) [1 comment:](#)

New IEC 61850/UCAIUG Test Labs accredited

17 Aug 2013
Level A - IEC 61850 Server
Korea Electrotechnology Research Institute (KERI)
111, Hanggaul-ro, Sangnok-gu, Ansan-si,
Gyeonggi-do, 426-910, Republic of Korea

15 Oct 2013
Level A - IEC 61850 Client
Korea Testing Laboratory
87, Digital 26-gil, Guro-gu, Seoul, Korea

15 Oct 2013
Level A - IEC 61850 Conformance Testing for **Edition 2 Server** Products
KEMA Nederland B.V.
Utrechtseweg 310
6812 AR Arnhem

The number of tested and certified IEDs (2013-10-18):

- 33 Clients (Ed1)
- 367 Server (Ed1)
- 2 Server (Ed2)
- 11 Merging Units (9-2LE)

Posted by [Karlheinz Schwarz](#) at [12:07 PM](#) [2 comments:](#)

Labels: [conformance](#), [conformance test](#), [IEC 61850](#), [IEC 61850 edition 2](#), [iec 61850-10](#)

Monday, October 14, 2013

World Standards Day 2013 – October 14

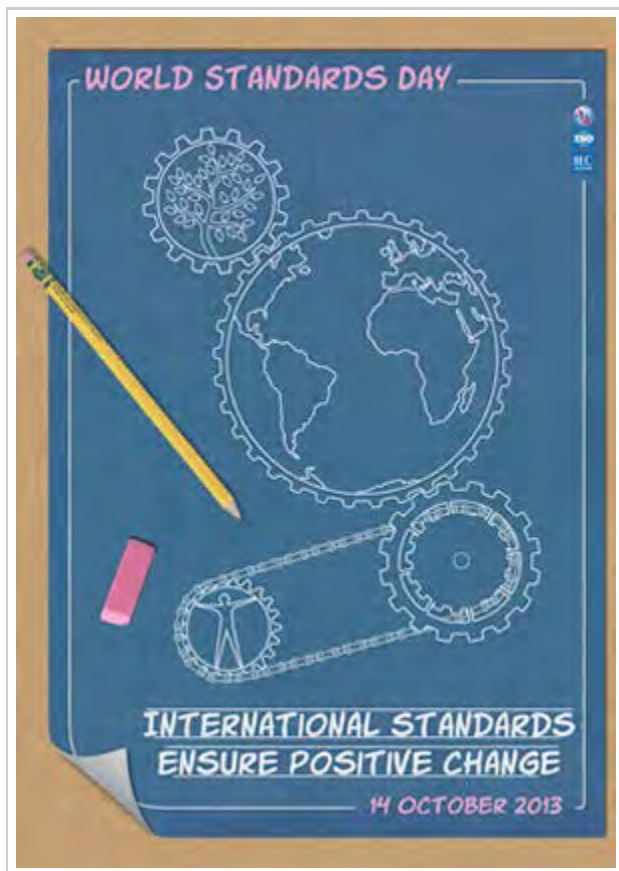
Did you know that there is a world standards day? I didn't!

I searched a bit and found a nice web page:

<http://www.worldstandardscooperation.org/wsd.html>

The results of the World Standards Day 2013 poster competition encouraged me to discuss a bit time and power!

The first price was won by Frederica Scott Vollrath (Germany):



This is really describing what IEC 61850 does: let the power flow through a lot of interrelated gear wheels.

It is one of the most interesting, albeit most challenging aspects of the future power system development because there must be a guarantee that all aspects and tasks of the functions and information sharing services will mesh together like the teeth of gear wheels!!

Well done poster!!

I visited the other day a museum with several of our grand sons ([Dynamikum](#)). We saw the following set of 18 gear wheels:



The top wheel is driven by a motor with 250 rpm and 26.5 Watt:



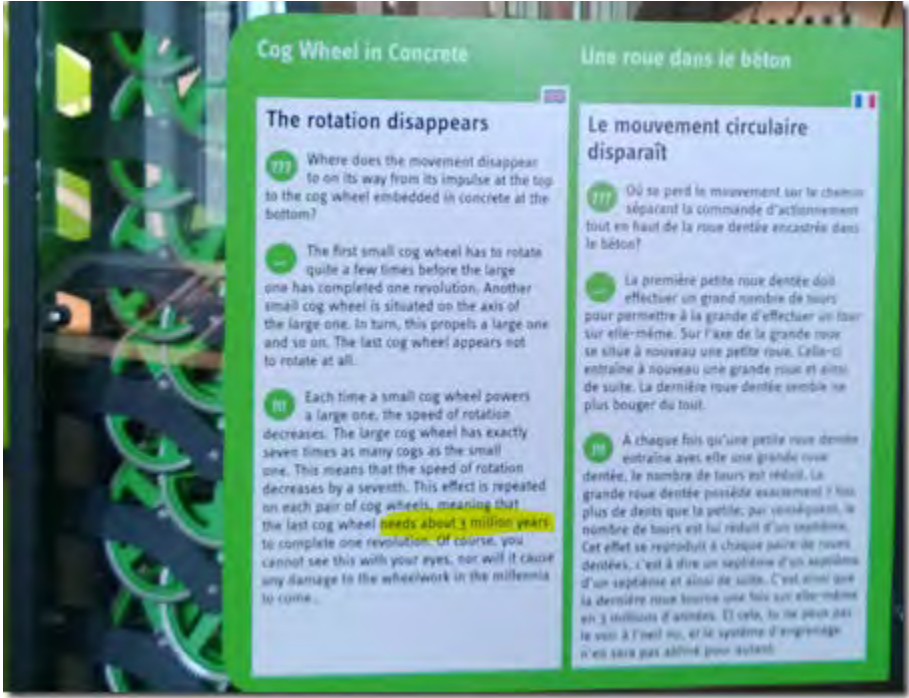
The motor drives the first wheel (large), the first (small) drives the second (large), and so on.



The questions are:

How long does it take until the 18. (last) wheel turns one (1!!) time? How much energy is consumed by the motor during that time?

It takes 3 Million years!!



The motor would consume

26,5 W x 365 x 24 x 3,000,000 h =
7 x 10**2 GWh or
0.7 TWh
WOW

That would cost some **128 Million Euro** at **0.2 Euro/kwh** ...

Without IEC standards it would be much more expensive! Or?

Posted by [Karlheinz Schwarz](#) at [1:03 PM](#) [No comments:](#)

Labels: [IEC](#), [ISO](#), [standardization](#), [standards](#)

Friday, October 11, 2013

IEC 61850 and DC

IEEE invites all interested parties to contribute to the [development of a plan "DC in the Home"](#) to ensure that DC electricity can be safely and conveniently accessed in homes, eliminating the wasteful conversion of AC to DC, and in many cases, DC to AC, prior to entering the home.

This seems to be an interesting question. I guess people digging into this issue will – some time down the street – start discussing a DC communication standard. Is this required? I guess it is not needed.

IEC 61850 could already be applied as well for DC systems. IEC 61850 defines many models for, e.g., PV inverter, batteries, storage systems, DC protection, ... DC measurements.

As an example see the logical node MMDC defined in IEC 61850-7-4 Ed2:

Watt	Power
Amp	Current (DC current)
Vol	Voltage (DC voltage) between poles
VolPsGnd	Voltage between positive pole and earth
VolNgGnd	Voltage between negative pole and earth
Ris	Resistance in DC circuit
RisPsGnd	Resistance between positive pole and earth
RisNgGnd	Resistance between negative pole and earth

Posted by [Karlheinz Schwarz](#) at [9:40 PM](#) [No comments:](#) 

Labels: [dc](#), [DC measurements](#), [IEC 61850](#), [IEEE](#)

Thursday, October 10, 2013

Utility cuts IT workforce, hires Indian outsourcers

Northeast Utilities (NU) in Connecticut (USA) confirmed plans to outsource IT work to India-based outsourcers; move will affect some 200 jobs

Northeast Utilities confirmed the other day that it plans to turn over part of its IT operations to two India-based outsourcing firms, despite a recent push by state lawmakers to keep it from doing so.

NU says it employs some 400 IT workers, and "will retain about half of those employees" after turning some operations over to outsourcers Infosys and Tata Consultancy Services, two of India's largest IT firms.

Click [HERE](#) for more details.

Could this be a solution for automation, control, monitoring ... ?

Here is another question somebody brought up discussing the NU approach:

“Would you outsource the autopilot to some inexpensive pilot on the ground in some foreign country with cheap labor? No? Then why is anyone even discussing such options for SCADA? And yet, they do!

The problem is education. Many utilities are putting poorly educated, poorly trained staff at the **controls of our infrastructure**, and then because it fails all the time, are seriously contemplating outsourcing the whole operation to another country.

Outsourcing to the cloud doesn't work. It's not about the technology. It's the people.”

I would add to state that another crucial problem is the education of people that make these decisions to outsource managing our infrastructure.

Posted by [Karlheinz Schwarz](#) at [4:06 AM](#) [No comments:](#) 

Labels: [aging infrastructue](#), [infrastructure](#), [outsource](#), [workforce](#)

Wednesday, October 9, 2013


IntelliSub Europe 2013 conference

The IntelliSub Europe 2013 conference about next-generation smart substations, takes place 26-28 November 2013 in Frankfurt, Germany

Mövenpick Hotel Frankfurt City, Germany

Click [HERE](#) for details.

IEC 61850 is a core component that will be discussed throughout the conference.

Posted by [Karlheinz Schwarz](#) at [9:11 PM](#) [No comments:](#) 

Labels: [conference](#), [IEC 61850](#)

Sunday, October 6, 2013

IEC 61400-25 and IEC 61850 for Semantic models in Integrated Operations for Oil & Gas and New Energy

In 2010 Billam Rajashekar Reddy (Norway) analyzed several semantic models for information exchange supporting operations and maintenance :

“Use of Semantic models in Integrated Operations for Oil & Gas and New Energy”

He looked into many solutions like:

- IEC 61400-25 Wind Turbine Communication
- RDS-PP Reference Designation System for Power Plant
- CRM Conceptual Reference Model
- WITSML Well site Information Transfer Standard Mark-up Language
- PRODML Production Markup Language
- RESQML Reservoir Characterization Markup Language
- RDS-PP Reference Designation System for Power Plants
- OPC OLE for process control

The conclusion drawn at the end of the Master’s Thesis says:

“Use of semantic models in integrated operations for oil and gas and new energy includes several methods. We come across all those methods. **The IEC 61400-25 series of standards provides the means to get open and easy access to key O&M data.** This data is a necessity for making the evaluations and analysis needed to improve operation and maintenance of the wind power plants. The paper has shown how the standard can be implemented and what benefits are associated with its use.

The standard does not restrict nor mandate specific customer-supplier roles, but provides a solution that supports the whole range of business cases where the different actors can cooperate. **Both the customer and the supplier can benefit from IEC 61400-25 through decreased costs for data access and system integration. Time and money can instead be put on the development of applications, functions and methods that increase the performance of the wind turbines. ...”**

I totally agree with the last sentence in the above quoted conclusion! The information modelling method, huge bunch of information models defined in IEC 61400-25 and IEC 61850, information exchange, communication protocols, system configuration language, ... could be used immediately – if you choose a ready-to-go software solution with an easy API.

Spend your time and money in applying the standards! **Build interoperable systems that keep the sky blue, the grass green, and the power flowing ;-)**

Click [HERE](#) to access the master thesis.

Posted by [Karlheinz Schwarz](#) at [10:03 AM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [maintenance](#), [OPC](#), [OPC UA](#), [RDS](#), [RDS PP](#)

Wednesday, October 2, 2013

VDE and DKE have published Compendium on Energiewende 180° in English

“The DKE has taken an active role in shaping the turnaround in energy policy. Standards open new markets and enable innovation. With the Energiewende 180° initiative, we offer companies and institutions a forum for their various innovations which focus on the energy transition.”


The DKE (German Commission for Electrical, Electronic & Information Technologies of DIN and VDE) is a modern, non-profit service organization for the secure and efficient production, distribution and use of electricity. By extension, it serves to benefit the general public. It is the competence centre for electro technical standardization in Germany.

The power of standardization reveals itself through activities that encourage dialogue, protect competency and strengthen commitment. This is why the DKE launched the Energiewende 180° initiative.

Click [HERE](#) to visit the website of the Initiative Energiewende 180°

Free download of the Compendium E-Book is available.

NettedAutomation is one of the supporters of the Energiewende 180 °: The turnaround in energy policy is achieved with IEC standards and good training

Posted by [Karlheinz Schwarz](#) at [8:37 PM](#) [No comments:](#) 

Labels: [consultancy](#), [education](#), [Energiewende](#), [IEC 61850](#), [standardization](#)

How do you know which IEC 61850 Information Models are published

or underway for publication?

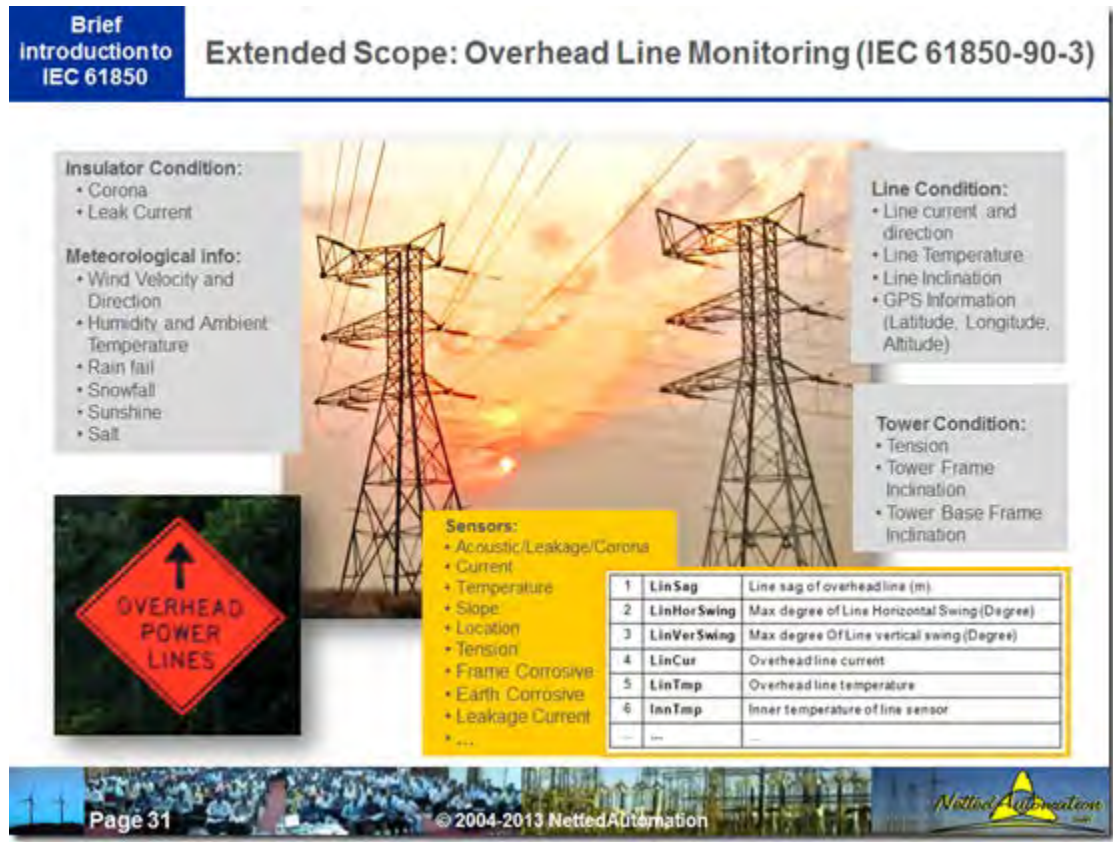
Information models in IEC 61850 are growing very fast. Many groups have understood that one of the benefits of IEC 61850 is this: **Information Models for real world** information (measurements, status, configuration, limits, control, ...).

One crucial question is this: Where can you get an overview and introduction in the many models already published or those models underway? There are several groups extending the models for several applications inside and outside electrical substations.

The easiest way is to ask somebody that has a good overview and long-term experience with IEC 61850 ...

One of the crucial extensions is defined in the [draft IEC 61850-90-3](#). During a training course I was asked last week if IEC 61850 defines something for overhead line monitoring – he did not have a chance to easily figure out that there is one document under preparation ... sure you usually don't know it or don't find some documentation.

The following figure gives a brief overview about the various aspects of line monitoring:



Want to learn more on the 300+ Logical Node classes defined so far? Please contact NettedAutomation ... or attend the next [training course in Frankfurt/Germany on 16-18 October 2013](#).

You have the chance to learn the basics AND the most crucial definitions of the standards and how they could be used. See you there.

The aging infrastructure and aging work force requires more sensors to make sure that the power is flowing reliably in the future! Almost every day you can read stories about breaking infrastructure.

Posted by [Karlheinz Schwarz](#) at [10:55 AM](#) [No comments:](#)

Labels: [condition monitoring](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [monitoring](#), [seminar](#), [Training](#)

Saturday, September 28, 2013

Tissue Data Base for IEC 61850-10 Edition 2 is now open

Please note that the Tissue Data Base for IEC 61850-10 Edition 2 is now open:

Click [HERE](#) to go to the part 10 Ed2 tissue data base.

The tissue data base is a very successful means to register, discuss and solve bugs, typos or other issues.

Posted by [Karlheinz Schwarz](#) at [4:58 AM](#) [No comments:](#)

Labels: [conformance test](#), [IEC 61850](#), [IEC 61850 edition 2](#), [iec 61850-10](#), [tissues](#)

Wednesday, September 25, 2013

Merging Unit and Monitoring IED with IEC 61850 Server and I/Os

The Merging Unit MU320 offered by Reason combines the Sampled Value exchange with "conventional" Inputs and Outputs using GOOSE and Client/Server communication. This device seems to be a very convenient way to combine both worlds: real-time and general SCADA

applications:

- 9-2LE compliant
- Up to **16 analog inputs, 12 binary inputs** and **16 outputs**
- Support for **Protection** and **Measurement (metering)** profiles simultaneously
- **MMS monitoring and control**
- Binary inputs and outputs via GOOSE messages
- Synchronization via Ethernet using PTP (IEEE1588)
- Parameter setting using standard data model and SCL language

Click [HERE](#) for a more detailed description.

Posted by [Karlheinz Schwarz](#) at [3:57 AM](#) [No comments:](#) 

Labels: [GOOSE](#), [IEC 61850](#), [IEEE 1588](#), [merging unit](#), [MMS](#), [monitoring](#), [SMV](#)

Saturday, September 21, 2013

SCADA and Me: A Book for Children and Management

The simple picture book (simple enough for managers and children) “SCADA and Me: A Book for Children and Management” is worth to “study” – really.

This is the children’s book recommended to be read by managers, politicians, teachers, and technical staff!

The crucial message is: **SCADA systems are quite often far away from protected!** “You can keep SCADA safe by doing simple things. **It is the BASICS that are important.**”

Click [HERE](#) to read more about the picture book.

Just do it! Protect your system! ... It requires education and team work.

I would like to design such a little book on IEC 61850 ... such a picture book would end like this:

It is the BASICS that are important. Do you know the basics of IEC 61850 and IEC 62351 (Security)? ... are you sure. Maybe it is better to get crucial training on the basics.

Posted by [Karlheinz Schwarz](#) at [12:22 AM](#) [No comments:](#) 

Labels: [education](#), [IEC 61850](#), [IEC 62351](#), [SCADA](#), [security](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Friday, September 20, 2013

Benefits of integrating real-time automation functions into IEC 61850-based SCADA platforms

What are the benefits of using IEC 61850 for real-time automation functions?

The results of an Australian project shows the capabilities of an IEC 61850 based SCADA solution that supports the integration of real-time automation functions into their platform based on the use of IEC 61131 logic programming and IEC 61850 as a means of communication for distributed automation functions.

The performance of simple Centralised Remedial Action Scheme (CRAS) implemented on a SCADA system has been evaluated and compared to the legacy methods to determine if the performance, security, reliability, scalability/flexibility and cost are justified considering the additional complexity of an integrated system. Experimental results show that the system delivers significant benefits including improved system reliability through reduced device count, improved safety with configurable operator interfaces, mobility services and remote diagnostic capabilities, and reduced engineering costs by providing a unified engineering environment that allows simple and seamless configuration based on the use of open standards.

Gaining an understanding of the capabilities of today’s real-time automation products and IEC 61850, along with new distributed automation and control functions will provide decision makers with the confidence to adopt more capable digital platforms and implement a smarter grid. The additional complexity introduced with those highly integrated systems is justified. However, **digital technology products will require organisations to develop specialised skills-sets**, work processes and procedures to ensure a successful transition to new solutions and architectures.

Click [HERE](#) to download the complete report [580 KB, pdf]

Posted by [Karlheinz Schwarz](#) at [12:15 AM](#) [No comments:](#) 

Labels: [distribution automation](#), [education](#), [IEC 61131-3](#), [IEC 61850](#), [real-time](#), [SCADA](#), [Training](#)

Thursday, September 19, 2013

See IEC 61850 in action: Smart Vehicle to Grid Interface (SMARTV2G)

The European Project **Smart Vehicle to Grid Interface** ([SMARTV2G](#)) invites to attend a one day workshop in

Munich (Germany)
Monday, October 14th 2013

Participation in the event is **free**. All registered participants will also receive a **free ticket** for the eCarTec 2013.

The major target of SMARTV2G is the connection of electric vehicles to the grid by enabling controlled flow of **energy and power** through **safe, secure, energy efficient** and **convenient transfer of electricity and data**.

One key component in the project is the application of IEC 61850. Attendees of the workshop will get a deep inside view **into the state-of-the-art of Smart Vehicle to Grid integration** and status of **international standardization**. There is a chance to meet senior industry experts.

Click [HERE](#) to download the program and registration flyer [270 KB, pdf]
Click [HERE](#) for the online registration form in English.
Click [HERE](#) for the online registration form in German

See you there.

Posted by [Karlheinz Schwarz](#) at [10:56 PM](#) [No comments:](#) 

Labels: [E-Mobility](#), [IEC 61850](#), [IEC 61850-90-8](#), [Smart Grid](#), [smart vehicle to grid](#), [workshop](#)

Friday, September 13, 2013

FDIS of IEC 61850-3 “General requirements” published

IEC CO has just published the 67 page FDIS (57/1391/FDIS) for the IEC 61850-3 Edition 2: Communication networks and systems for power utility automation – Part 3: General requirements

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Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

Ballot closes 2013-11-08

What’s new?

1. Requirements are in line with those of other equipment used in the same environment (e.g. protection relays);
2. Product safety added based on IEC 60255-27;
3. EMC requirements completed and in line with IEC 60255 series and IEC 61000-6-5.

Main clauses are:

- Environmental conditions
- Ratings
- Design and construction
- Tests
- Marking, labeling and packaging
- Rules for transport, storage, installation, operation and maintenance
- Product documentation

Posted by [Karlheinz Schwarz](#) at [10:58 AM](#) [No comments:](#) 

Labels: [EMC](#), [EMI](#), [environmental requirements](#), [IEC 61850-3](#)

Monday, September 9, 2013

Meet THE experts: Learn about the Use of IEC 61850 in Italy according to the Italian Norms CEI 0-16 and CEI 0-21

TÜV SÜD and three experts from ENEL will present and discuss the application of IEC 61850 for smart grid applications in Italy:

IEC 61850: la comunicazione nelle smart grid.
Connessione con le norme CEI 0-16 e CEI 0-21


10 October 2013
presso TÜV Italia srl
via Carducci 125 pal.23 - Sesto San Giovanni (MI)

This will be a unique opportunity for the Italian audience to get introduction to IEC 61850, especially to **understand how and why ENEL is using IEC 61850**.

Presentation language will be in Italian.

Click [HERE](#) for more information about the **(must attend)** event.

Click [HERE](#) for more information on CEI 0-16 and 0-21.

Posted by [Karlheinz Schwarz](#) at [2:33 AM](#) [No comments:](#) 

Labels: [education](#), [ENEL](#), [IEC 61850](#), [Italy](#), [seminar](#), [Smart Grid](#)

Saturday, August 31, 2013

Vulnerability in multiple Triangle MicroWorks’ products

The Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) reported on August 28, 2013 the following vulnerability:

Adam Crain of Automatak and independent researcher Chris Sistrunk have identified an improper input validation **vulnerability in multiple Triangle MicroWorks’ products and third party components**. Triangle MicroWorks has produced an update that mitigates this vulnerability. Adam Crain has tested the update to validate that it resolves the vulnerability.

This vulnerability could be exploited remotely.

The following Triangle MicroWorks products are affected:

- SCADA Data Gateway, v2.50.0309 through v3.00.0616
- DNP3 .NET Protocol components, v3.06.0.171 through v3.15.0.369
- DNP3 ANSI C source code libraries, v3.06.0000 through v3.15.0000

Click [HERE](#) to access the complete report.

Posted by [Karlheinz Schwarz](#) at [9:03 AM](#) [No comments:](#) 

Labels: [DNP3](#), [security](#), [source code](#), [Triangle Microworks](#), [vulnerability](#)

Friday, August 30, 2013

Siemens Siprotec 5: IEC 61850 Edition 2 certified

The Siprotec 5 protection devices are the first devices of their kind on the market worldwide to be certified under IEC 61850, Edition 2. Thanks to the certification under IEC 61850, Edition 2, these Siemens products have the "future built right in," for long-term investment

security.

All Siemens protection device series provide two new Ethernet redundancy protocols – HSR (high-availability seamless redundancy) and PRP (parallel redundancy protocol).

These new products prove that IEC 61850 is **THE standard for energy delivery systems**.

Click [HERE](#) for the press release.

More on Siprotec 5 could be found [HERE](#).

Posted by [Karlheinz Schwarz](#) at [10:42 PM](#) [No comments:](#) 

Labels: [certificate](#), [conformance](#), [conformance test](#), [IEC 61850](#), [protection](#), [Siemens](#), [SIPROTEC 5](#)

Friday, August 23, 2013

Cyber security key management for power system equipment

IEC TC 57 has just published a new committee draft:57/1388A/CD

IEC 62351-9:

Power systems management and associated information exchange – Data and communications security – Part 9: **Cyber security key management for power system equipment**

Closing date for comments is: 2013-11-15


Please contact your TC 57 national body to get a copy of the CD.

The present document cancels and replaces the previous document 57/1388/CD and differs merely by the project number IEC 62351-9 (previously IEC **TS** 62351-9); the document is intended to be issued as an **IEC International Standard (IS)** and no longer as an IEC Technical Specification (TS).

The normative clauses are:

- 7 General key management requirements
- 8 Asymmetric key management
- 9 Symmetric key management

I highly recommend to review that document to make sure to get a consistent set of requirements applicable for all IEDs in the **whole energy market** – not only in the electric power delivery system.

Posted by [Karlheinz Schwarz](#) at [10:28 PM](#) [No comments:](#) 

Labels: [Cyber Security](#), [IEC 62351](#), [IEC 62351-9](#), [key management](#), [security](#)

Saturday, August 17, 2013

Die Energiewende braucht mehr als Messeinrichtungen!

Eine sehr interessante Untersuchung von Ernst & Young im Auftrag des Bundes-Wirtschaftsministeriums kommt zu einer – neu entdeckten – alten Weisheit, die von den vdi-Nachrichten treffend so zusammengefasst und kommentiert wird:

“Ohne die Ausrüstung **aller Stromerzeugungsanlagen**, die nach dem Erneuerbare-Energien-Gesetz (EEG) gefördert werden, mit intelligenten Messsystemen [Anmerk. K. Schwarz: gemeint ist die **Kombination von Mess- und Steuertechnik**] ist die flächendeckende Einführung von Smart Metern in Deutschland **volkswirtschaftlicher Unsinn.**“ Die Investitionen ohne intelligente Steuerungs- UND Regelungsfunktionen (!) wäre mehr als Unsinn!!

Die vdi-Nachrichten führen weiter aus: “Als größtes Hindernis auf dem Weg zu Smart Grids entpuppt sich ausgerechnet das EEG. Dessen Rechtsrahmen gibt in Hinsicht auf intelligente Zähler und digitale Anlagensteuerung nicht viel her und führt in der Praxis eher zurück ins **steuerungstechnische Mittelalter.**“

Viel mehr gibt es zu diesem Thema fast nicht zu sagen!

Klicken Sie [HIER](#) für den Beitrag in den vdi-Nachrichten.
[HIER](#) für die BMWI-Pressemeldung (!!).
[HIER](#) für die Gesamtstudie von Ernst & Young

In der BMWI-Pressemeldung wird ausgesagt: **“Die Bezahlbarkeit von Energie für den Verbraucher ist dabei oberste Leitlinie.”**

Hat der Schreiber der Aussage mit der Bezahlbarkeit wirklich die Studie gelesen – oder sie nicht verstehen können oder nicht verstehen wollen!?!?

Das wichtigste Ziel muss sein, dass Energie **sicher und hoch-verfügbar** bereitgestellt wird – sonst gehen die Lichter aus! Vergessen darf man bei alledem auch nicht, das die derzeitige Infrastruktur zum guten Teil in die Jahre gekommen ist und auch noch – zusätzlich zu den intelligenten Systemen – erneuert werden muss!

Erneuerbare Energien und **erneuerte Netzinfrastrukturen** müssen Hand in Hand gehen!

Für beide sind Normen sehr wichtig!

Posted by [Karlheinz Schwarz](#) at [12:04 PM](#) [No comments:](#) 

Labels: [Energiewende](#), [Smart Grid](#), [smart metering](#), [smart people](#), [smart solution](#), [standards](#)


Thursday, August 15, 2013

Hirschmann Switches provide integrated IEC 61850 Server

The new 8.0 release (The Classic Switch Software) increases again the feature range for managed switches from the MACH, MICE, Rail and OCTOPUS families from Hirschmann™. Depending on the switch family, these include an **integrated IEC61850 server for seamless integration into data networks for power generation and distribution**. A PTP power profile according to IEEE C37.238 also allows to accurately synchronizing these networks. Thanks to support for Jumbo frames, which ensure optimum utilization of user data, high-resolution video applications are also possible. Furthermore, in addition to extensions for PROFINET and Ethernet/IP, the new release for all four switch families offers additional mechanisms for detecting overload situations as well as improved diagnostic and encryption mechanisms.

Click [HERE](#) to get more information on the new release providing an IEC 61850 Server.

To my knowledge, they were the first manufacturer that supported an IEC 61850 Server in their Ethernet Switches.

Posted by [Karlheinz Schwarz](#) at [4:13 AM](#) [No comments:](#) 

Labels: [Belden](#), [Ethernet](#), [Ethernet switches](#), [hirschmann](#), [IEC 61400-25](#), [IEC 61850](#), [seamless](#), [server](#)

Wednesday, August 14, 2013

Next Public Training Frankfurt, 16.-18. October 2013

The next public training conducted by Karlheinz Schwarz (NettedAutomation) will take place at the NH Hotel in

Frankfurt-Mörfelden (Germany), 16.-18. October 2013

3 day IEC 61850/61400-25 Seminar/Hands-on Training (NettedAutomation) with with several embedded Controller Development Kits (RTOS, ...), Starter Kit (Windows DLL), and several other demo software.

[Details for the event in Frankfurt \(Germany\) can be found here](#)

For the last two years almost all training events are conducted as customized courses. This is the most efficient way to get your hands on the subject.

A list of training courses and other information could be downloaded:

http://www.nettedautomation.com/download/dt2013/IEC61850_Schwarz_EN-Training_2013-01-25_p.pdf

Get a FREE IEC 61850 Development Kit (HW and SW)- worth 1,290 Euro; as a special GIFT we offer you a free IEC 61850/61400-25 Development Kit, with an ready to go API and example application source code in C/C++ (the kit is included in the regular attendance fee).

The Kit may be used during the course.

Or receive a deep discounted fee (without a Development Kit).

The hands-on training will also comprise use of IEC 61850 to IEC 60870-5-104 Gateway:

For the training we will use DLLs, com.toms, DK61, ... several other tools.

<http://com-tom.de/products.php?l=en>

Posted by [Karlheinz Schwarz](#) at [3:09 AM](#) [No comments:](#) 

Labels: [education](#), [Ethernet](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [MMS](#), [seminar](#)

IEC 61850-90-4 Network Engineering – Just Published

IEC just published a crucial document on network engineering:

IEC/TR 61850-90-4 ed1.0
Communication networks and systems for power utility automation -
Part 90-4: Network engineering guidelines

Congratulation to the editors of this great technical report – worth to study in detail!

IEC/TR 61850-90-4:2013 is intended for an audience familiar with network communication and/or IEC 61850-based systems and particularly for substation protection and control equipment vendors, network equipment vendors and system integrators. This Technical Report

focuses on engineering a local area network focused on the requirements of IEC 61850-based substation automation. It outlines the advantages and disadvantages of different approaches to network **topology, redundancy, clock synchronization**, etc. so that the network designer can make educated decisions. In addition, this report outlines possible improvements to both substation automation and networking equipment. This Technical Report addresses the most critical aspects of IEC 61850, such as protection related to tripping over the network. This Technical Report addresses in particular the multicast data transfer of large volumes of sampled values from merging units. It also considers the high precision clock synchronization and "seamless" guaranteed transport of data across the network under failure conditions that is central to the process bus concept.

This 250+ page report could be used as a compendium of solutions for the various applications found in power automation systems. The communication infrastructure is one of the crucial aspects of the future energy delivery system – in the electric power world, gas delivery, heating and cooling systems as well as in E-Mobility. The recommendations given in this new part of IEC 61850 could be applied in many application domains even outside the energy world.

As you may have seen, network infrastructure vendors like [MOXA](#) and [Kyland](#) have integrated IEC 61850/MMS in their infrastructure.

Click [HERE](#) to download the preview of IEC/TR 61850-90-4 ed1.0
Click [HERE](#) if you want to buy the report.

Posted by [Karlheinz Schwarz](#) at [2:22 AM](#) [No comments:](#) 

Labels: [engineering](#), [Ethernet](#), [Ethernet switches](#), [IEC 61850](#), [IEC 61850-90-4](#), [Network Management](#), [real-time](#), [redundancy](#)

Tuesday, August 13, 2013

KYLAND – IEC 61850 Modeling for Switch Management

Kyland is proud of using IEC 61850 for information exchange of network management information. They write in a white paper:

Excerpt:

*“**The IEC61850 Modeling technology can be used to manage industrial Ethernet switches based on IEC61850 protocols.** This white paper describes the models and typical applications of the technology. ...*

*In the development of IEC61850, Ethernet switches constitute the communication platform between process layer and substation layer networks. IEC61850 does not take Ethernet switches as devices. **However, the monitoring, management, and configuration of Ethernet switches will be gradually incorporated into the entire system in actual applications, which is required by running the system normally, fault diagnosis and alarming.***

*... Therefore, **developing IEC61850-based industrial Ethernet switches management model is one of the key technologies for convenient management of a smart grid.***

*... Besides key protection, measurement, and monitoring functions, **more and more monitoring systems** (including the management and monitoring system for communication facilities such as industrial Ethernet switches) will be incorporated into the **IEC61850 management system with its openness and interoperability.** In the near future, intelligent unmanned substations and infrastructure will be a reality.”*

Kayland has defined two specific logical nodes:

ZSWM is the switch management node, a general feature of a switch; ZSWP is the switch port management node, management and status information of a switch port.


ZSWP is based on port. Therefore, each device can contain multiple ZSWP instances:

PortCsPktNum - Number of collision packets
PortCrcPktNum - Number of CRC packets
PortShortPktNum - Number of short packets
PortLongPktNum - Number of long packets
PortBCPktNum - Number of broadcast packets
PortMCPktNum - Number of multicast packets
PortRcvPktNum - Number of total packets received
PortRcvOctetNum - Number of total octets received

More to come.

MMS – Makes Management Simpler

Click [HERE](#) for the Kayland White paper.

Posted by [Karlheinz Schwarz](#) at [11:34 AM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [MMS](#), [Network Management](#)

MOXA’s Dual Protocol Approach: MMS and SNMP

MOXA has announced to support a dual protocol approach in their communication infrastructure: **IEC 61850/MMS** and **SNMP**.

This is no surprise: already in the first year of standardization of IEC61850 EdF (France) proposed to use SNMP (simple network management protocol) to carry IEC 61850 payload modeled in a specialized MIB. There was very little support for SNMP.

It is natural that the communication infrastructure also provides IEC 61850/MMS access to the many data objects used in switches, routers and other equipment. IEC 61850-7-4 Edition 2 has a lot of new – communication related – logical nodes that are linked directly to network management like “Physical communication channel supervision” logical node (LCCH):

RxCnt - Number of received messages

RedRxCnt - Number of received messages on redundant channel


TxCnt - Number of sent messages

This is related to the communication infrastructure ... Or?

Click [HERE](#) for details from MOXA.

MOXA concludes in a [White paper](#):

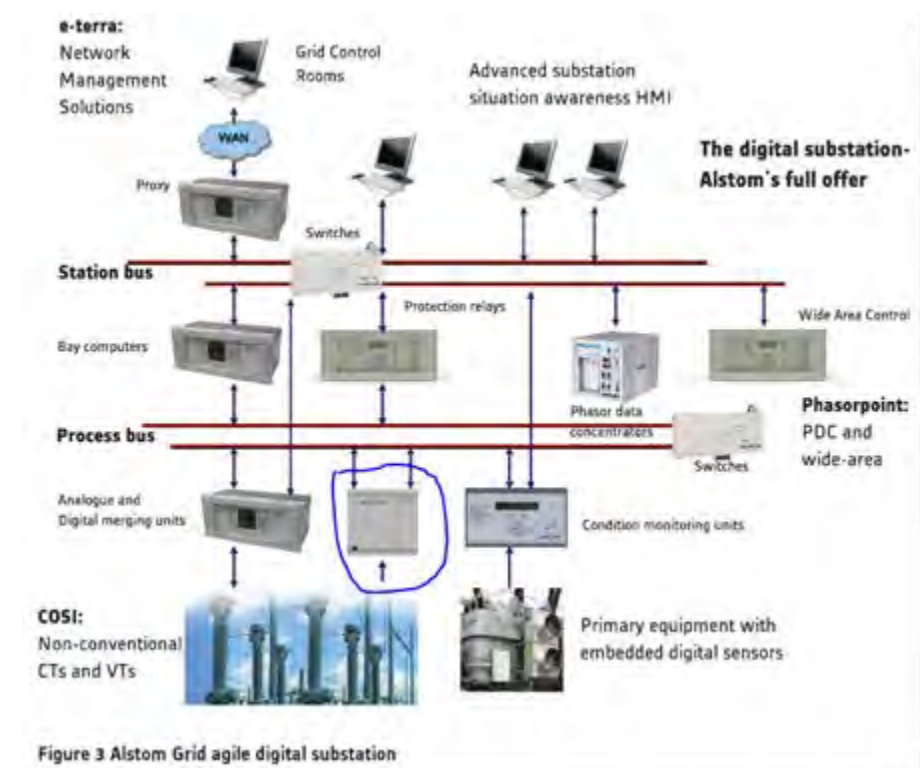
*“Moxa's new line of PowerTrans IEC 61850 switches now come with full MMS compatibility, with a complete **implementation of IEC 61850 data modeling and a built-in MMS server**. Our entire line of substation computers, switches, and other associated hardware all still feature our own enhanced SNMP support (with custom MIB files), but Moxa welcomes any inquiry into further customizing our switches, embedded computers, and other substation IT hardware with full or enhanced MMS support, made to your order.”*

Posted by [Karlheinz Schwarz](#) at [11:19 AM](#) [No comments:](#) 

Labels: [Ethernet](#), [Ethernet switches](#), [IEC 61850](#), [MIB](#), [MMS](#), [process bus](#), [protocol](#), [SNMP](#)


New Merging Unit from Alstom according to 9-2LE

Alstom Grid is offering a new Merging Unit according to 9-2LE that supports the integration of conventional current and voltage samples into a all digital substation:



Click [HERE](#) to download a brochure on the Merging Unit.

According to the UCAIUG Users Group there are now 10 Merging Units certified by the Users Group.

Posted by [Karlheinz Schwarz](#) at [12:03 AM](#) [No comments:](#) 

Labels: [9-2LE](#), [Alstom](#), [merging unit](#), [process bus](#), [protection](#), [Substation](#), [Substation Automation](#)

Saturday, August 10, 2013

Eine Sprache für das Stromnetz – IEC 61850

Kürzlich erschien ein sehr beachtenswerter sechs-seitiger Artikel zur Anwendung der **IEC 61850** beim Anschluss dezentraler Erzeuger wie die Photovoltaik in der Zeitschrift [photovoltaik](#): **“Eine Sprache für das Stromnetz”** (von Dipl.-Ing. Heiko Schwarzbürger MA).

Auszug: *“Italien hat das Kommunikationsprotokoll IEC 61850 zum Gesetz erhoben. **In Deutschland herrscht hingegen Kleinstaaterei. So werden die Netze zum Nadelöhr und ihre Modernisierung zum Milliardengrab.**”*

Die Uhr tickt, doch vielen Anlagenbetreibern ist das gar nicht bewusst: Bis Ende 2013 müssen auch Solaranlagen mit 30 bis 100 Kilowatt Leistung durch den Netzbetreiber regelbar sein. In den vergangenen Monaten wurde diese Vorschrift zunächst bei Anlagen mit mehr als 100 Kilowatt umgesetzt, nun sind die kleineren Generatoren dran. Wer die erforderliche Technik nicht nachrüstet, riskiert den Netzanschluss und die Einspeisevergütung. ...
Könnte, würde, sollte: In der Realität haben die Netzbetreiber das Sagen, nicht die Vernunft. So hat Eon Bayern im vergangenen Jahr in seinem Netzgebiet rund 5.500 regenerative Kraftwerke – Photovoltaik, Windräder, Biogasanlagen – mit Leistungen ab 100 Kilowatt ausgerüstet. Fernwirktechnik gab es nur für 150 Kraftwerke, die mehr als ein Megawatt leisten. An alle anderen lieferte Eon Bayern die unzureichenden Rundsteuerempfänger aus, keine Steuerboxen mit Fernwirktechnik. „Wir müssen die Kosten für die Betreiber im Blick haben“, sagt Markus Schwürzenbeck, Leiter des Einspeisemanagements bei Eon. „Sie bekommen von uns einen Rundsteuerempfänger für 356 Euro geliefert.“
Für 400 Euro wäre Fernwirktechnik auch für kleine Anlagen ab 30 Kilowatt verfügbar gewesen, beispielsweise durch die Firma IDS. Das Unternehmen lieferte unlängst 17.000 Geräte an die Lechwerke aus. Wegen der hohen Stückzahl gehen die Kosten runter. Oder könnten sinken, denn das ist bisher ein Einzelfall. Ein Massenmarkt für intelligente Steuersysteme ist nicht in Sicht.

Kleinstaaterei wie im Mittelalter

Das zweite Problem: In Deutschland gibt es rund 900 Netzbetreiber und Stadtwerke. Im Laufe der Jahrzehnte haben sie tausende Lösungen entwickelt, um ihre Generatoren zu steuern. Jedem Tierchen sein Plaisierchen: **Da tobt sich die deutsche Kleinstaaterei so richtig aus. Auf ein einheitliches Kommunikationsprotokoll konnten oder wollten sich die Netzbetreiber bisher nicht einigen.** „Die Rundsteuerempfänger haben in der Regel vier Relaiskontakte, die vom Wechselrichter ausgelesen werden“, erläutert der SMA-Experte. „Dafür werden unterschiedliche Standards verwendet. **Die Vereinheitlichung der Protokolle wäre sinnvoll.**“

So wird das Netz zum Nadelöhr der Energiewende ... Soll das Netz nicht zum Engpass für die Energiewende werden und dem Steuerzahler unnötige Milliardensummen abverlangen, braucht es eine Steuerung von unten. Und schon zeichnet sich ab, dass die Modelle zur schnellen Netzsteuerung noch komplexer werden. Nämlich dann, wenn Batterien und Elektroautos in die Strombilanzen eingreifen. Das Netz als freien Marktplatz für Strom aus allen erdenklichen Quellen zu definieren und dafür die technischen Voraussetzungen zu schaffen, das ist ohne einheitlichen Standard in der Datenkommunikation nicht möglich. **Das Netz braucht eine Lingua franca, nicht nur in Italien.**“

Für eine gewisse Übergangszeit (sicher von mehreren Jahren) wird das Fernwirkprotokoll IEC 60870-5-104 noch eine wichtige Rolle spielen. Auf Geräteebene in Schaltanlagen und Erzeugungsanlagen werden allerdings heute schon zunehmend Geräte mit IEC 61850 und IEC 61400-25 eingesetzt, die über ein Gateway zu IEC 60870-5-104 angeschlossen werden. Mit diesen Gateways wir den Netzleitsystemen eine Schonfrist über einen Migrationspfad hin zu IEC 61850 geboten. Damit werden neue Möglichkeiten nach IEC 61850 und IEC 61400-25 ermöglicht, ohne gleich in der Breite die Netzleistellen-Kopplung verändern zu müssen. Technisch wäre das sicher heute schon möglich! Neben den Netzleitstellen benötigen zunehmend auch andere Dienststellen und Gruppen Informationen über den **Prozess**, die **Prozessautomatisierung** und die **Kommunikationsinfrastruktur: Asset Monitoring im engeren und weitesten Sinne** – hier werden Daten sehr oft direkt mittels IEC 61850 und IEC 61400-25 ausgetauscht!

In der Normung der IEC 61850 wurde diese Migration schon vor etwa 10 Jahren beschrieben. Als Ergebnis dieser Arbeiten wurde 2008 der Teil IEC 61850-80-1 veröffentlicht:



[Hier klicken](#), um den gesamten Artikel “Eine Sprache für das Stromnetz” zu lesen.

Posted by [Karlheinz Schwarz](#) at [12:02 PM](#) [No comments:](#) 

Labels: [de](#), [erneuerbare Energien](#), [Fernwirktechnik](#), [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 61850](#)

Wednesday, August 7, 2013

IEC 61850 Control Model – What is the function of SelectWithValue?

Somebody asked the other day these good questions:

“I tried to understand what “select with value” or **SelectWithValue (SelVal)** means, but without success.

What I did understand is it is used for **Select before operate with enhanced security**.

Question: What is the purpose of **SelectWithValue** ? What is the difference between normal Select and SelecWithValue?”

... questions that have some hidden answer in IEC 61850-7-2 ...

You have to look at the service parameters exchanged with the SelectWithValue service request (which is part of the IEC 61850-7-2 control model) – see figure:

20.5.3.3 **SelectWithValue (SelVal)**

The **SelectWithValue** service shall define the following service parameters.

Parameter name
Request
ControlObjectReference ✓
ctlVal F
operTm[0..1]
origin
ctlNum 6
T
Test
Check ✓
Response+

The use of the various parameters is this (excerpt, example):

ctlVal (e.g. OPEN) could be used to check against the interlocking information (Logical Node CILO). If opening is not allowed, the server could already at this stage return saying: opening is not allowed.

The ctlNum could be used to guarantee a sequence ... further:

20.5.2.4 **ctlNum**

The service parameter **ctlNum** determines the control sequence number of the control service. Its TypeDefinition shall be identical to the functional constrained ST respectively MX DataAttribute **ctlNum** defined in the controllable common data class of IEC 61850-7-3 used by the control object.

All service primitives belonging to one control sequence shall be identified by the same control sequence number. The use of ctlNum is an issue of the client.

20.5.2.5 **T – control time-stamp**

The service parameter **T** (see Table 49) shall be the control time-stamp. It shall contain the time when the client issues the service control request.

NOTE Control requests can be Select, Operate, Cancel, TimeActivatedOperate.

Table 49 – T definition

T type		
Service parameter name	Parameter type	Value/value range/explanation
T	TimeStamp	

Observe that the command service tracking allows logging of this timestamp, for example to compare the time a client issues a command with the time the command has been received or executed.

With the T a server could figure out that the SelectWithValue is too old to be processed ...

I guess this gives a good understanding of the general objective.

In the case of Select, you don’t have these.

Posted by [Karlheinz Schwarz](#) at [12:55 AM](#) [No comments:](#) 

Labels: [control](#), [control model](#), [IEC 61850](#)

Monday, August 5, 2013

List of 5,000+ abbreviations in IEC 61850 and related documents

Please find a list of 5,000+ abbreviations used in IEC 61850 and related documents:

Abbreviations in IEC 61850 and related documents			
Prepared by Karlheinz Schwarz, SCC			
k.schwarz@scs-schwarz.de			
05.08.2013			
1	Abbreviation	Description	Document
1	a	Current	7-4162-1-01a01
4	A	Current	7-4162-1-01a01
5	A	Current	9-2142
6	AVD	Analogue – Digital Converter	IEC 61850-2-3
7	AA	APPLICATION ASSOCIATION	IEC 61850-2-3
8	Ab	Aberration	7-4162-1-01a01
9	Ab	Aberration	7-4162-1-01a01
10	Ab	Aberration	7-4162-1-01a01
11	Ab	Aberration	7-4162-1-01a01
12	Ab	Aberration	7-4162-1-01a01
13	Ab	Aberration	7-4162-1-01a01
14	Ab	Aberration	7-4162-1-01a01
15	Ab	Aberration	7-4162-1-01a01
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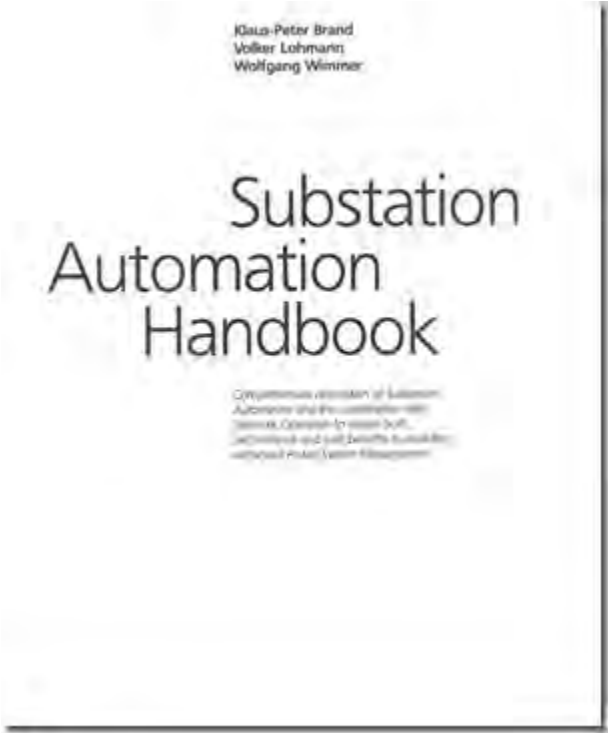
Click [Here](#) for the complete document [163 pages pdf, 6 MB]

Posted by [Karlheinz Schwarz](#) at [12:02 PM](#) [No comments:](#) 

Labels: [abbreviations](#), [IEC 61400-25](#), [IEC 61850](#)

Substation Automation Handbook On Sale

The famous **Substation Automation Handbook** by Dr. Klaus-Peter Brand, Volker Lohmann, and Dr. Wolfgang Wimmer is on Sale ... deeply discounted:



The new price is now:

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	CD IEC 61850	25.00	30.00/ 24.00	30.00

The book is a must for all people involved in substation automation:

Click [Here](#) for the new order form.

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Posted by [Karlheinz Schwarz](#) at [11:56 AM](#) [No comments:](#) 

Labels: [handbook](#), [Substation Automation](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Sunday, August 4, 2013

Could a Counter Interrogation Service bring the European Power or Gas Networks down?

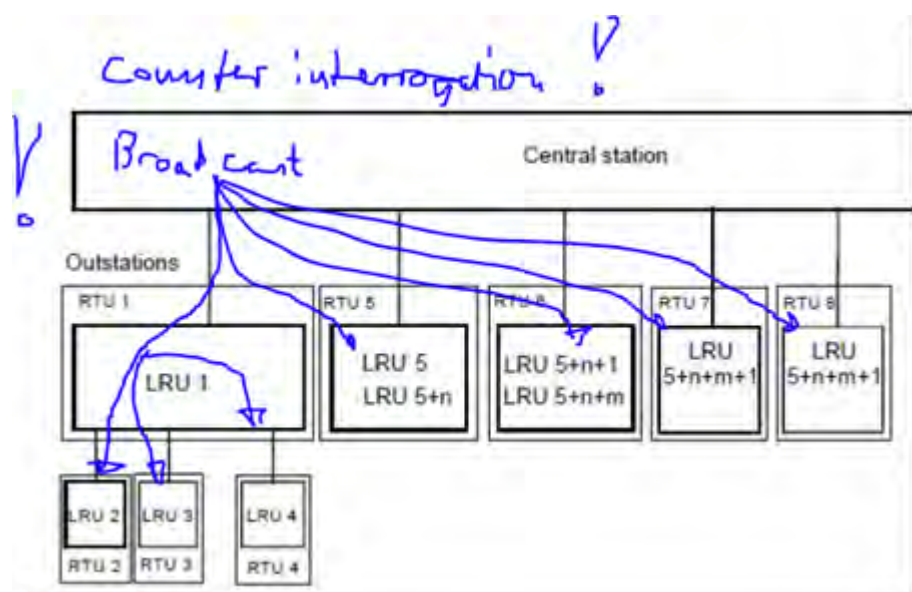
Good question! Easy to answer: Yes! It depends on the standard and implementation used.

Early May 2013 it almost happened in Europe. What? During a test of a new control center communication and application an IEC 60870-5-101 or -104 Broadcast "Counter interrogation" command went out to interrogate counters from ALL RTUs somehow "connected". The command was received and answered by all these RTUs. Obviously one RTU responded with a "Broadcast" response ... and obviously there was a "loop" somewhere in the network ... it ended up in flooding the network for days!!!

The operators had very severe problems to get status and measurements from the process – because first the network was sending bunches of messages back and forth and around. Second, when experts started to "break" the "loops" and disconnect from the neighboring network they could "cool" down the traffic but lost some awareness of the system's situation. After a few days they fixed some software ... but they did not yet find the device that caused the trouble. According to a report from experts involved.

Hm!? That's really a crucial issue with a standard protocol in operation for 15 or 20 years.

Here is why this could happen at all: During the days IEC 60870-5-101 was designed, people thought that the communication is strictly hierarchical and looks like a tree (top-down) – see next figure from 101:



For counter interrogation the broadcast is often used in order to catch the counter values at a certain time, let's say 20:00 h. To freeze the

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► 2008 (82)

Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

value at 20:00 h the control center has to send out a broadcast counter interrogation to freeze the value at 20:00 h (+/- some seconds – due to travel time ...).

Next it can send another command to start sending the values from the RTUs to the control center.

That means: A lot of messages have to be sent at the same time ... to reach all RTUs ... in star topologies, or “looped” networks, ... how to control such a process if you have hundreds of RTUs ... owned by different utilities ... blabla ...

The issue is here: People thought that you could start system-wide synchronous functions by synchronizing through timeliness messages. That may work in simple topologies ... but ... in Smart Grid systems with many (many) meters, it is unlikely that this approach will work reliably.

How does IEC 61850 solve that requirement? It defines a concept of time-wise synchronized RTUs (or generally speaking IEDs). The control center can send a command to freeze well in advance – an hour or two ... so that no message shower will occur around 20:00 h. The IEC 61850 server stores the time when it has to freeze the corresponding value(s). The server can then send the frozen values via a data set and report control block, or can the data set or log it.


The synchronization is completely decoupled from the freezing and retrieving process.

The process is configured using the common data class BCR (Binary Counter Reading):

BCR class - Binary counter reading				
DataAttribute	Type	FC	TrgOp	Value/Value range
status				
actVal	INT64	ST	dchg	Binary counter status
frVal	INT64	ST	dupd	Frozen binary counter status
frTm	TimeStamp	ST		Time of the last counter freeze
q	Quality	ST	qchg	Quality of the attribute(s) representing the value
t	TimeStamp	ST		Timestamp of the last change
configuration, description and extension				
units	Unit	CF	dchg	Units of the attribute(s)
pulsQty	FLOAT32	CF	dchg	Magnitude of the counted value per count. actVal/frVal and pulsQty are used to calculate the value
frEna	BOOLEAN	CF	dchg	BOOLEAN value, which controls the freeze process. If TRUE, freezing shall occur as specified in strTm, frPd and frRs. If FALSE no freezing shall occur.
strTm	TimeStamp	CF	dchg	Starting time of the freeze process. If the current time is later than the start time, the first freeze shall occur at the next freeze interval (frPd) expiration, computed from the start time setting.
frPd	INT32	CF	dchg	Time interval in ms between freeze operations. If frPd is 0, only single freeze is performed at the time indicated in strTm.
frRs	BOOLEAN	CF	dchg	Indicates that counter is to be automatically reset to zero after each freezing process.

This model really is based on the (bad) experience with 101 and 104 ... and ... it works ... and does not flood the network!

The broadcast command in 101 and 104 SHOULD be REMOVED ... at least utilities should no longer rely on it!!! Take this very serious ... as many other utility experts do.

Posted by [Karlheinz Schwarz](#) at [12:01 PM](#) [No comments:](#) 

Labels: [blackout](#), [broadcast](#), [gas](#), [iec 60870-5](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [meter](#), [synchronization](#)

Friday, August 2, 2013

Logical Nodes and Data Models for Steam and Gas Turbines

IEC has just published a committee draft (CD) with a proposal for new models to be used in steam and gas turbines:

57/1383/CD - AIEC 61850-7-410 A1:


Amendment 1 to IEC 61850-7-410: Communication networks and systems for power utility automation – Part 7-410: Basic communication structure – Hydroelectric power plants – Communication for monitoring and control

Comments could be provided until 2013-11-01

The draft contains the details of the following new logical nodes (with some 120 data objects):

EBCF	Block control function. This LN will represent one physical device the control of the thermal pressure of the steam generator and power regulation of turbine / generator system
EFCV	Fuel control valve. This LN will represent the physical device of f related to the gas turbine in a thermal power plant.
EGTU	Gas turbine production unit. This LN represents the physical devi the generator combination in a thermal power plant. It is intende rating plate that allows settings of data. It also acts as a placeh current operating conditions of the unit.
ESCV	Steam control valve. This LN will represent the physical device o valve of the steam turbine in a thermal power plant.
ESPD	Speed monitoring. This LN is derived from HSPD
ESTU	Steam turbine production unit. This LN represents the physical d and the generator combination in a thermal power plant. It is int extended rating plate that allows settings of data. It also acts as the current operating conditions of the unit.
EUNT	Thermal unit operating mode. The present status of the producti
FDBF	Dead-band filter. This LN represents a settable filter for dead-ba
FMTX	Trip matrix. This LN represents a matrix for linking various trip f equipment that shall be tripped or controlled during a fault.
GUNT	Production unit operating mode. The present status of the produ
SECW	Supervision of electrical conductivity in water. This logical node r system for monitoring of electrical conductivity in water.
TECW	Measurement of electrical conductivity in water. This logical node generic device for measuring the conductivity in water.

The LN Group E stands for "Enthalpy"; *Enthalpy* is a measure of the total energy of a thermodynamic system.

Posted by [Karlheinz Schwarz](#) at 2:09 AM [No comments:](#) 

Labels: [gas power plants](#), [IEC 61850](#), [logical node](#), [Power Plants](#), [steam power plants](#)

Wednesday, July 31, 2013

IEC 61850 Security – Siemens SIPROTEC 5

Siemens published an informative document on Security of their communication systems supporting IEC 61850, IEC 60870-5-103, DNP3 etc:

SIPROTEC 5 Application Note

SIP5-APN-009:

Communication Architecture Under Cyber Security Aspects

I was a bit surprised that the IEC 61850-8-1 (MMS) communication in SIPROTEC 5 IEDs is not secured. The paper even does not mention the IEC 62351 series ... which at least recommends to apply TLS for the TCP communication and MMS.

Click [HERE](#) to download the document.

Posted by [Karlheinz Schwarz](#) at 5:02 AM No comments: 

Labels: [iec 60870-5](#), [IEC 61850](#), [IEC 62351](#), [MMS](#), [security](#), [TLS](#)

Tuesday, July 30, 2013

Multiagent Automation based on IEC 61850 and IEC 61499

G. Zhabelova and V. Vyatkin know for their interest in combining IEC 61850 with IEC 61499 have published an interesting paper on

"Multiagent Smart Grid Automation Architecture Based on IEC 61850/61499 Intelligent Logical Nodes"

in Industrial Electronics, IEEE Transactions on, vol. 59, pp. 2351-2362, 2012.

Abstract— Universal, intelligent and multifunctional devices controlling power distribution and measurement will become the enabling technology of the Smart Grid ICT. In this paper we report on a novel automation architecture which supports distributed multi-agent intelligence, interoperability and configurability, and enables efficient simulation of distributed automation systems. The solution is based on the combination of IEC 61850 object-based modeling and interoperable communication with IEC 61499 function blocks executable specification. Using the developed simulation environment we demonstrate the possibility of multi-agent control to achieve self-healing grid through collaborative fault location and power restoration.

Click [HERE](#) to download the complete paper.

Posted by [Karlheinz Schwarz](#) at 5:24 AM No comments: 

Labels: [distribution automation](#), [Functionblock](#), [Functions](#), [IEC 61499](#), [IEC 61850](#), [self-healing](#), [Smart Grid](#), [smart solution](#)

Monday, July 29, 2013

IEC 61850/IEC 61499 Based Engineering

You may remember the papers on the use of IEC 61850 in conjunction with IEC 61499 published a few years ago:

<http://blog.iec61850.com/2012/09/ieee-award-for-paper-on-standards-based.html>

Since then a couple of papers on the subject have been published. One of the latest has been published today:

G. Zhabelova, C.-W. Yang, V. Vyatkin , "SysGrid: IEC 61850 and IEC 61499 based engineering process for Smart Grid system design", IEEE Conference on Industrial Informatics (INDIN'13), Bochum, July 29-31, 2013

Abstract — The paper proposes a novel computer-aided model-based system engineering process for Smart Grid applications. The process is supported by the SysGrid tool that plays the roles of system configurator and device configurator. The design process starts with single line diagrams which are automatically transformed to executable function block specifications. The process is based on the Smart Grid control architecture that is a heterogeneous network of controllers communicating in a peer to peer manner. This "artificial nervous system" of the Smart Grid will be capable of self-healing and dynamic adaptation to renewable generation and ever-changing loads. The tool supports system-level design of automation logic in the form of function block networks with compliancy to IEC 61499. The capabilities of SysGrid are demonstrated through the process of designing a distributed protection application.

Click [HERE](#) to download the full paper.

Posted by [Karlheinz Schwarz](#) at [8:46 AM](#) [No comments:](#) 

Labels: [configuration](#), [engineering](#), [engineering system](#), [IEC 61499](#), [IEC 61850](#), [Sysgrid](#)

Saturday, July 27, 2013

Batteries and Electric Vehicles - U.S. Government spends \$2.4 Billion in Grants

According to the White House press release (2009-08-05) President Obama "announced 48 **new advanced battery and electric drive projects** that will receive **\$2.4 billion in funding** under the American Recovery and Reinvestment Act. These projects, selected through a highly competitive process by the Department of Energy, will accelerate the development of U.S. manufacturing capacity for batteries and electric drive components as well as the deployment of electric drive vehicles, helping to establish American leadership in creating the next generation of advanced vehicles."

The award winners will invest **another \$2.4 Billion**.

One of the biggest deployment projects will be implemented by ETEC in cooperation with Nissan. According to ETEC: "The Project will install **electric vehicle charging infrastructure** and **deploy up to 1,000 Nissan battery electric vehicles** in strategic markets in five states: Arizona, California, Oregon, Tennessee, and Washington. ... To support the Nissan EV, the Project will install approximately **12,500 Level 2** (220V) charging systems and **250 Level 3** (fast-charge) systems."

Click [HERE](#) for the full White House press release.

Posted by [Karlheinz Schwarz](#) at [12:27 AM](#) [No comments:](#) 

Thursday, July 18, 2013

IEC 61850 – How to use the Standard in Substations?

The German mirror committee of IEC TC 57 (DKE K 952) is quite active in supporting IEC 61850 and helping the utility industry to discuss the application of IEC 61850 and provide feedback to the international standardization. Congratulation to all experts that have contributed to that work for many years! Well done!

The final documents of the modeling and engineering group provide a great inside view into the many use cases of IEC 61850 in protection and substation automation. The crucial results are written in English, too. Four out of seven topics are published in English:

1. Überblick [DE] / Overview [EN]
2. Engineeringprozess [DE] / Engineering Process [EN]
3. Engineeringwerkzeuge [DE]
4. Modellierungsrichtlinie [DE] / Modeling Guide [EN]
5. Mustermodellierung [DE]
6. Applikationsbeschreibungen [DE] / Application Description [EN]
7. Weitere Applikationen [DE]

Click [HERE](#) to access the above documents. The pdf documents are free to download.

Enjoy.

Posted by [Karlheinz Schwarz](#) at 2:07 AM No comments: 

Labels: [applications](#), [control](#), [DKE](#), [engineering](#), [engineering system](#), [IEC 61850](#), [modeling method](#), [models](#), [protection](#), [Substation Automation](#)

Wednesday, July 17, 2013

Telecoms – How they may impact the energy automation infrastructure

Telecom companies have a lot of experience of building huge communication systems made up of thousands of computers. For several years they are looking to enter the market of energy delivery systems. They are – to some extent – competing with traditional manufacturers (SMEs and large companies) of energy automation systems – let's call them Smart(er) Grids.


The "[Telecoms for Smart Grid Conference](#)", 23-24 September, 2013, London, will provide a lot of possible solutions that may – some time down the street – be used by utilities one way or the other.

There is another group of manufacturers that believe they have the appropriate solutions for the Smart(er) Grids: the industrial automation people. They have also a long history in (factory floor and process) automation.

Building the future hybrid energy delivery system will be a very challenging task.

Taking the many influences into account it seems to be natural that this work could only be done with TEAMWORKs:

Teamwork makes the dream work – supported by international standards like IEC 60870-5-104, DNP3, IEC 61850, CIM, ...

Posted by [Karlheinz Schwarz](#) at 7:16 AM No comments: 

Labels: [DNP3](#), [IEC 60870-5-104](#), [IEC 61850](#), [industrial automation](#), [teamwork](#), [telecommunication](#)

Mapping between DLMS/COSEM and IEC 61850

A first draft has been written describing the mapping between DLMS/COSEM and IEC 61850:

80-4: Mapping between the DLMS/COSEM (IEC 62056) data models and the IEC 61850 data models

It defines a one-to-one relationship between IEC 62056 OBIS codes and IEC 61850 Logical Nodes and Data Objects.

Posted by [Karlheinz Schwarz](#) at 5:28 AM [No comments:](#) 

Labels: [DLMS/COSEM](#), [IEC 61850](#), [iec 61850-80-4](#), [meter](#)

OSCE publication on Energy Infrastructure Protection

The Organization for Security and Co-operation in Europe (OSCE) has published a comprehensive report titled:

Good Practices Guide on Non-Nuclear Critical Energy Infrastructure Protection (NNCEIP) from Terrorist Attacks Focusing on Threats Emanating from Cyberspace

The 100 page Guide is a very comprehensive document that states at the beginning that "The importance of **energy security and energy infrastructure security** cannot be overstated. It is among the most serious security, economic and environmental challenges of both today, and the future."

The report is worth to read – but it would be more important if vendors and users of the **energy infrastructure** and the **energy automation infrastructure** would increase investments in implementing the basic measures to secure both systems. Unfortunately the implementation of these measures are not a business case to increase the profit of an utility!

The challenge with the future energy infrastructure is this: to manage the **Cost and Lost**. Both infrastructures (energy and energy automation) will require huge amount of investment to keep the energy delivery stable, secure, reliable, and resilient (**Cost**) and deal with more renewable energy (**Lost** in the sense of relative reduction of traditional bulk generation and transmission).

Almost everything about security has been said – but not by everybody. Let's move on with more implementations of security measures.

Click [HERE](#) for the complete guide.

Posted by [Karlheinz Schwarz](#) at 1:24 AM [No comments:](#) 

Labels: [energy supply](#), [infrastructure](#), [security](#)

Tuesday, July 16, 2013

IEC 61850-8-1 Signal Quality Encoding

Yesterday I received an email with a question on the encoding of the signal quality in MMS messages. Please find below the question and how the encoding is done in MMS made visible with the Wireshark:

Hello Karlheinz,

Hope everything fine and good health.

When we capture any MMS traces, we get correct information once we applied the setting "Set in PRES protocol preferences new u context item:

Context id: 3

Syntax Name OID: 1.0.9506.2.1"

But we can't get correct information in the quality bit information - it appear as Bitstring compressed of Padding & Bitstring.

How can we modify this Bitstring into Quality information.

Data: bit-string (4)

Padding: 3

bit-string: 0000

```

AccessResult: success (1)
  success: structure (2)
    structure: 3 items
      Data: structure (2)
        structure: 1 item
          Data: Floating-point (7)
            Floating-point: 083ddcb0bc
      Data: bit-string (4)
        Padding: 3
        bit-string: 0000
      Data: utc-time (17)
        utc-time: May 30, 2011 02:05:17.667968750 UTC
    
```

I am doing fine. Guess you saw the 0000 ... and ...

The encoding is correct. Here is an example with good quality and bad quality encodings

Good value:

IEDScout:

```

LN STMP1
  FC MX
    DO Tmp {{26}}, [00000000000000]
      DA mag {26}
        DA l 26
        DA q [00000000000000]
    
```

Corresponding MMS Read Response:

```

MMS
  confirmed-ResponsePDU
    invokeID: 98
    confirmedServiceResponse: read (4)
      read
        listOfAccessResult: 1 item
          AccessResult: success (1)
            success: structure (2)
              structure: 3 items
                Data: structure (2)
                  Data: bit-string (4)
                    Padding: 3
                    bit-string: 0000
                  Data: utc-time (17)
                    
```

0030 21 7f 57 75 00 00 03 00 00 33 02 f0 80 01 00 01
 0040 00 61 26 30 24 02 01 03 a0 1f a1 1d 02 01 62 a4
 0050 18 a1 16 a2 14 a2 03 85 01 1a 84 03 03 00 00 91
 0060 08 00 00 00 73 5a 3b 03 2a

Tag length value
 padding

Not good:

IEDScout:

LN STMP1
FC MX
DO Tmp [{845}, [1101000000000],
DA mag {845}
DA i 845
DA q [1101000000000] + 3 padding
DA t (001/01/1970_00:02:35.692,|
= 16

Corresponding MMS Read Response:

MMS
confirmed-ResponsePDU
invokeID: 99
confirmedServiceResponse: read (4)
read
listOfAccessResult: 1 item
AccessResult: success (1)
success: structure (2)
structure: 3 items
Data: structure (2)
structure: 1 item
Data: integer (5)
integer: 845
Data: bit-string (4)
Padding: 3
bit-string: d000
Data: utc-time (17)
utc-time: Jan 1, 1970 00:02:35.69247

130	21	06	6a	a0	00	00	05	00	00	34	02	70	80	01	00	01
140	00	61	27	30	25	02	01	03	a0	20	a1	1e	02	01	63	a4
150	19	a1	17	a2	15	a2	04	85	02	03	4d	84	03	03	00	00
160	91	08	00	00	00	9b	b1	45	e9	2a	—	—	—	—	—	—

1101: 0000 1000: 0000
10

Here is the quality encoding in 8-1:

Table 33 – Encoding of IEC 61850-7-3 quality

Bit(s)	IEC 61850-7-3		Bit-String	
	Attribute name	Attribute value	Value	Default
0-1	Validity	Good	0 0	0 0
		Invalid	0 1	
		Reserved	1 0	
		Questionable	1 1	
2	Overflow		TRUE	FALSE
3	OutOfRange		TRUE	FALSE
4	BadReference		TRUE	FALSE
5	Oscillatory		TRUE	FALSE
6	Failure		TRUE	FALSE
7	OldData		TRUE	FALSE
8	Inconsistent		TRUE	FALSE
9	Inaccurate		TRUE	FALSE
10	Source	Process	0	0
		Substituted	1	
11	Test		TRUE	FALSE
12	OperatorBlocked		TRUE	FALSE

d0 = 1101 ...

first 11 means: Questionable

second 1 means: OutOfRange

Hope that helps.

Best Regards,
Karlheinz

Hope that give some deep inside knowledge for those that analyze the MMS message exchange needed for IEC 61850-8-1.

Posted by [Karlheinz Schwarz](#) at 11:05 PM No comments: 

Labels: [ASN.1](#), [BER](#), [Encoding](#), [IEC 61850](#), [IEC 61850-8-1](#), [MMS](#), [quality](#)

Telecommunication and IEC 61850 for power distribution systems

More often distribution utilities are looking into the future information and communication infrastructure. One example is the Flexible Plug and Play (FPP) project in Great Britain:

“The challenge

Distribution Network Operators in Great Britain face the challenge of accommodating high concentrations of renewable generation connections on to the network. Where there is high demand of connection requests, the connection can be costly and time consuming. Flexible Plug and Play will address this. ...

At the heart of Flexible Plug and Play will be a new **Telecommunications Platform**. This platform, which is formed of a high-speed communications and radio frequency mesh network (similar to wi-fi), will enable the integration of Flexible Plug and Play smart technologies and systems. It will facilitate the data exchange and control capability to implement the technical and commercial solutions which will manage the network constraints to enable an increase in the renewable generation connections and the renewable generator developers to export on to the distribution network.

The smart technologies will communicate with each other using open standard data protocol defined by the International Electrotechnical Commission (IEC). The protocol is commonly called the **IEC 61850 and is an international standard for data communications between smart devices and information systems for electricity networks.**
..."

Click [HERE](#) to get an overview about the project.

Click [HERE](#) for downloading a nice and comprehensive presentation on the history and the plans for the future ... including the use of IEC 61850 for use in power distribution systems. [pdf, 87 pages, 10 MB]

Posted by [Karlheinz Schwarz](#) at [7:41 AM](#) [No comments:](#) 

Labels: [distribution automation](#), [iec 60870-5](#), [IEC 61850](#), [telecommunication](#)

Saturday, July 13, 2013

IEC 61850: Phoenix Contact offers special Ethernet Ring Solution

Phoenix Contact (Germany) published a paper "[IEC 61850 verknüpft Energie- und Automatisierungsnetz](#)" (IEC 61850 connects Energy Networks and Automation Networks) in the latest issue of the Magazine Computer & Automation (July 2013).

IEC 61850 is understood as a huge benefit in the energy delivers system because it is accepted globally.

Phoenix Contact offers special Managed industrial Ethernet switches that combine extensive network performance and security features with complete IEEE redundancy (STP/RSTP/MST) and 15 ms recovery time **extended ring redundancy**.

The extended ring redundancy is offered as a cost-effective redundancy solution – compared to solutions based on PRP and HSR.

Click [HERE](#) for further information on the IEC 61850-3 compliant Ethernet Switches.

Posted by [Karlheinz Schwarz](#) at [5:56 AM](#) [No comments:](#) 

Labels: [Ethernet switches](#), [IEC 61850](#), [Phoenix Contact](#), [real-time](#), [redundancy](#), [RSTP](#)

Thursday, July 11, 2013

Easy Gateway for ZIGBEE to IEC 61850

The Beck IPC Development Kit DK61 seems to be one of the favorite platforms for building gateways between several protocols and IEC 61850. A gateway between ZIGBEE and IEC 61850 has been developed by a master student in Poland.

Dominik Nowak (AGH University of Science and Technology, Krakow, Poland) has developed a ZigBee-to-IEC61850 bridge. It is designed to meet IEC61850 standard requirements and to connect ZigBee network to a substation automation system. The architecture is shown in the following excerpt:

4.1.2. Hardware components of a ZigBee-to-IEC61850 bridge.

Figure 4.2 presents hardware components used in the "WSN network" IED. The most important part of the IED is a ZigBee-to-IEC61850 bridge which is in scope of this work. The prototype design is based on Development Kit DK61, provided by Beck IPC GmbH. It contains IPC@CHIP SC143 Embedded Web Controller. The kit is shipped with Paradigm C++ compiler and tools for developing applications. To make an IEC 61850 compliant device, it's best to use proven and reliable hardware and software components and tools. Beck IPC GmbH company offers reliable industrial control technology and communication products. They provide IEC61850 libraries suited to the SC143, which have been used in the project.

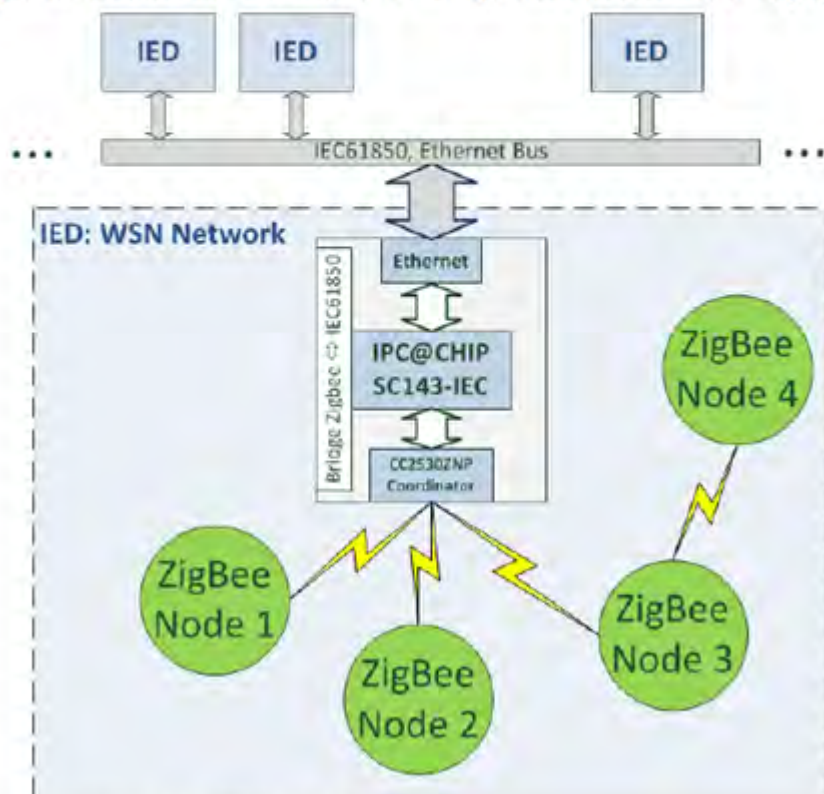


Figure 4.2. Components of the "WSN Network" IED.

Click [HERE](#) for the pdf file of the mater thesis [2.8. MB].

The thesis describes to some extent how to build such a gateway with the Beck IPC Chip.

Posted by [Karlheinz Schwarz](#) at 9:49 AM No comments:

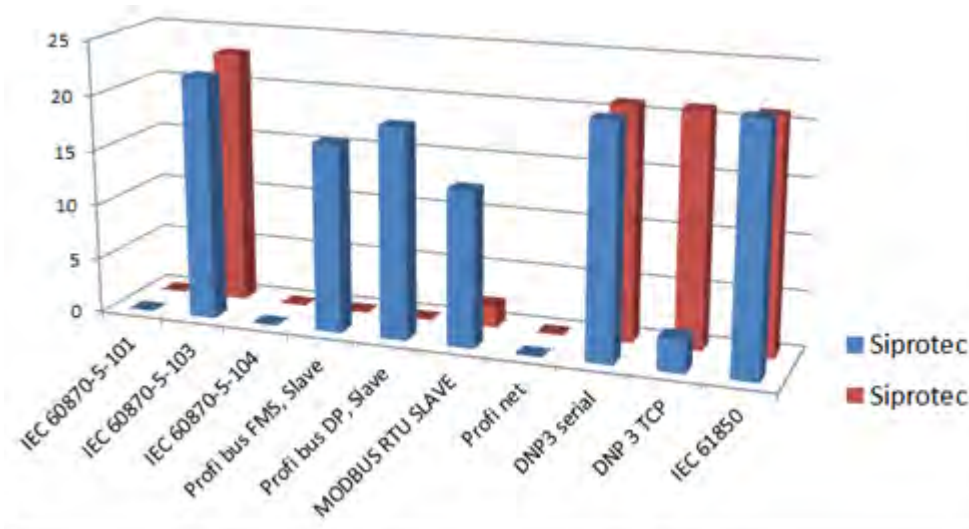
Labels: [Beck Chip](#), [Gateway](#), [IEC 61850](#), [ZIGBEE](#)

Wednesday, June 26, 2013

Communication solution for Siprotec 4 and 5

The Siemens Siprotec solutions support usually several solutions for communication interfaces. The following list shows which communication solutions are supported by Siprotec 4 and Siprotec 5 devices:

	Siprotec 4	Siprotec 5
IEC 60870-5-101	0	0
IEC 60870-5-103	22	23
IEC 60870-5-104	0	0
Profi bus FMS, Slave	17	0
Profi bus DP, Slave	19	0
MODBUS RTU SLAVE	14	2
Profi net	0	0
DNP3 serial	21	21
DNP 3 TCP	3	21
IEC 61850	22	21



According to Siemens comprises the installed base of Siprotec devices about one million devices and some **250,000 with IEC 61850**. As you can see, the Siprotec 5 does (not yet) support IEC 60870-5-104*, not any more FMS, DP, and Profinet.

* under development for Siprotec 5.

Source (dated 2013):

[Selection Guide for SIPROTEC Edition 2](#)

The number devices with IEC 61850 interface is growing very fast. Recently experts from two German utilities told me that they expect that in some time down the road even 104 will not anymore be offered by major manufacturers.

Posted by [Karlheinz Schwarz](#) at 7:21 AM No comments:

Labels: [DNP3](#), [iec 60870-5](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#), [Profibus](#), [Siemens](#), [SIPROTEC 4](#), [SIPROTEC 5](#)

Friday, June 14, 2013

Guideline for Time Stamping of Operational Data Logs

NERC has published a Guideline to describe minimum recommendations for maintaining accurate time stamp indications for logged events on the bulk power system.

Security Guideline for the Electricity Sector: Time Stamping of Operational Data Logs

[Click HERE to download the complete NERC document.](#)

This is a document worth to read!

Posted by [Karlheinz Schwarz](#) at [2:21 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [NERC](#), [time stamp](#), [time synchronization](#)

End-to-end quality codes for SADA Signals

IEC TC 57 has published the 49 page final draft standard IEC 62361-2 (57/1374/FDIS):

Power systems management and associated information exchange –
Interoperability in the long term –

Part 2: **End-to-end quality codes for supervisory control and data acquisition (SCADA)**

The ballot closes 2013-08-09.

What does this FDIS provide?

It lists the quality codes of the following standards and provides a mapping between them:

- IEC 61850
- IEC 60870-5-101/104
- IEC 60870-6 TASE.2
- DAIS DA
- OPC DA

There could be the following series of standards involved from IEDs to a CC:

IEC 61805 -> IEC 60870-5-104 -> IEC 61970 -> IEC 60870-6 -> IEC 61970

Good luck!

This standard will help to reach a standardized mapping!

Posted by [Karlheinz Schwarz](#) at [1:52 AM](#) [No comments:](#) 

Labels: [iec 60870-5](#), [IEC 60870-6](#), [IEC 61850](#), [IEC 61970](#), [quality](#), [SCADA](#)

Wednesday, June 5, 2013

First Draft on how to use IEC 61850 models in substations (IEC 61850-7-500)

IEC TC 57 has recently published a first Draft IEC TR 61850-7-500 – Use of logical nodes for modelling applications and related concepts and guidelines for substations (57/1371/DC). The document comprises almost 60 pages.

Comments are requested by 2013-07-12 at the latest.


The technical report is intended to provide guidelines and explanations, how the logical nodes defined in IEC 61850-7-4 shall be combined and used to model applications from substation automation domain.

A crucial goal is to show the most common application of Logical Nodes in modelling simple and complex functions, to **improve common understanding in modelling and data exchange**, and finally to lead

to implementations which keep at least interoperability.

For those people that are interested in process bus applications, it is highly recommended that you review that document!

[If you are interested in this work, please contact your national mirror committee of TC 57.](#)

Posted by [Karlheinz Schwarz](#) at [3:09 AM](#) [No comments:](#) 

Labels: [control](#), [how to use](#), [iec 61850-7-500](#), [model extensions](#), [process bus](#), [protection](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Wednesday, June 5, 2013

First draft for IEC 61850-90-3 (Condition Monitoring)

IEC TC 57 has recently published a first Draft IEC TR 61850-90-3 – Using IEC 61850 for condition monitoring diagnosis and analysis (57/1372/DC). The document comprises almost 200 pages. Comments are requested by 2013-07-12 at the latest

Domains covered are among others: monitoring of GIS, transformers, load tap changers, underground cables, transmission lines and the auxiliary power system ... proposing **a few new Logical Nodes and about 200 new Data Objects extending existing Logical Nodes** of, e.g. IEC 61850-7-4 Edition 2.

[If you are interested in this work, please contact your national mirror committee of TC 57.](#)

Posted by [Karlheinz Schwarz](#) at 2:45 AM [No comments:](#) 


Labels: [condition monitoring](#), [IEC 61850-90-3](#)

IEC 61850-90-14 for FACTS (Flexible AC Transmission Systems) – Project started

The work on IEC 61850-90-14 FACTS (Flexible AC Transmission Systems) data modeling (Using IEC 61850 for FACTS data modeling) has been started recently.

There is a lot of interest in this area. A first draft is expected by end of 2013.

[If you are interested in this work, please contact your national mirror committee of TC 57.](#)

Posted by [Karlheinz Schwarz](#) at 2:30 AM [No comments:](#) 

Labels: [FACTS](#), [IEC 61850-90-14](#)

Störmelder mit IEC 61850 – kostenlose eintägige Schulung

Die Firma EES in Backnang bietet ein kostenloses praxisnahes eintägiges Seminar zum Thema "Integration von Störmeldern in IEC 61850 Strukturen" an.

IEC 61850 ist Standard in der Stationsautomatisierung. Mit dem USM61850 stellt EES einen Störmeldebaukasten mit IEC61850-Schnittstelle vor, der z.B. als „Lumpensammler“ in der Stationsautomatisierung eingesetzt werden kann.

Im Seminar werden im ersten Teil Grundlagen der IEC61850,

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[IEC 61850-90-14 for FACTS \(Flexible AC Transmissio...](#)

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Unterschiede zu IEC61850-101/104, Datenmodellierung und Systembeschreibung erläutert. Im praxisorientierten Teil 2 werden Funktion, Parametrierung und Ankopplung des Störmeldbausteins USM61850 an die Leittechnik dargestellt.

Das Seminar findet am 13.6.2013 in Backnang statt. Weitere Informationen finden Sie unter <http://www.ees-online.de/>

Posted by [Karlheinz Schwarz](#) at 1:49 AM No comments: 

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [seminar](#), [Störmelder](#)

Tuesday, May 28, 2013

Energiewende gelingt mit IEC-Normen und guter Ausbildung

Die DKE – Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE dient als moderne, gemeinnützige Dienstleistungsorganisation der sicheren und rationellen Erzeugung, Verteilung und Anwendung der Elektrizität und so dem Nutzen der Allgemeinheit. Sie ist das Kompetenzzentrum für elektrotechnische Normung in Deutschland.

„Die DKE gestaltet die Energiewende aktiv mit. Durch Normen und Standards, die neue Märkte öffnen und Innovationen ermöglichen. Mit der [Initiative Energiewende 180°](#) bieten wir Unternehmen und Institutionen mit ihren vielfältigen Innovationen zur Energiewende ein Forum.“ (Dr. Thies, DKE)

Die Kraft der Normung entfaltet sich durch Aktivitäten, die den Dialog fördern, Kompetenz sichern und Engagement stärken. Deshalb hat die DKE die Initiative Energiewende 180° ins Leben gerufen.

In diesem Sinne hat sich die NettedAutomation HmbH mit einem Beitrag am Kompendium Energiewende 180° beteiligt:

[Energiewende gelingt mit IEC-Normen und guter Ausbildung](#)

Posted by [Karlheinz Schwarz](#) at 8:31 PM No comments: 

Labels: [Energiewende](#), [IEC 61850](#), [IEC Normen](#), [Schulung](#), [Smart Grid](#)

Wednesday, May 22, 2013

How Secure is the Information Technology for Electric Grids?

Are you surprised that there are many Security Gaps? Guess just a few experts are surprised that there are crucial Gaps! Why? Security is not a business case for utilities. Security measures are – in the eyes of many responsible people – just producing costs without helping to increase the shareholder value ... as long as no serious attack happens.

A new US congressional survey has brought a lot of serious details and facts to light:

Electric Grid Vulnerability – Industry Responses Reveal Security Gaps

[Click HERE for the complete Report published yesterday \(May 22, 2013\) \[pdf\]](#)

I hope that the “EnergieWende” will not loose its “W” and end in an

► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

“EnergieEnde”. We are about to risk loosing the “W” ... Or?

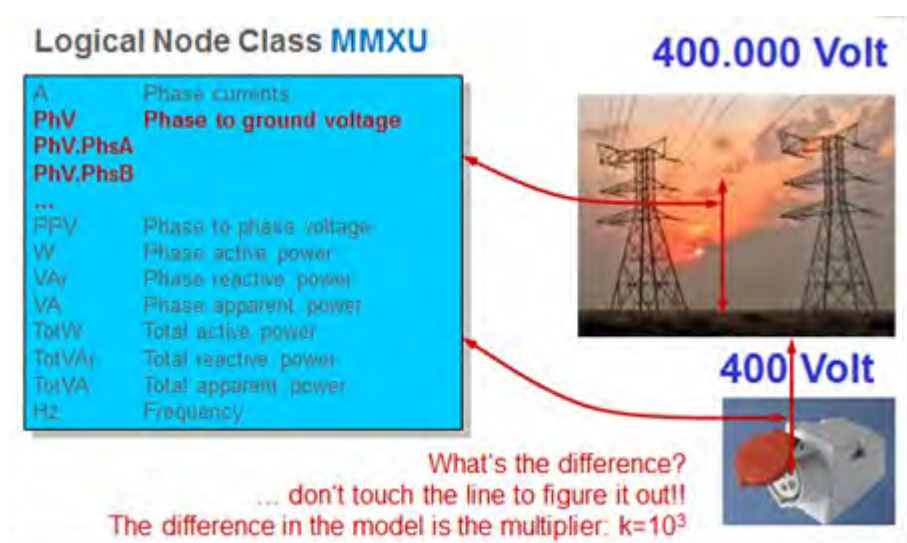
Posted by [Karlheinz Schwarz](#) at [12:14 PM](#) [1 comment:](#) 

Labels: [Energiewende](#), [security](#), [vulnerability](#)

Semantic Models of IEC 61850 raise Interest in OPC UA Domain

One of the first true international standards in the domain of automation that defines rich semantic models is IEC 61850: LogicalNodes containing DataObjects containing DataAttributes ... etc.

Example:



IEC 61850 models of all almost all application domains have been converted to UML (Enterprise Architect). The interest in the many crucial semantic models of IEC 61850 is growing all over!

From the UML representation of the IEC 61850 based class-models it is now possible to generate OPC UA Address Spaces!

UMLbaT—UML based Transformation

UMLbaT is an extension, a so-called Add-In, for Sparx Enterprise Architect. The Add-In is an advancement of existing CIMbaT (CIM based Transformation). With CIMbaT it is possible to generate OPC UA Address Spaces from CIM based class-models. **Now, with UMLbaT, it's also possible to create OPC UA Address Spaces from IEC 61850 based class-models.**

[Visit the UMLbaT website \(OFFIS Oldenburg\) to get more details on the transformation.](#)

Usually the various fieldbus consortia define fieldbus-specific “models” ... not allowing interoperability at semantic level between different fieldbusses. IEC 61850 semantic models could now be accessed by MMS (as defined in IEC 61850-8-1) and OPC UA. The mapping of IEC 61850-7-2 ACSI to OPC is under discussion and may be published as IEC 61850-8-2.

In the mid 90s we had already a document IEC 61850-8-2 (SCSM: Mapping to Profibus FMS). [See also discussion on further mappings in IEC 61400-25-4.](#)

Let me know what you think about the transformation. Thanks.

Posted by [Karlheinz Schwarz](#) at [11:50 AM](#) [No comments:](#) 

Labels: [ACSI](#), [iec 61400-25-4](#), [IEC 61850-7-2](#), [IEC 61850-8-1](#), [mapping](#), [MMS](#), [OPC UA](#)

Many ISO standards for free download

Some people complain that ISO standards are expensive ... there are many ISO standards available for free download from ISO:

<http://standards.iso.org/ittf/PubliclyAvailableStandards/index.html>

... it may be quite late for widespread use of ISO/OSI standards ...

Here are some direct links to standards related to IEC 61850, MMS, ASN.1, ...

[ISO/IEC 7498-1:1994](#)

Information technology -- Open Systems Interconnection -- Basic Reference Model: The Basic Model

[ISO/IEC 7498-3:1997](#)

Information technology -- Open Systems Interconnection -- Basic Reference Model: Naming and addressing

[ISO/IEC 7498-4:1989](#)

Information processing systems -- Open Systems Interconnection -- Basic Reference Model -- Part 4: Management framework

[ISO/IEC 8824-1:2008](#)

Information technology -- Abstract Syntax Notation One (ASN.1): Specification of basic notation

[ISO/IEC 8825-1:2008](#)

Information technology -- ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)

[ISO/IEC 8825-4:2008](#)

Information technology -- ASN.1 encoding rules: XML Encoding Rules (XER)

[ISO/IEC 9834-1:2008](#)

Information technology -- Open Systems Interconnection -- Procedures for the operation of OSI Registration Authorities: General procedures and top arcs of the International Object Identifier tree

... and many other standards.

Posted by [Karlheinz Schwarz](#) at [11:16 AM](#) [No comments:](#) 

Labels: [free download](#), [ISO](#), [iso 7498](#), [iso 9506](#), [osi](#), [standards](#)

What does the OSI-AP-Title "1,3,9999" mean?

Is this identifier more than just a number defined by somebody from IEC TC 57 WG 10? No! The underlying definition is the "OSI Object Identifier model" (OID). This numbering schema has been defined some 30 years ago in the context of ASN.1.

MMS and MAP 3.0 used this identifier concept to get unique object

identification (see MAP 3.0). The basics of MMS and OSI have been defined in the 80's ... and a lot of people are still (and again and again) struggling with these concepts that have no real use these days. The concept of OIDs is great – just we do not make use of it in the domain of IEC 61850.

Many people I have trained and many other people have no clue what these numbers mean and what purpose they serve.

"In computing, an object identifier or OID is an identifier used to name an object (compare URN). Structurally, an OID consists of a node in a hierarchically-assigned namespace, formally defined using the ITU-T's ASN.1 standard, X.690. Successive numbers of the nodes, starting at the root of the tree, identify each node in the tree. Designers set up new nodes by registering them under the node's registration authority. The root of the tree contains the following three arcs:

0: ITU-T

1: ISO

2: joint-iso-itu-t"

(from http://en.wikipedia.org/wiki/Object_identifier)

The OID is used by ACSE to establish an application association ... for MMS.

Definition in IEC 61850-8-1 Edition2:

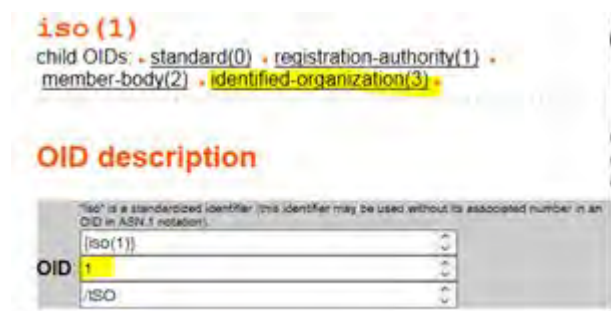
OSI-AP-Title	OSI ACSE AP title value	o	The value shall be quoted and per th specified for OSI Object Identifiers. T set shall be limited to 0 to 9 and com
--------------	-------------------------	---	---

Example in SCL notation:

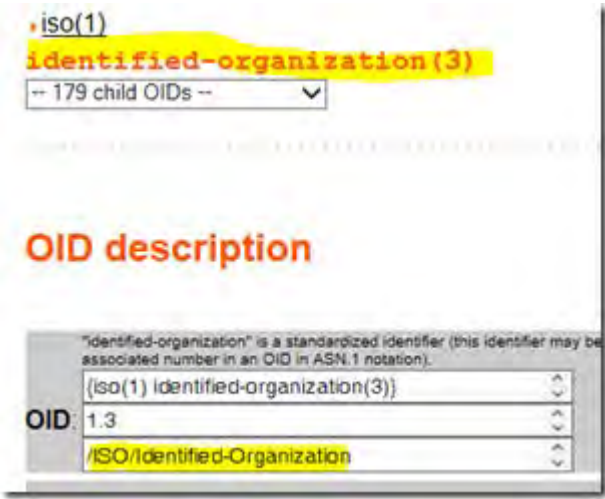
```
<Address>
<P type="IP" xsi:type="tP_IP">10.0.0.11</P>
<P type="IP-SUBNET" xsi:type="tP_IP-SUBNET">255.255.255.0</P>
<P type="IP-GATEWAY" xsi:type="tP_IP-GATEWAY">10.0.0.101</P>
<P type="OSI-AP-Title" xsi:type="tP_OSI-AP-Title">1.3.9999.23</P>
<P type="OSI-AE-Qualifier" xsi:type="tP_OSI-AE-Qualifier">23</P>
<P type="OSI-TSEL" xsi:type="tP_OSI-TSEL">00000001</P>
<P type="OSI-PSEL" xsi:type="tP_OSI-PSEL">01</P>
<P type="OSI-SSEL" xsi:type="tP_OSI-SSEL">01</P>
</Address>
```

Here is the meaning of the values "1", "3", and "9999" for the OSI-API-Title according to <http://oid-info.com>:

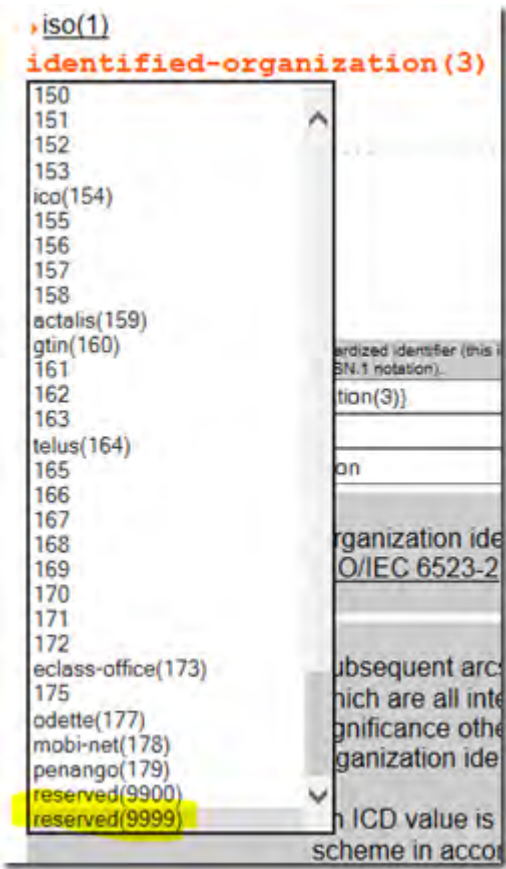
"1" -> <http://oid-info.com/cgi-bin/display?oid=1&action=display>



"3" -> <http://oid-info.com/get/1.3>



"9999" -> <http://oid-info.com/get/1.3.9999>



The value is a reserved value ->

iso(1) identified-organization(3)
reserved(9999)

OID description

- Format of this page
- Modify this OID
- Create a child OID
- Create a brother OID

OID:

(iso(1) identified-organization(3) reserved(9999))	^
1.3.9999	v
ISO-identified-Organization.9999	v

(ASN 1 notation)

(dot notation)

(OID-IRI notation)

Description: Reserved ICD value

Information: Interchanging partners may want, by prior agreement, to interchange organization identifiers allocated by an identification scheme to which an ICD value has been assigned, or for which the assignment of an ICD value is pending. The range of ICD values between 9900 and 9999 is reserved for that effect. The interchange partners shall agree on the identification of the identification scheme, using one of the above reserved values.

For more information, see [ISO/IEC 6523-1](#), clause 5

IEC 61850 and especially IEC 61850-8-1 does not (yet?) use the registration of further identifier for specific application.

So, applications (servers) need to use the "1,3,9999.13" to allow MMS/ACSE to establish an application association! Please make sure that your client uses the correct setting of this and the other configuration attributes in the address.

The last value "13" is not known to me ... could not find any hint on that. It is not registered.

Please do not change this OID "1,3,9999" used by MMS. The value "1,3,9999.13" is used as an example in 8-1 Ed2. The "13" may be replaced or omitted – I guess.

The value could be empty as well. The following attributes are all optional (IEC 61850-8-1 Ed2):

OSI-AP-Title	OSI ACSE AP title value	o
OSI-AP-Invoke	OSI ACSE AP invoke ID	o
OSI-AE-Qualifier	OSI ACSE AE qualifier	o
OSI-AE-Invoke	OSI ACSE AE invoke ID	o

These are mandatory:

OSI-TSEL	OSI transport selector	m
OSI-SSEL	OSI session selector	m

OSI-PSEL	OSI presentation selector	m
----------	---------------------------	---

Some vendors fix the values ion their PIXIT documents:

Example 1 (Alstom Mx70):

5.3.4 Association parameters

The following parameters are required to be specified when attempting to initiate an association with Mx70 IEDs:

Parameter	Value
Transport selector (tse/)	00 01
Session selector (sse/)	00 01
Presentation selector (pse/)	00 00 00 01

The following parameters are only required if write permission should be granted. The values are not checked, only the presence of the parameters is used to grant complete write permission. Unless both parameters are present, writes to many objects are disallowed.

Parameter	Value
AP Title	1,3,9999,10 6
AE Qualifier	33

Example 2 (ABB COM600):

Addresses		
IP Address	127.0.0.1	IEC 61850 Node Number of the device
OSI ACSE AE Qualifier	23	IEC 61850 Subnet Number of the device
OSI ACSE AP Title Value	1,3,9999,23	OSI ACSE AP Title Value as defined in IEC 61850-8-1.
OSI Presentation Selector	00000001	OSI Presentation Selector as defined in IEC 61850-8-1.
OSI Session Selector	0001	OSI Session Selector as defined in IEC 61850-8-1.
OSI Transport Selector	0001	OSI Transport Selector as defined in IEC 61850-8-1.

Example 3 (Siprotec):

What called association parameters are necessary for successful association ?	Transport selector Y Session selector Y Presentation selector Y AP Title ANY AE Qualifier ANY Where Y means: as defined within the ICD-File ANY means: any value accepted
---	--

Please check the documentation of the vendors’ IEDs to figure out how the various attributes are used and which ones are required!

Good luck!

Posted by [Karlheinz Schwarz](#) at 6:21 AM No comments: 

Labels: [Addresses](#), [ASN.1](#), [IEC 61850](#), [IEC 61850-8-1](#), [ISO](#), [iso 9506](#), [MMS](#), [OID](#), [osi](#)

Wednesday, May 15, 2013

Another draft standard that “copies” IEC 61850
Logical Nodes

ISO/TC 205/WG 3 (Building Automation and Control System (BACS))

Design) has published recently a new work proposal on **power system information models** [ISO/TC 205 / SC N 410].

Title: Facility Smart Grid Information Model

Purpose and justification of the proposal:

"The purpose of this standard is to define an abstract, object-oriented information model to enable appliances and control systems in homes, buildings, and industrial facilities to manage electrical loads and generation sources in response to communication with a "smart" electrical grid and to communicate information about those electrical loads to utility and other electrical service providers.

This proposed standard will define an information model intended to provide a basis for revision or creation of technology- specific communication protocol standards that enable products and services to control the operation of electrical energy generating and consuming devices found in homes, commercial buildings, institutional buildings, and in manufacturing and industrial facilities, in cooperation with energy providers in a "smart grid" environment."

The new work item proposal states that "This proposal builds upon work done by IEC/TC 57 Power Systems Management and Associated Information Exchange ... There is no known conflict with an existing IEC or ISO standard or project."

There may be no conflict ... the proposal (same as Draft standard BSR/ASHRAE 201P) "copies" Logical Nodes from IEC 61850 and modifies the Data Object names. For example:

Excerpt from Draft standard BSR/ASHRAE 201P:

5.7.3.3.1.5. DEROperationalModeControls

Operating mode at the ECP.
Control of the operational modes of the DER – constant watts, constant vars, ...More than one mode can be set simultaneously for certain logical combinations (61850
Logical Node = DOPM).
Parent Class(es): CommonLN
UML element location: Model Elements from External
Sources.IEC61850.61850-7-420. DEROperationalModeControls.

Table 5.193 - Class Attributes

Data Object	Description
OperationalModeConstantW	Mode of operation - constant
OperationModeConstantPowerFactor	Mode of operation - constant factor.
OperationModeConstantV	Mode of operation - constant voltage.

Excerpt from Standard IEC 61850-7-420 (LN DOPM):

Data Object	Description
OpModConW	Mode of operation – constan watts
OpModConPF	Mode of operation – constan power factor
OpModConV	Mode of operation – constan voltage

So, changing the names from abbreviated names to full text names makes it another standard information model ... why? If other groups "copy" the Logical Nodes and Data Objects they should keep the names ... Or?

I guess the main reason for this is:

Genesis 11:9 "Therefore, it is named Babel, because there the LORD **mixed up the language of all the earth.**" ... languages spoken by humans and by computers!

Posted by [Karlheinz Schwarz](#) at [12:45 AM](#) [1 comment:](#) 

Labels: [BACnet](#), [building automation](#), [data object](#), [IEC 61850](#), [ISO](#), [logical node](#)

Tuesday, May 14, 2013

English Version of Vattenfall's "VHP READY – Virtual Heat & Power Ready" available

Vattenfall Europe Wärme AG (Berlin, Germany) has published the famous specification "VHP READY" for information exchange in virtual power plants based on IEC 60870-5-104 respectively IEC 61850-7-420.

In order to integrate renewable energies into the power supply system successfully and economically, ways must be found to store and control them. The Virtual Power Plant, which stores energy in the form of heat, is a promising approach to solving this problem. With this technology, modern heating systems can also help to integrate renewable energies into the power supply cost-efficiently and accelerate the "Energy Transition".

Data transmitted between a plant and the central control system via IP networks are encrypted either according to the **IEC 60870-5-104** standard or the **IEC 61850 series** of standards (IEC 61850-7-420 in particular). Time synchronization is via SNTP/NTP. The following protocols are used for communication:

- either IEC 60870-5-104 or IEC 61850 / 61850-7-420
- TCP/IP
- SSL/TLS
- SNTP/NTP


[Download the specification 3.0 in English](#) [pdf]

[Download the specification 3.0 in German](#) [pdf]

The approach used in the specification is exactly what needs to be done for many other applications domains: define the profile to be implemented in such a detail that no or just very few options are left!!

The specification needs some more details to be published: the complete details of the information model as an SCL file. Currently the models are partly specified in SCL ... the LNs and DOs are just listed in a table. The next version will have more details. And it is very likely that other resources like PV ... will be included in version 4 as well.

Congratulation to Vattenfall for this promising approach!

Posted by [Karlheinz Schwarz](#) at [8:20 AM](#) [No comments:](#) 

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [IEC 61850-7-420](#), [Vattenfall](#), [virtual power plant](#)

Wednesday, May 1, 2013

Optical Fibre for Temperature Measurement in Power Systems

Optical fibres are known to be used in power systems because they withstand the rough conditions in high voltage environments – as such they are used in Substations for carrying messages, e.g., according to IEC 61850.

There is another very interesting use case of optical fibres in power systems: in generation, transport, distribution, and loads. One of the crucial measurements that can be applied to more efficiently use of electric power is measuring temperatures. But you may state that installing a lot of temperature sensors could be quite expensive!

With the application of optical fibre for measuring temperatures it seems to be a very promising approach to reduce the amount of power needed for many critical process like in huge data centers, high voltage lines and cables, transformers, switch gears, to name a few.

According to [alquist \(a UK based company specializing on measurement systems using fibres\)](#) there are many advantages of fibre as a temperature sensor:


- Simultaneously measures temperature and position over long distances
- Low cost – the sensor is made from standard 50/125 optical fibre zip cord - very cost effective
- Immune to shock/vibration and electromagnetic interference
- No electronics, wireless, batteries or moving parts in monitoring zone. Totally passive, minimal maintenance.
- Inherent high reliability (fibre has a design life of 30+ years)
- High temperature range -200°C to +500°C
- Extremely small for access in legacy areas with restricted space
- Easily installed in without any downtime or interruption of service

There are an incredible number of applications for fibre optics beyond their use as a simple communications links.

[Download a very useful presentation given by Andrew Jones \(alquist\) \[pdf, 2.8 MB\]](#)

The availability of myriads of “measurement signals” from various processes allows to more efficiently use energy, i.e., to reduce the amount of energy we need to consume to service our needs for modern life.

What ever will be measured in energy supply systems could be modeled and communicated with IEC 61850 – The Communication Standard for power system automation. One crucial focus of IEC 61850 is on measurements!

Posted by [Karlheinz Schwarz](#) at [12:20 AM](#) [No comments:](#) 

Labels: [energy efficiency](#), [IEC 61850](#), [measurements](#), [monitoring](#), [power management](#), [power systems](#), [temperature monitoring](#)

Friday, April 19, 2013

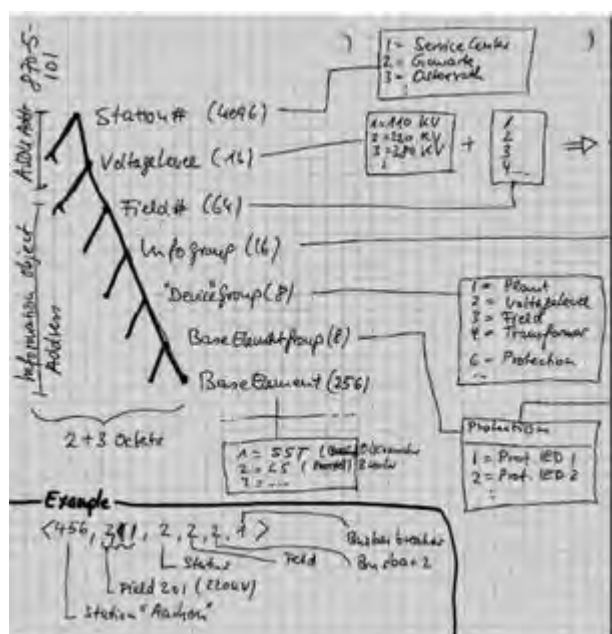
Is IEC 61850 still there?

A very interesting discussion was started by a retired substation protection and automation engineer from one of the big German transmission operators. The engineer stopped at the boot 45/1 (hall 13) at the Hannover Messe last week. He saw the letters “IEC 61850” (see

photo) and asked me: "Is IEC 61850 still around?"



He thought that IEC 61850 was just a hype some 10 years ago. His expectation was that IEC61850 is far to complex and expensive ... and disappeared before it really hit the market. One of his babies was a very well know IEC 60870-5-101 profile for substation automation. In this profile you will find a nice "information model" of substations:



Ok, that is what many (not only retired) engineers guess. I helped him to understand the current situation of the big success of IEC 61850 all over.

Then I showed him an embedded Controller IED (Beck com.tom) that integrates IEC 61850 AND IEC 610870-5-104 (running separate or both at the same time):



This small box runs both ... and it's really affordable.

Then I showed him the requirement specification of Vattenfall's VHP Ready that specifies both: IEC 60870-5-104 and IEC 61850:

Index
↓

Modul	Signal zur Zentrale	Zahlenformat	IEC 60870-5-104		Einheit	Be
			APDU	IOA		
BHKW	Erzeugte elektrische Arbeit der abgelaufenen Viertelstunde	Gleitkommazahl	36 (M_ME_TF_1)	111	kWh	
	Erzeugte thermische Arbeit der abgelaufenen Viertelstunde	Gleitkommazahl	36 (M_ME_TF_1)	112	kWh	
	Aktuell erzeugte elektrische Leistung (zum Zeitpunkt der Abfrage/Übermittlung)	Gleitkommazahl	36 (M_ME_TF_1)	113	kW	

↙

Modul	Signal zur Zentrale	Zahlenformat	IEC 61850-7-420						Ein
			Logical Device	Logical Node	LN Instance	Funct. Constr.	Data Object	Data Attribute	
BHKW	Erzeugte elektrische Arbeit der abgelaufenen Viertelstunde	Double	IEDM1CPUB HKW	MMTR	1	ST	TotWh	actVal	kWh
	Erzeugte thermische Arbeit der abgelaufenen Viertelstunde	Double	IEDM1CPUB HKW	MMET	1	MX	AccretionOut	instMag	kWh
	Aktuell erzeugte elektrische Leistung (zum Zeitpunkt der Abfrage/Übermittlung)	Double	IEDM1CPUB HKW	MMXU	1	MX	TotW	instMag	kW

model
⏟

There is almost no difference between the implementation of the information and services in both worlds. The difference is just, that IEC 61850 has **standard models**, a **configuration language**, **GOOSE**, **SMV**, and **self-description**. The price of a com.tom with 104 or 61850 is (I guess) the same.

Finally he said: "I am a consultant to a manufacturer of substation automation and protection systems; I have to tell them this story! They will like it – because they have already enquiries for IEC 61850 conformant IEDs."

There is a need to educate more engineers to understand the situation!

Posted by [Karlheinz Schwarz](#) at [12:51 AM](#) [No comments:](#) 

Labels: [configuration](#), [GOOSE](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [information exchange](#), [Information Model](#), [Smart Grid](#), [smart solution](#), [Vattenfall](#)

Thursday, April 18, 2013

High speed wireless support for IEC 61850 GOOSE

Full Spectrum Inc. (Palo Alto, California) announced yesterday a new version of its wireless communications software which supports the utility industry's IEC 61850 Generic Object Oriented Substation Event protocol (also known as "GOOSE"). The protocol is designed to reduce the scope and impact of power outages by implementing instantaneous and intelligent switching decisions without human intervention. It is a critical element in the implementation of the self-healing smart grid. To date IEC 61850 has been deployed primarily at electric utility substations over high capacity fiber connections. The challenge, until now, has been to operate the high capacity, low latency protocol over wireless infrastructure. Full Spectrum's IEC 61850 wireless support includes custom compression and quality of service algorithms to address this challenge.

Full Spectrum's new software release **allows the IEC 61850 protocol to be pushed deep into the distribution electric grid where wired infrastructure is not cost effective to install and maintain.** With IEC 61850 intelligent devices along the distribution grid, sensors can isolate faults and reroute power almost instantaneously. **The implementation of IEC 61850 greatly reduces the number of customers impacted by outages.** This is especially important for industrial and commercial power users where even brief power outages can be costly and dangerous.

[Click HERE to download the press release on GOOSE.](#)

Posted by [Karlheinz Schwarz](#) at [7:44 AM](#) [No comments:](#) 

Labels: [distribution automation](#), [GOOSE](#), [IEC 61850](#), [wireless](#)

Italian Norm CEI 0-16 revised – now referring to IEC 61850

The Italian Norm CEI 0-16 has been revised and published end of 2012. The new norm (**High and Medium Voltage**) refers to IEC 61850 – similar compared to CEI 0-21 (**Low Voltage**). The norm even requires GOOSE messaging ... more to come.

Title:

Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti AT ed MT delle imprese distributrici di energia elettrica

(Reference technical rules for the connection of active and passive consumers to the HV and MV electrical networks of distribution Company)

[Click HERE to download the norm CEI 0-16 \[Italian, pdf, 3.1 MB\]](#)

[Click HERE for Information on CEI 0-21.](#)

Posted by [Karlheinz Schwarz](#) at 3:35 AM No comments: 

Labels: [distribution](#), [GOOSE](#), [high voltage](#), [IEC 61850](#), [Italy](#), [low voltage](#), [medium voltage](#)

The German Roadmap E-Energy/Smart Grid 2.0 available

The German Roadmap E-Energy/Smart Grid 2.0 has been published recently. The 82 page document gives an overview about the status of many projects that had been involved in recent years: IEC, DKE, ...

One key standard mentioned more than 20 times is (of course): IEC 61850. The Web2Energy project is introduced as a project that intensively uses IEC 61850.

[Download the German Roadmap E-Energy/Smart Grid 2.0 \(English version\) \(pdf, 8.5 MB\)](#)

[Download the German Roadmap E-Energy/Smart Grid 2.0 \(German version\) \(pdf, 4.3 MB\)](#)

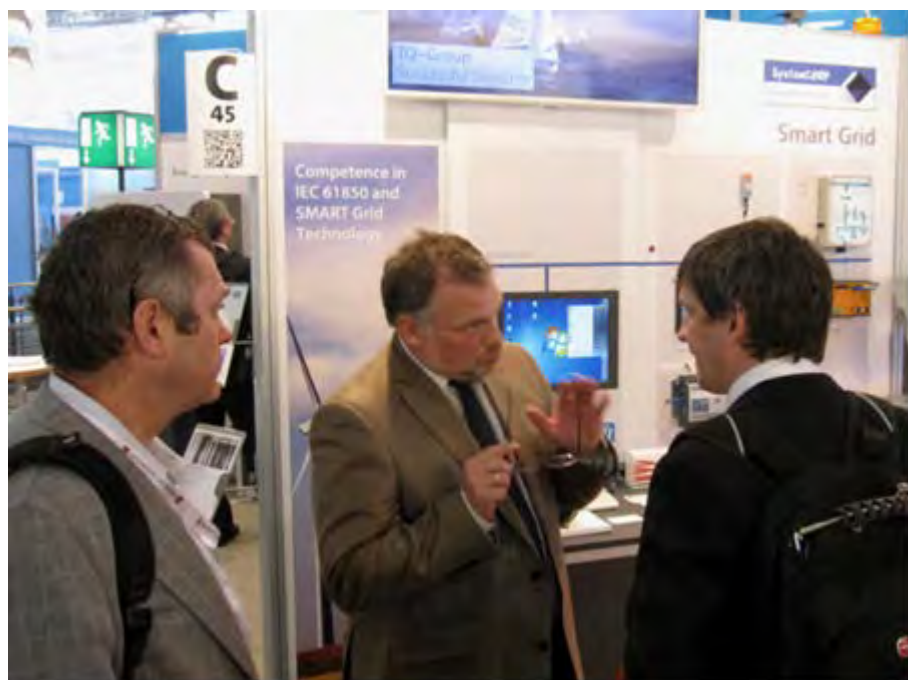
Posted by [Karlheinz Schwarz](#) at 1:50 AM No comments: 

Labels: [CIM](#), [E-Energy](#), [E-Mobility](#), [IEC 61499](#), [IEC 61850](#), [Roadmap](#), [Smart Grid](#)

Wednesday, April 10, 2013

Wednesday at Hannover Messe

Today (10 April 2013) was the busiest of the first three days. People ... people, people walked the rows. Even more people than the other days stopped at the booth of TQ Systems, Beck IPC and SystemCorp. There was a huge interest in learning how to get IEC 61850, IEC 61400-25, IEC 60870-5-104, DNP3, Modbus ... integrated into IEDs.



One of the most interesting questions asked today was from a small company that was looking for IEC 61850 software to be included for a substation switchgear drive system. The person I talked to said: IEC 61850 is very complex and we have figured out that the integration would cost some 100,000 Euro (one hundred thousand!) !! He asked me about my opinion.

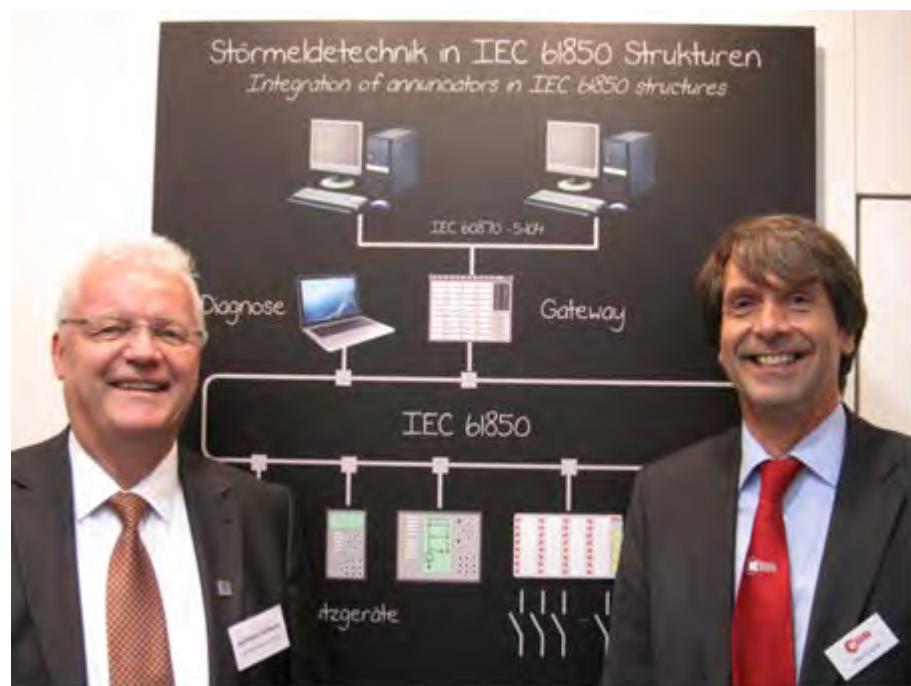
My response was: It could be even more than 100.000 Euro – if you do it wrong! But it could be in the range of less than a tenth of that amount: some 5.000 Euro may be sufficient to get it running and integrated in the application ... it all depends ...

The Alarm Annunciator system developed by [EES \(Backnang, Germany\)](#) is one of the companies that recently [implemented IEC 61850](#) within a few days ... this integration proves that it is feasible in very short time.

Detlef Raddatz (SystemCorp, left) and Uwe Scholz (EES) in front of the display that shows the topology:



... it's me (left) ...



EES presented a nice “power box” that promised that you reach the “finishing line” with IEC 61850 faster than without!





TQ System's products were well received by many visitors.



Some companies were quite fast in immediately ordering the IEC 61850 stack/API solution during the fair – there is a lot of pressure in various markets to make smart IEDs speaking IEC 61850 and IEC 61400-25 ... fast-to-market and at a reasonable price.

Posted by [Karlheinz Schwarz](#) at [12:40 PM](#) [1 comment:](#) 

Labels: [Beck](#), [Beck Chip](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [short time to market](#), [SystemCorp](#), [TQ](#)

Tuesday, April 9, 2013

What happened today at Hannover Messe?


The second day at the Hannover Messe was a quite interesting one. Many people came by and asked for IEC 61850 to be applied for building SYSTEMS that help to bring together PV Power, storages, Combined Heat and Power, Loads, Heating systems, ... The time has come where many more people are looking for support to integrate many of these individual "pieces" into smarter systems!

IEC 61850 is about to play a major role in this regard. Many interested companies showed up and asked for a simple and easy integration of IEC 61850 into their applications (devices) ... After a first wave of devices that used IEC 61850 one way or the other (roughly from 2004 to 2012), there is now a new wave coming that requires simple and

easy to integrate solutions.

I have heard from several experts that they have tried to use IEC 61850 the recent years – and failed because it was too costly for their applications. Many of them are now back and checking again to get IEC 61850 integrated into their IEDs. Guess they will get what they are looking for. Most of them want just to use IEC 61850 – not struggle with the implementation (integration) of it.

More to come tomorrow and the other days. Many people have reported that IEC 61850 is an issue at many more booths in 2013 than last year.

Posted by [Karlheinz Schwarz](#) at [3:28 PM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [integration](#), [short time to market](#), [Smart Grid](#), [smart solution](#)

Monday, April 8, 2013

IEC 61850 – Brief Report from first day at Hannover Messe 2013

The Hannover Messe has opened today (Monday, 08 April 2013). Some 6,800 exhibitors demonstrate their industrial products from industrial fieldbusses and PLCs to Power Generation and Power System Automation and Protection.

I am personally involved (as a Missionary for IEC 61850, IEC 61400-25, IEC 60870-5-104, DNP3, Modbus, ...) in helping interested people at the booth of TQ Systems, Beck IPC and SystemCorp to get a brief introduction of IEC 61850, answering questions and helping them to navigate through the above standards ... mainly: How to get from standards to market-ready products!

There was a lot of interest in the solutions the three companies could provide. Many people just stopped at the booth and were excited to see how easy it is these days to get their IEDs and systems to speak the above standard communication languages!

In case you are visiting the Hannover Messe this week, please come by at booth C45/1 in hall 13.

[Download the information package I am giving away at the Hanover Messe this week](#) [pdf, 4.3 MB].

Some impressions:

Building up the booth



... does it fit Detlef? Yes!



... smart people to install smart devices:



... Wow ! It is all working according to IEC 61850 ... it's REAL !



... ruggedized IEC 61850 gateway to Modbus:



TQ Systems HMI with IEC 61850 Client:




Beck IPC Products:



Any question ... when you see this price for a special RTU?



The com.tom also supports DNP3, IEC 61850, Modbus, ...

Posted by [Karlheinz Schwarz](#) at 2:58 PM No comments: 

Labels: [Beck](#), [Beck Chip](#), [Fernwirktechnik](#), [Gateway](#), [GPRS](#), [IEC 61400-25](#), [IEC 61850](#), [RTU](#), [SystemCorp](#), [TQ](#), [Training](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Monday, April 8, 2013

IEC 61400-25 - Poster from REpower at AWEA Windpower 2013

REpower is presenting an excellent poster about the application of IEC 61400-25 at the AWEA Windpower conference in Chicago (IL) in May 2013.

The poster concludes:

IEC 61400-25 is a new standard for Wind Turbine communications. It can facilitate and simplify the integration of new wind projects in a multiple-vendor, multiple-system industry.

From the experience of the author of this article, the **adoption of IEC 61400-**

25 by customers in new projects in the last year has been 100%.

All new projects with REpower turbines in North America selected this interface.

The most benefit will be made once a critical mass of manufacturers, wind farms owners, and equipment providers will use and support it. This communication standard is needed for the wind industry to become more efficient and competitive with traditional power sources.

[Download the IEC 61400-25 poster \[pdf, 370 KB\]](#)

... more to come.

Posted by [Karlheinz Schwarz](#) at [2:13 PM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [multi-vendor project](#), [REpower](#), [wind power](#), [wind turbine controller](#)

Thursday, April 4, 2013

Open Source C-Code for IEC 61850

Some six weeks ago I reported about the [open source Java code for IEC 61850](#). The group that developed the Java code has now also published the open source C code.

"In cases where Java is not an option (e.g. if you want to implement a server on very resource constrained systems) you can also consider [libiec61850](#) which is an alternative implementation in C."

libIEC61850 provides a simple API for MMS. This API is **in no way specific to IEC 61850** but provides a **generic MMS client API**.

This MMS API seems to be an option in case you have to decide to use (on one side) Modbus, DNP3, Fieldbus, or CAN in Automation OR (on

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[IEC 61850 as a kind of template for Modbus based S...](#)

► March (15)


the other side) to use IEC 61850. It may help you to get started with IEC 61850. **There is no reason anymore not to start with IEC 61850!!** The cost argument has gone.

As a Siemens employee I wrote two remarkable papers on the standardization:
one about the future of Fieldbusses/MMS and one about MAP/MMS in 1991:

Click [HERE](#) for the paper "Fieldbus standardization: Another way to go" [PDF, 720 KB].

Click [HERE](#) for the paper "Bridging MAP/MMS to Ethernet" [PDF, 720 KB]

It took some 30 years from the first baby steps to the availability of open source MMS code and other IEC 61850 solutions like the one from SystemCorp that is quite powerful and comprehensive. The time where you have to pay high ("voltage") prices is over! "High voltage" refers to the application domain high voltage substations – the domain that first used IEC 61850 some 10 or 15 years ago.

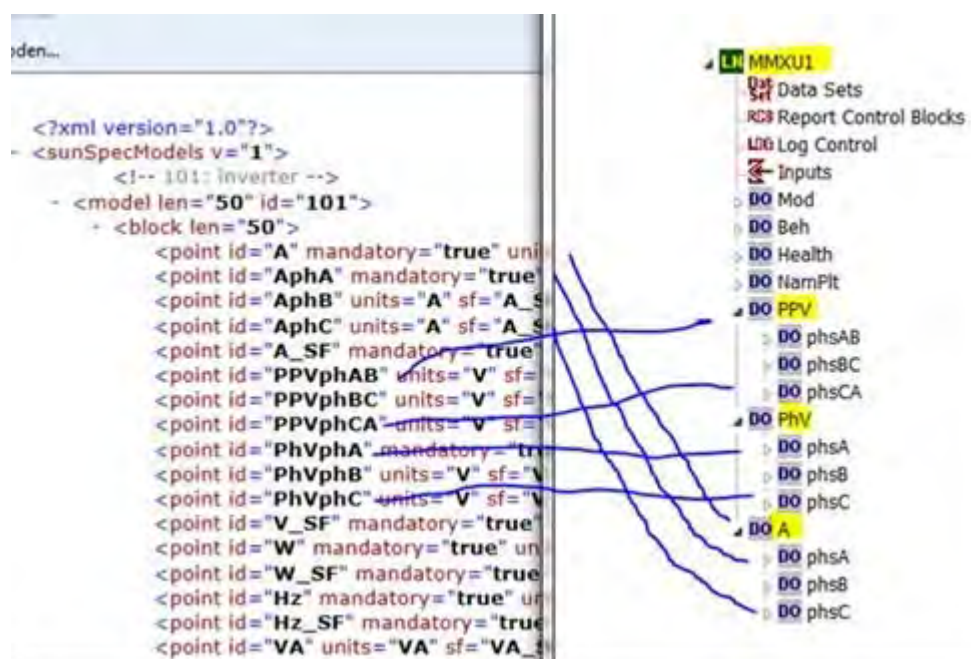
Posted by [Karlheinz Schwarz](#) at 4:36 AM No comments: 

Labels: [fieldbus](#), [IEC 61400-25](#), [IEC 61850](#), [MAP](#), [MMS](#), [open source](#), [SystemCorp](#)

IEC 61850 as a kind of template for Modbus based SunSpec Standard

The standard IEC 61850 has influenced other groups defining domain specific standards like [IETF EMAN](#) (Energy Management) and [SunSpec Alliance](#). I have reported on the IETF EMAN group in March 2012. The SunSpec Alliance is new to me. So I browsed a bit their website and figured out that they have "copied" parts of the IEC 61850 information models, remodeled them and mapped them to Modbus registers.

Example: The electrical measurements from logical node MMXU (right) have been used by SunSpec (smdx_00101.xml) to some extent:



Unfortunately the names are slightly different! "PPV.phsAB" in IEC 61850 and "PPVphAB" in sunspec ... I would have expected that the

► [February](#) (17)

► [January](#) (16)

► [2012](#) (188)

► [2011](#) (159)

► [2010](#) (153)

► [2009](#) (162)

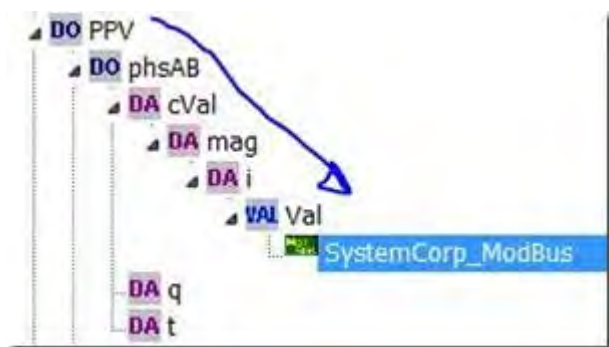
► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

names (that carry the semantic) are the same! This would make the mapping between the two worlds much simpler --> reducing the costs ...



Path could map to the following Modbus address (as an element inside the value ... using the SystemCorp IEC 61850 stack/API):

Slave Address	3
Data Address	112
DataType	DiscreteInput

The mapping of the IEC 61850 model to Modbus could be easily specified in the corresponding SCL file as Private Elements!! This could even be done automatically if the models (the names and semantic) in both standards would be equivalent!! Then a gateway device could offer both protocols (IEC 61850 and Modbus) running at the same time using a SINGLE specification file!

IMHO this is putting some soft pressure on IEC 61850 community! Why? Because why are the vendors implementing SunSpec not using IEC 61850 (the mother of SunSpec ... to some extend)? One reason seems to be that it is not easy (and not for free) to get the models for PV applications. Another issue is that the implementations of IEC 61850 stacks/APIs are in some cases too expensive for these vendors.

Fortunately there is a solution available that provides a full set of services and support of any model specified in SCL notation: The SystemCorp Stack/API. [There is a free of charge IEC 61850 DLL \(for server and clients\) available that runs for six months](#) ... enough time to evaluate the solution.

With the approach shown above we have implemented a device that is configured by SCL and that runs an IEC 61850 server AND an IEC 60870-5-104 slave at the same time (running on Beck IPC com.tom)!

Please come by at the booth 45/1 in Hall 13 at the Hannover Messe next week.

Posted by [Karlheinz Schwarz](#) at 3:14 AM [No comments:](#)

Labels: [Beck Chip](#), [embedded system](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [mapping](#), [Modbus](#), [Smart Grid](#), [smart solution](#), [SystemCorp](#)

Sunday, March 31, 2013

Security Standard IEC 62351-3 on its way

The Technical Specification IEC TS 62351-3, First edition, 2007-06 is underway to become an International Standard (57/1319/CDV):

Power systems management and associated information exchange –
Data and communications security –
Part 3: Communication network and system security – Profiles including
TCP/IP

The CVD is out for ballot until 2013-07-05.

IEC 62351-3 specifies how to secure TCP/IP-based protocols through constraints on the specification of the messages, procedures, and algorithms of Transport Layer Security (TLS) (defined in RFC 5246) so that they are applicable to the telecontrol environment of IEC TC57. It is intended that this standard be referenced as a normative part of other IEC TC57 standards that have the need for providing security for their TCP/IP-based protocol.

The conformance is very strict:

8 Conformance

Conformance to this part **shall** be determined by the **implementation of all parts** of clause 5.

The definition of clause 5 could be implemented today already: the content is available in the Technical Specification IEC TS 62351-3.

There is no (and never was an) excuse to not implement quite secure communication.

Posted by [Karlheinz Schwarz](#) at [11:17 PM](#) [No comments:](#) 

Labels: [iec 60870-5](#), [IEC 60870-6](#), [IEC 61000-4-30](#), [IEC 61400-25](#), [IEC 61850](#), [security](#), [TCP/IP](#), [TLS](#)

Thursday, March 28, 2013

IEC 61850/61400-25 for QNX available

Please note that the SystemCorp IEC 61850/61400-25 Stack/API has been ported to QNX 6.5 and PREEMPT_RT Linux. You are invited to visit the SystemCorp booth to discuss further details.



Invitation to Hanover Fair 2013 from 8th to 12th April | E-Energy,

Smart Grids

Dear All,

We invite you to visit the booth of SystemCorp (Hall 13, booth C45/1).

SystemCORP offers their IEC 61850 (IEC 61400-25) Stack/API for Substations, Decentralized Energy Resources , Distribution Automation, Hydro Power Plants, and Wind Turbines, to name few.

The communication stack with integrated APIs has been developed by SystemCorp and most efficiently ported to **QNX 6.5** and **PREEMPT_RT Linux**. Both APIs are also supported by the advanced SoftPLC DACHSview++ with realtime targets under QNX 6.x or PREEMPT_RT Linux..

At the booth you will see an overview about the possibilities, how to apply Embedded Controllers to realize most powerful and cost efficient implementations of standards for Protection Relays, Automation Devices, SCADA, Gateways and Systems.

Best Regards,


Your Team from SystemCorp and STEINHOFF Automation

Mr Karlheinz Schwarz, NettedAutomation will be available at the booth to answer your questions related to the standards.

<http://systemcorp.com.au>

<http://www.steinhoff-automation.com>

See you there.

Posted by [Karlheinz Schwarz](#) at [5:44 AM](#) [No comments:](#) 

Labels: [API](#), [embedded system](#), [hanover fair](#), [IEC 61400-25](#), [IEC 61850](#), [Preempt_RT Linux](#), [QNX](#), [real-time](#), [stack](#)

Wednesday, March 27, 2013

Cause of New Orleans Superdome partial Blackout

The Superdome in New Orleans was hit by a partial blackout on February 03, 2013. Some six weeks later you can find a technical report on the causes of the interruption of power flow.

There are multiple reasons reported why the circuit breaker tripped:

- Misoperation of the protection function under certain conditions
- Using factory default settings that had not been adjusted for the application at the Superdome
- Unclear technical documentation and communication between manufacturer and user

It is likely that the responsible technicians had a lack in experience and education or that they had to do the commissioning and testing in some haste. You know: Haste produces waste! Who knows.


Lessons learned: The electrical system requires **highly experienced and educated protection engineers**!! The application of more and more information and communication technology will require even more educated and experienced engineers!!

[Click HERE to download the report \[pdf, 560 KB\]](#).

There was another crucial "misbehavior" of technical people that caused a very crucial outage. Relay settings are very crucial ... care must be taken to prevent outages ... or you will see huge outages like the one in

Europe Nov 04, 2006 which was caused by inconsistent alarm and trip settings (from UCTE Report, link see below):

The protection settings on both sides of the Landesbergen-Wehrendorf line are different. They are summarized in the table below.



	E.ON Netz (Landesbergen)	RWE TSO (Wehrendorf)
Steady state value (thermal capacity of the line)	2 000 A	2000 A
Warning value (alarm)	1000 A and 2 000 A	1 795 A (90% of the max. limit value)
Maximal accepted value	2 550 A (85% of tripping current) for a max. time 1 hour.	1995 A (95% of the tripping current)
Tripping current	3 000 A	2 100 A

Table 1: Current limit values on the line Landesbergen-Wehrendorf

According to E.ON Netz: dispatchers were not aware of the settings in the protection system in Wehrendorf (RWE TSO substation). Therefore the dispatchers did not take into account the correct values for their evaluation of the situation.

The limits on both ends of a line must be the same (!!) ... at least both sides need to take the values of the other side into account.

But what happens if you don't take them into account? a big outages maybe the result (usually) as on Nov 04.

IEC 61850 would have help to prevent this situation: if each side gets read access to the alarm and trip settings ... let's say once a week, then you will figure out an inconsistent situation ... or send an spontaneous report in case any setting value changes ...

[Click HERE for the Final Report of the Nov 04, 2016 outage \[pdf, 2.8 MB\]](#)

Information and communication technology can help to do routine tests and checks and help to get consistent settings. But it will not replace the well trained and experienced engineers.

Posted by [Karlheinz Schwarz](#) at [1:06 AM](#) [No comments:](#) 

Labels: [blackout](#), [IEC 61850](#), [outage](#), [protection](#)

Saturday, March 23, 2013

IEC 61850 for Fault Protection, Isolation and Restoration (FPIR) equipment

Brisbane, Qld, Australia – Electrical switchgear engineers NOJA Power today announces its support for the adoption of **IEC 61850 for Fault Protection, Isolation and Restoration (FPIR) equipment**. NOJA Power says the use of IEC 61850 would significantly enhance coordination between Automatic Circuit Reclosers (ACR)--pole- or ground-mounted electricity distribution network protection devices--allowing such equipment to form an essential element of smart grids.

"ACRs will form a critical part of smart grids and **IEC 61850 is rapidly gaining unstoppable momentum** as the preferred communication and control standard for the smart infrastructure of the future," said Neil O'Sullivan, CEO, NOJA Power.

[Click HERE for the press release on IEC 61850 for DA application.](#)

Posted by [Karlheinz Schwarz](#) at [6:38 AM](#) [No comments:](#) 

Labels: [Australia](#), [distribution automation](#), [DNP3](#), [IEC 61850](#), [protection](#)

Tissue Database opened for IEC 68150-80-1, 90-1 and 90-5

Please note that we opened the IEC 61850 Tissue Database for three additional parts: 80-1, 90-1 and 90-5:

[General](#)
[Part 90-1](#)
[Part 1 \(2001\)](#)
[Part 2 \(2003\)](#)
[Part 3 \(2003\)](#)
[Part 4 \(2004\)](#)
[Part 4 \(2011: Edition 2\)](#)
[Part 5 \(2003\)](#)
[Part 5 \(2013-01: Edition 2\)](#)
[Part 6 \(2004\)](#)
[Part 6 \(2009-12: Edition 2\)](#)
[Part 7-1 \(2003\)](#)
[Part 7-1 \(2011: Edition 2\)](#)
[Part 7-2 \(2003\)](#)
[Part 7-2 \(2010: Edition 2\)](#)
[Part 7-3 \(2003\)](#)
[Part 7-3 \(2010: Edition 2\)](#)
[Part 7-4 \(2003\)](#)
[Part 7-4 \(2010: Edition 2\)](#)
[Part 7-410 \(Hydro Power, 2007\)](#)
[Part 7-420 \(DER, 2008\)](#)
[Part 7-510 \(2012: Edition 1, Hydroelectric power\)](#)
[Part 8-1 \(2004\)](#)
[Part 8-1 \(2011 Edition 2\)](#)
[Part 9-1 \(2003\)](#)
[Part 9-2 \(2004\)](#)
[Part 9-2 \(2011: Edition 2\)](#)
[Part 9-2LE](#)
[Part 10 \(2005\)](#)
[Part 80-1 \(2008, Edition 1, CDC's to 101/104\)](#)
[Part 90-1 \(2010, Ed1, Comm. between substations\)](#)
[Part 90-4 \(2013: Edition 1, Network Engineering\)](#)
[Part 90-5 \(2013: Edition 1, Synchrophasor\)](#)
[Part 90-7 \(2013: Edition 1, DER power converters\)](#)

[Click HERE for the IEC 61850 Tissue Database.](#)

Posted by [Karlheinz Schwarz](#) at 6:13 AM [No comments:](#) 

Labels: [IEC 61850](#), [quality](#), [tissues](#)

Smart Grids at Hannover Messe 2013

An exclusive area "Smart Grids" is dedicated to themed presentations and products spanning all aspects of smart grid technology.

HANNOVER MESSE is more than just an international meeting place for smart grids stakeholders. Thanks to its interdisciplinary and fully integrated format, the event exposes exhibitors and trade visitors to all the key technologies needed for today's and tomorrow's intelligent energy supply systems.

Exhibitors at the themed presentations in Hall 13, Stand C45 are:

Advantech Europe B. V.
Beck IPC (C45/1*)
E-Energy Begleitforschung

EuroSkyPark
Germany Trade & Invest (GTAI)
Landis + Gyr GmbH
Magtech
mdex GmbH
Nexans Deutschland GmbH
Operation Technology Inc. (ETAP)
PcVue GmbH
Robotron Datenbank-Software GmbH
SAG
SSV Software Systems GmbH
SystemCORP (C45/1*)
TQ-Systems GmbH (C45/1*)
VDE

Some 40 presentations and discussions are planned for the five days.

[Download complete program and list of exhibitors](#) [EN/DE, pdf, 1.5 MB]

* These three companies show their excellence in smart communication systems according to IEC 60870-5-104/DNP3, IEC 61850 and IEC 61400-25: Hardware, Software, Applications, ... Gateways.

Posted by [Karlheinz Schwarz](#) at [12:36 AM](#) [No comments:](#) 

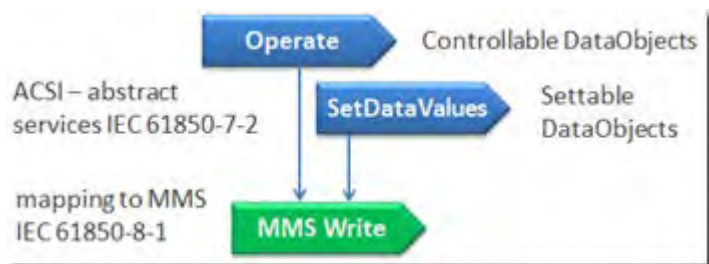
Labels: [Beck](#), [DNP3](#), [embedded system](#), [hanover fair](#), [IEC 60870-5-104](#), [IEC 61850](#), [Smart Grid](#), [smart solution](#), [SystemCorp](#), [TQ](#)

Saturday, March 16, 2013

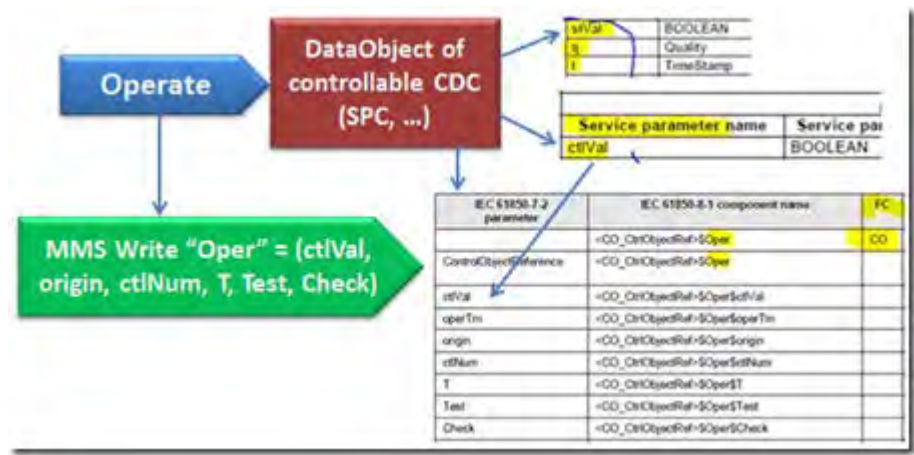
When to use Operate Service and when SetDataValues?

The IEC 61850-7-2 abstract services Operate and SetDataValues are both mapped to MMS Write in IEC 61850-8-1. So, what makes a MMS Write service an Operate or a SetDataValues?

The two services and the mapping are sketched here:

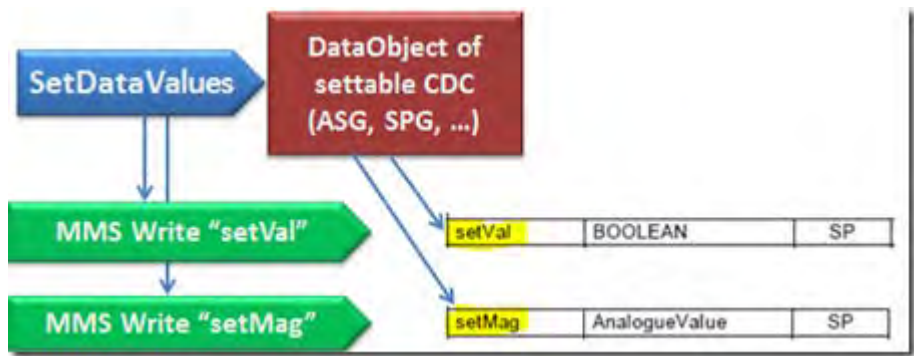


The first mapping is showing the Operate service (as part of the control model):



The Operate service is used in conjunction with the control model (defining state machines, select-before-operate, time-activated control, ...). Control service models require a special information model: controllable Common Data Classes, e.g., SPC – Controllable Single Point. The model comprises attributes defined by the CDC and the service parameter `ctlVal`: these are shown in the MMS Variable as a structure "Oper" with the components: `ctlVal`, `origin`, `ctlNum`, `T`, `Test`, `Check`. These have to be written at MMS level. These are always required for Operate even if you need just `ctlVal` !!

The settable DataObjects require the MMS Write as shown in the following figure:



In IEC 61850-7-3 it is defined exactly which services are to be used for the various attributes in the Common Data Classes. Example for controllable DataObjects:

GenCommonDataClass model	setDataValues GetDataValues GetDataDefinition GetDataDirectory	DC, CF, SV, BL ALL ALL ALL
Data set model	GetDataSetValues DataSetValues	ALL DC, CF, SV, BL
Reporting model	Report	ALL
GSE model	SendGOOSEMessage SendGSSEMessage	ST, MX ST
Sampled values model	SendMSVMessage SendUSVMessage	ST, MX ST, MX
Control model	Select SelectWithValue Cancel Operate CommandTermination TimeActivatedOperate	<div>CO sep 8-1</div>

Note that the FC=CO is defined in 8-1 !

Note also that client user interfaces (like the IEDScout) may use different service names than 7-2 or MMS.

Posted by [Karlheinz Schwarz](#) at [12:55 AM](#) [3 comments:](#) 

Labels: [control model](#), [education](#), [IEC 61850](#), [IEC 61850-7-2](#), [IEC 61850-8-1](#), [mapping](#), [MMS](#), [operate](#), [Training](#), [write](#)

Thursday, March 14, 2013

Security and IEC 61850: Is it about Bug Fixes or Systematic Issues?

These days experts discuss the future of more secure IEDs and systems in the world of Industrial Control Systems (ICS). Note: ICS is also used in power systems – no question.

There are people that focus on **single bugs and how to solve them by patching** et cetera. Other experts are more looking at the **systematic security problems** in control systems.

Eric Byres, CTO and vice president of Tofino Security, a division of Belden, says "It will take major players like Exxon, Duke Energy, for instance, and other corporations with the **ICS purchasing power**, he says, to **force vendors to step up and fix the systemic security issues**."

[Read a comprehensive discussion about the two positions – quite crucial and interesting.](#)

What do you think about translating this statement into the issues we have with IEC 61850 Interoperability?

It will take major players like AEP, SCE, E.ON, EDF, RWE, Duke Energy, for instance, and other corporations with the **ICS purchasing power**, to **force vendors to step up and fix the systemic interoperability issues with regard to IEC 61850**."

This would help to prevent a lot of frustrations during factory and site acceptance tests.

Why do we see **just a few major players from the utility domain** using their force to improve interoperability? There are several reasons I see:

- Wall Street, Frankfurter Börse, ...
- Ignorance of issues
- Not enough experts
- Attitude: just fix what brakes
- ...

Recommendation from my side: Vendors and users should cooperate more in Teamwork and agree on writing documents like "How to profile IEC 61850, IEC 60870-5, ..." to get **specific profile specifications for a specific application** that have (hopefully) not left options to ignore or to chose from.

A good example is the [Vattenfall VHP Ready specification](#) (Virtual Heat an Power). This spec defines the IOA for signals according to IEC 60870-5-104 and the Logical Device, Logical Node and Data Object Names.

Example 104:

Modul	Signal zur Zentrale	Zahlenformat	IEC 60870-5-104		
			APDU	IOA	Einheit
BHKW	Erzeugte elektrische Arbeit der abgelaufenen Viertelstunde	Gleitkommazahl	38 (M_ME_TF_1)	111	kWh
	Erzeugte thermische Arbeit der abgelaufenen Viertelstunde	Gleitkommazahl	38 (M_ME_TF_1)	112	kWh
	Aktuell erzeugte elektrische Leistung (zum Zeitpunkt der Abfrage/Übermittlung)	Gleitkommazahl	38 (M_ME_TF_1)	113	kW
	Aktueller Zustand (An/Aus) - zum Zeitpunkt der Abfrage/Übermittlung	Binär	30 (M_SP_TB_1)	11	0 oder 1

Example IEC 61850:

Logical Device	Erklärung
Anlage	repräsentiert die Gesamtanlage (für Messwerte, die keiner Komponente zugeordnet werden können)
BHKW	repräsentiert ein Blockheizkraftwerk
WP	repräsentiert eine Wärmepumpe
ELE	repräsentiert eine elektrische Ergänzungsheizung
Kessel	repräsentiert einen konventionellen Heizkessel

Modul	Signal zur Zentrale	Zahlenformat	IEC 61850-7-426						Einheit
			Logical Device	Logical Node	LN Instance	Funct. Constr.	Data Object	Data Attribute	
Wärmepumpe	Verbrauchte elektrische Arbeit der abgelaufenen Viertelstunde	Double	IEDM1CPWP	MM7S	1	ST	TotWh	actVal	kWh
	Erzeugte thermische Arbeit der abgelaufenen Viertelstunde	Double	IEDM1CPWP	MMET	1	MX	AccHeatOut	instMag	kWh
	Aktuell verbrauchte elektrische Leistung (zum Zeitpunkt der Abfrage/Übermittlung)	Double	IEDM1CPWP	MMDU	1	MX	TotW	instMag	kW

If utilities do not specify what they want, they may experience a big surprise when they get the system delivered and installed. They may get much less or much more than what they expected.

And note this: When we get more standard conformant and interoperable IEDs installed, they are definitely linked to the Security issues discussed at the beginning!

What we are looking for is: **Interoperable and Secure IEDs and Systems. We should not separate these two requirements! They are highly interrelated.**

Posted by [Karlheinz Schwarz](#) at 1:56 AM No comments: 

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [interoperability](#), [profile](#), [security](#), [system](#), [utilities](#), [Vattenfall](#), [vendors](#), [VHP Ready](#), [virtual power plant](#)

Hanover Fair 2013: TQ, Beck IPC and SystemCORP Join their Strengths

Hanover Fair 2013 8-12 April, hall 13, booth 45/1:

TQ, Beck IPC and SystemCORP will demonstrate (based on the Embedded Modules TQMa35, TQMa28 and SC143) complete solutions with the lowest efforts and shortest time-to-market for IEC 61850, IEC 60870-5, DNP3, ...

[Download Invitation in English](#) [pdf, 600KB]
[Download Invitation in German](#) [pdf, 600KB]
[Map and booth location](#) [pdf, 1.6 MB]

I will be at the same booth for answering questions related to the various standards.

See you there.

Posted by [Karlheinz Schwarz](#) at [1:03 AM](#) [No comments:](#) 

Labels: [61850](#), [Beck](#), [Beck Chip](#), [DNP3](#), [Gateway](#), [iec 60870-5](#), [IEC 60870-5-104](#), [IEC 61850](#), [SystemCorp](#), [TQ](#)

Tuesday, March 12, 2013

Crucial Lessons learned from a MV Substation Project at a Huge Power Plant

Recently I discussed the issue of interoperability of IEDs in the context of a crucial non-interoperability problem of two vendors' IEDs. [Click here for the discussion.](#)

Now, three months later, the utility has decided to replace two protection IEDs in summer 2013 in order to get fully interoperable IEDs for the power plant control system.

The whole process of discussing back and forth over a period of nine (9!) months has frustrated many engineers and other people involved in the project. We had meetings with almost 20 people from several companies involved – could you believe it?

The utility (power plant operator) finally ordered a one day training on IEC 61850 to get a much better understanding what the (relatively small) issue was all about and to get an overview about IEC 61850.

The **crucial lessons learned** by the utility engineers are:

1. If you want to use IEC 61850 in your plant, **specify** to some extent what you want to get delivered.
2. When you get the offer from vendors, **check in detail what they offer**.
3. Once you have almost selected one or more vendors, **make sure** that all IEDs that have to speak IEC 61850 are **interoperability tested** one way or the other.
4. Once you have signed the contract with one or more vendors, **organize interoperability tests in a lab** in due time prior to the commissioning process on site.


Note that conformance testing is required – but not sufficient!!

Utilities must take a firm position in favor of a genuine open international standard in the energy market, leaving behind once and for all the outmoded notion of great champions of vendors with many proprietary bells and whistles.

In case utility management and engineers involved in a project follow these recommendations it is likely that the problems that may occur on site later on will be tremendously minimized.

The utility I was involved with told me, that they will contract with me again, as soon as they have to build another MV substation in a power plant using IEC 61850 IEDs.

Good luck!

Posted by [Karlheinz Schwarz](#) at 3:16 AM [No comments:](#) 

Labels: [conformance](#), [conformance test](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [lessons learned](#), [power plant control](#), [Substation](#), [Substation Automation](#)

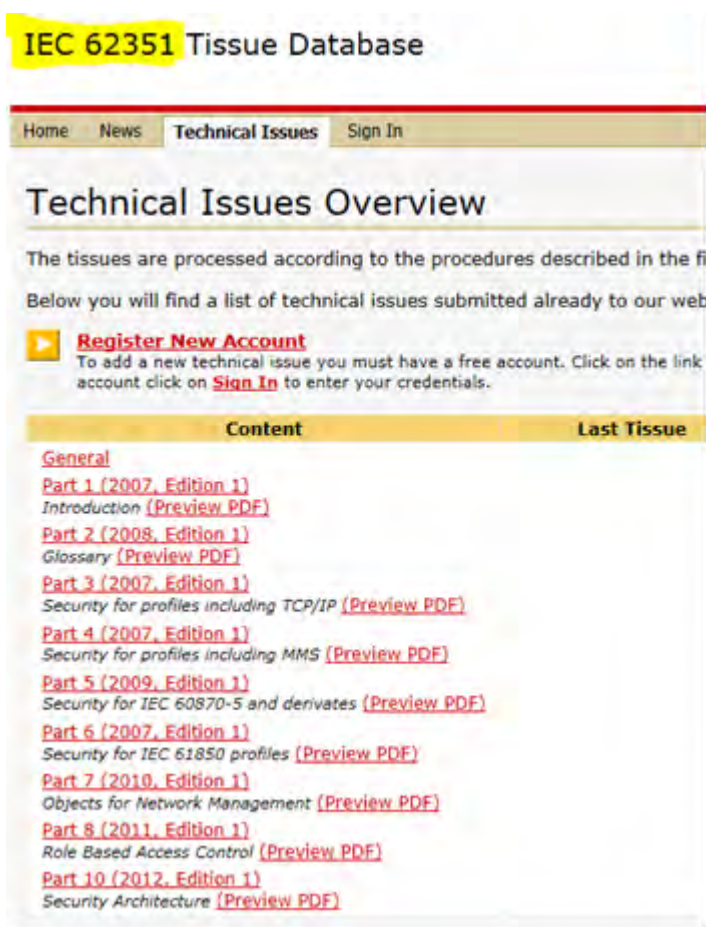
Sunday, March 10, 2013

Tissue Database for IEC 62351 just opened

The Tissue Database for **IEC 62351**:

Power systems management and associated information exchange – Data and communications security

has been opened for immediate access. Nine parts have been published so far. You may post your feedback (bug reports, ...) now.



The screenshot shows the 'IEC 62351 Tissue Database' website. At the top, there's a navigation bar with 'Home', 'News', 'Technical Issues' (selected), and 'Sign In'. Below this is the 'Technical Issues Overview' section. It contains a paragraph about the processing of tissues and a list of technical issues. A 'Register New Account' button is visible, with a note that a free account is required to add new issues. The list of technical issues includes:

- General
- Part 1 (2007, Edition 1)
Introduction (Preview PDF)
- Part 2 (2008, Edition 1)
Glossary (Preview PDF)
- Part 3 (2007, Edition 1)
Security for profiles including TCP/IP (Preview PDF)
- Part 4 (2007, Edition 1)
Security for profiles including MMS (Preview PDF)
- Part 5 (2009, Edition 1)
Security for IEC 60870-5 and derivatives (Preview PDF)
- Part 6 (2007, Edition 1)
Security for IEC 61850 profiles (Preview PDF)
- Part 7 (2010, Edition 1)
Objects for Network Management (Preview PDF)
- Part 8 (2011, Edition 1)
Role Based Access Control (Preview PDF)
- Part 10 (2012, Edition 1)
Security Architecture (Preview PDF)

[Access the Tissue Database for IEC 62351.](#)

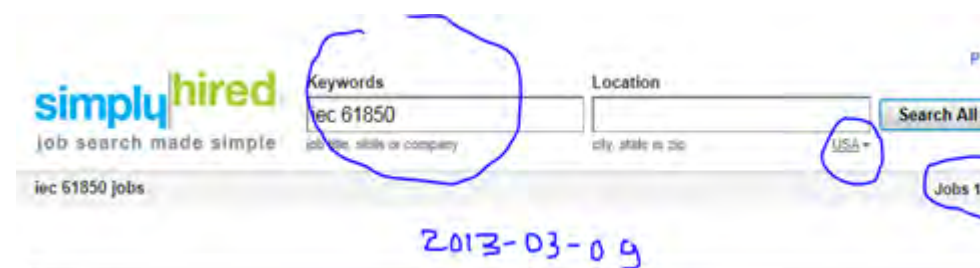
Posted by [Karlheinz Schwarz](#) at 6:59 AM [No comments:](#) 

Labels: [DNP3](#), [ICCP](#), [iec 60870-5](#), [IEC 62351](#), [MMS](#), [security](#), [TASE.2 ICCP](#), [TCP](#), [TCP/IP](#), [tissues](#), [TLS](#)

Saturday, March 9, 2013

More than 100 Job offerings for IEC 61850 in the USA at SimplyHired

Are you educated in IEC 61850 implementations and applications?
Looking for a new job? There are many opportunities: 100+ in the USA alone:



[Check for the list of IEC 61850 Job offerings.](#)

Do you want to improve your experience and knowledge?
NettedAutomation is offering the right IEC 61850 training courses:

[Training information, program example, list of references \[pdf, 3.0 MB\]](#)

Posted by [Karlheinz Schwarz](#) at 8:41 AM No comments: 

Labels: [education](#), [IEC 61850](#), [Job](#), [seminar](#), [Training](#)

Friday, March 8, 2013


IEC 61850 Interoperability Test Session Fall 2013

Interoperability of IEC 61850 IEDs and Tools is one of the crucial challenges the years to come. Good to know that the UCAIUG (Users Group) is planning to conduct the next Interoperability test session during Fall 2013 – likely in the second half of October in Munich (Germany).

I highly recommend vendors of IEDs and Tools to apply for attendance – AND: If your company is not yet a member of the UCAIUG, this is a good reason to apply for membership.

[Please contact the UCAIUG if you want to get involved in the IEC 61850 Interoperability testing session in October 2013.](#)

[Apply for UCAIUG membership – its so easy.](#)

Posted by [Karlheinz Schwarz](#) at 12:58 AM No comments: 

Labels: [IEC 61850](#), [interoperability](#), [interoperability tests](#)

Saturday, March 2, 2013

Tissue Database for IEC 61850-90-7 Edition 1 Open

[The tissue database for the new document IEC 61850-90-7 Edition 1 \(2013\) could be used immediately.](#)

Posted by [Karlheinz Schwarz](#) at 2:13 AM No comments: 

Labels: [converter](#), [IEC 61850-90-7](#), [tissues](#)

Friday, March 1, 2013

Is IEC/TR 61850-90-7 part of Edition 1, 2, or 3?

The document IEC/TR 61850-90-7:2013-02

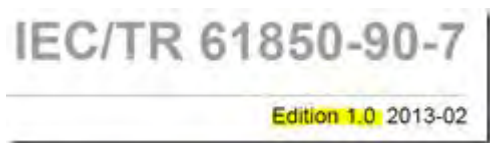
Communication networks and systems for power utility automation

Part 90-7: **Object models for power converters in distributed energy resources (DER) systems**

has been published the other day.


Is this document part of IEC 61850 Edition 1, 2 or 3? **NEITHER NOR!**

It has its own history which starts with IEC/TR 61850-90-7 - **Edition 1** - 2013-02 as you can see on the document:



When we talk about editions – be very careful and precise.

Implementing a model (Logical Node, data object, ...) from IEC/TR 61850-90-7 - Edition 1 may require IEC 61850-7-3 Edition 2 or not ... it depends on the model itself.

Posted by [Karlheinz Schwarz](#) at 9:28 PM [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [IEC 61850](#), [IEC 61850-90-7](#), [inverter](#), [PV](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Tuesday, February 26, 2013

IEC/TR 61850-90-7 Just published

Please note the publication of

IEC/TR 61850-90-7:2013-02

Communication networks and systems for power utility automation

Part 90-7: **Object models for power converters in distributed energy resources (DER) systems**

[Download the preview of IEC 61850-90-7.](#)

This part is very crucial because it provides solutions for the challenges of feeding the huge amount of power from PV and other DER systems into the various voltage levels of the power delivery grid. This part will have a crucial impact on how to manage especially distribution networks. **Just a few examples of these functions are:**

- 7.1.2 Function INV1: connect / disconnect from grid
- 7.1.3 Function INV2: adjust maximum generation level up/down
- 7.1.4 Function INV3: adjust power factor
- 7.1.5 Function INV4: request active power (charge or discharge storage)

- 7.1.6 Function INV5: pricing signal for charge/discharge action
- 7.2 Modes for volt-var management
 - 7.2.1 VAr management modes using volt-var arrays
 - 7.2.2 Example setting volt-var mode VV11: available var support mode with no impact on watts
 - 7.2.3 Example setting volt-var mode VV12: maximum var support mode based on WMax
 - 7.2.4 Example setting volt-var mode VV13: static power converter mode based on settings
 - 7.2.5 Example setting volt-var mode VV14: passive mode with no var support
- 7.3 Modes for frequency-related behaviours
 - 7.3.1 Frequency management modes
 - 7.3.2 Frequency-watt mode FW21: high frequency reduces active power
 - 7.3.3 Frequency-watt mode FW22: constraining generating/charging by frequency

...

Posted by [Karlheinz Schwarz](#) at [8:10 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-90-7](#), [inverters](#), [PV](#)

Tissue Database for IEC 61850-5 Edition 2 Open

The Edition 2 of IEC 61850-5 (Communication requirements for functions and device models) has been published the other day:

This second edition replaces the first edition published in 2003. It constitutes a technical revision. The major technical changes with regard

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► March (15)

▼ February (17)

[IEC/TR 61850-90-7 Just published](#)

[Tissue Database for IEC 61850-5 Edition 2 Open](#)

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[BDEW veröffentlicht Smart-Grid](#)


to the previous edition are as follows:

- extension from substation automation systems to utility automation systems;
- including the interfaces for communication between substations (interfaces 2 and 11);
- requirements from communication beyond the boundary of the substation.

[Preview of part 5 Edition 2.](#)

The tissue database for the new document could be used immediately:

[Part 5 \(2013-01; Edition 2\)](#)

Posted by [Karlheinz Schwarz](#) at 1:03 AM [No comments:](#) 

Labels: [Edition 2](#), [IEC 61850](#), [IEC 61850-5](#), [tissues](#)

Saturday, February 23, 2013

Familiar with IEC 61850, ICCP, and DNP3: Southern California Edison (SCE) is looking for you

Southern California Edison (SCE) is hiring an expert for SCADA maintenance of their Centralized Remedial Action Scheme (CRAS).

Job requirements lists among others: Demonstrated experience of

- **IEC 61850**,
- **ICCP** (IEC 60870-6; Inter-Control Center Communications protocols), and
- **DNP** (Distributed Network Protocol).

Candidate must be familiar with Common Information Model IEC 61970 standard and harmonization effort between IEC 61850 and IEC 61970.

[Click here to get the complete job description.](#)

[List of all job description in the USA that require one way or the other IEC 61850 \[78 as per 2013-02-23\].](#)

Posted by [Karlheinz Schwarz](#) at 6:04 AM [No comments:](#) 

Labels: [DNP3](#), [ICCP](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61850](#), [Job](#), [open position](#), [USA](#)

Thursday, February 21, 2013

TÜV SÜD Conducts 2 Day Smart Grid Forum in Munich

TÜV SÜD has become a very active supporter of **safe and secure power grids**. The future transmission and distribution grids need more than just standardized information and information exchange services. The open information exchange has to be complemented by safe and secure solutions – and corresponding tests.

To embed power contributors safe in to the power grid, an intelligent control is necessary, a common language for all the co-players in the space of the grid. At the same time, IT-security items get more and more relevant because of the safety impact of potential cyber attacks on critical infrastructures. In this context, new challenges in standardization and the development of proper technological solutions has to be addressed.

[Umsetzungs-Roadmap](#)

[IEC 61850 in the Joint EURELECTRIC-EDSO Smart Grid...](#)

[TÜV SÜD organizes IEC 61400-25 \(IEC 61850\) Interop...](#)

[IEC 60870-5-104 and IEC 61850 for Vattenfall's VHP...](#)

[IEC 62351 added to SGIP Catalog of Standards](#)

[IEC 61850-Why all the Hype?](#)

[Aging Infrastructure drives Use of IEC 61850](#)

[Second and third day of DistribuTECH in San Diego](#)

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► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

At the TÜV SÜD **smart.grids.forum** network operators, TÜV SÜD experts and manufacturers of automation components share their practice experience and provide convincing concepts to make grids smart, powerful and safe. Benefit from the opportunity to exchange experience and make (maintain) contacts.

Location: Munich (Germany)
Date: 21-22 March 2013

The conference will be held bilingual (**German and English**).

[Further information, program and registration information can be found here \[en\]](#)

[Weitere Informationen, Programm und Anmeldeformular finden Sie hier \[de\]](#)

Meet several well known experts in Munich. I look forward to seeing you there.

Posted by [Karlheinz Schwarz](#) at [11:45 PM](#) [No comments:](#) 

Labels: [safe energy](#), [security](#), [Smart Grid](#), [TÜV SÜD](#)

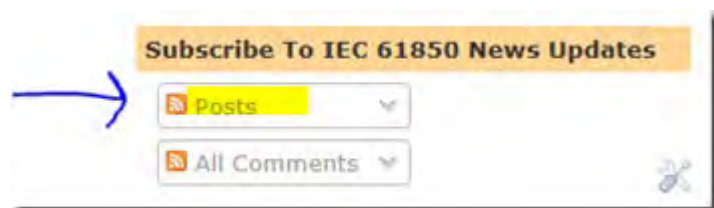
Wednesday, February 20, 2013

Download IEC 61850 Blog Content as single PDF Document (February 20, 2013)


For those readers of the blog that want to get the complete content as a **single pdf document**, it is just a click away ... it contains all 772 posts from 2008 until 2013-02-20. Once you have downloaded the file you can easily browse the content ... search ... mark ... copy ...

[Download all posts of the IEC 61850 blog in a single pdf](#) [18,5 MB, 570+ pages DIN A4]

You may also subscribe to the blog to **automatically receive updates** ... as many people do:



Enjoy!

Posted by [Karlheinz Schwarz](#) at [8:01 AM](#) [No comments:](#) 

Labels: [blog](#), [download](#), [IEC 61850](#)

Tuesday, February 19, 2013

GOOSE – APPID, appID, and GoID

To figure out the relation between the GOOSE – APPID, appID, and GoID takes some time ... it's a fortune for you that I spent that time for you. Sure, some reader will know it already. For those who don't, here is the relation:

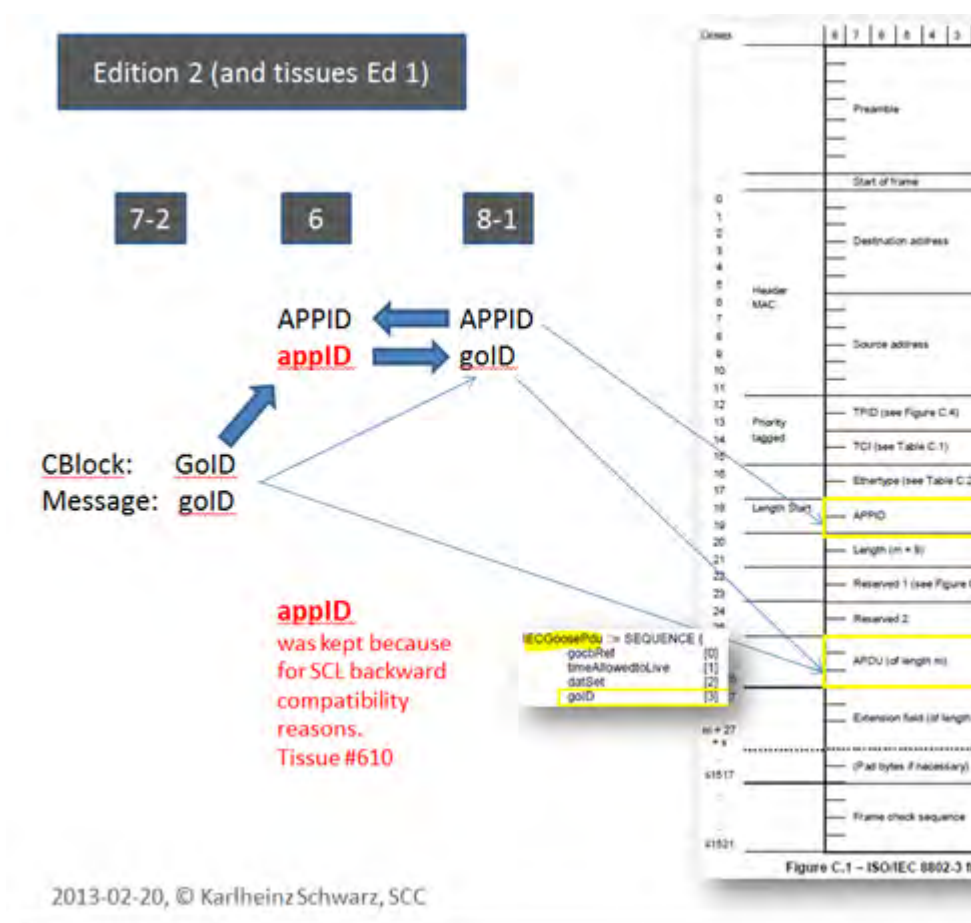
News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Tuesday, February 19, 2013

GOOSE – APPID, appId, and GoID

To figure out the relation between the GOOSE – APPID, appId, and GoID takes some time ... it's a fortune for you that I spent that time for you. Sure, some reader will know it already. For those who don't, here is the relation:



Hope this helps to understand the relation! ... without digging in three documents and checking the tissue database.

Posted by [Karlheinz Schwarz](#) at 7:34 PM No comments:

Labels: [Edition 1](#), [Edition 2](#), [education](#), [GOOSE](#), [IEC 61850](#), [mapping](#), [SCL](#)

IEC 61850 Tissue Number 1000 Posted Today

The technical issues database is used since 2004 by the global IEC 61850 community as a single entry point for reporting, discussing, solving, and documenting problems found in the various parts of IEC 61850.

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[Aging Infrastructure drives Use of IEC 61850](#)

[Second and third day of DistribuTECH in San Diego](#)

► January (16)

Today (2013-02-19) the tissue number **1000** has been posted:

<http://tissue.iec61850.com/tissue.msp?issueid=1000>

The database is used by the industry to help improving the quality of the standards.

Congratulation to the proposer!

In case you find a problem (bug, ...) please check first the tissue database to figure out if this problem has already been posted and solved – before you post an new one for the same topic.

Posted by [Karlheinz Schwarz](#) at **1:43 AM** [No comments:](#) 

Labels: [bugs](#), [IEC 61850](#), [quality](#), [questions](#), [tissue process](#), [tissues](#)

Saturday, February 16, 2013

What do you think about an IEC 61850 Open Source Implementation?

I have been asked off and on, if there is an Open Source Implementation for IEC 61850 or one with a reasonable price. Yes these are available these days. There is a **simple subset** of IEC 61850 implemented in Java licensed under the LGPL implemented by Fraunhofer Institute ISE (Freiburg, Germany). This solution is a result of the e-Energy eTelligence research project funded by Germany's Federal Ministry of Economics and Technology (2009-2012).

There is at least one **other affordable solution** available that provides a **full subset** of IEC 61850 even applicable at small embedded controllers – from [SystemCorp](#).

The Open Source IEC 61850 Server supports:

- MMS Associations
- (MMS) GetDirectory and (MMS) GetDataDefinition services
- (MMS) GetDataValues and (MMS) SetDataValues
- (MMS) DATA-SET model services
- Interpretation of ICD-File to build model

IEC 61850 Client supports in addition to Servers:

- Receiving (MMS) Reports

[Visit the home page of the openIEC61850 Implementation.](#)

We have tested the open source solution to some extend to see what it provides. The solution is mainly a MMS (ISO 9506) implementation. IEC 61850 contributes to the solution with its information models (logical devices, logical nodes, data objects, data attributes, ...). The hierarchical information maps perfectly to MMS NamedVariables (NV)!! The corresponding MMS Services allow to manage retrieving the MMS object model (NVs), writing to the NVs and reading from NVs. Since MMS fits well to the information model of IEC 61850, it is natural that the MMS NV and NV services provide the needed services for IEC 61850 information model management.

IEC 61850-7-2 (ACSI) provides more elaborated services (not supported by the open source solution), e.g., **Reporting, Logging, GOOSE, Sampled Value exchange, Control Model**, and **File transfer**. The most comprehensive (complex) model is the buffered Report Control model. This model allows the optimized usage of bandwidth by providing a spontaneous (event) driven mechanism. A specific status information

- [2012](#) (188)
- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

will be transmitted only when its **value changes** or when – for an analogue value – a configured **limit is violated**. This reduces the traffic tremendously and meeting a critical timeliness need.


Polling a huge number of devices in a huge distributed system does not scale at all. There is a crucial difference in **applying polling** or **event driven reporting**.

Sure, for accessing some values in a remote device once an hour or once a day or so, could be realized with polling.

Information exchange

Polling versus (event) Reporting

- Assuming a (cycle) rate of polling of One (1) poll request per 5 seconds and One (1) value change in 10 minutes
- Polling requires per 10 minutes
 - 120 Requests and
 - 120 Responses with the values
- Reporting requires only
 - One (1) „Response“ (MMS Information Report) with the value(s)
- Reporting saves 99.2 % of messages
 - NO value change → NO Message
- Event may be 4.999 seconds delayed when polling



If your need is focusing on fast (medium and hard real-time) information exchange, then you need high efficient reporting, GOOSE and Sampled Value exchange.

The OpenIEC61850 implementation uses the external access path (the complete path from LD/LN.DO,DA. ...) also for the internal access of the real information in the application. The application uses the path at the boundary between communication and application. The application has to analyze the text strings (up to 2 x 64 characters) for each element to be written or read. An API that maps between the external name path and a kind of an internal pointer (maybe just a linear index) is therefore more efficient. One of the crucial objectives of IEC 61850 is to use a standardized model independent of the internal organization of the real data values.

It would be interesting to see a first device that implements the OpenIEC61850 solution to get an IEC 61850 Conformance Certificate. The current solution does not yet support the **Control Model**, which is required as a **mandatory service**. MMS does not have a model that is equivalent to the IEC 61850 Control Model. That's why the IEC 61850 solution has to implement all the needed features of the Control Model according to IEC 61850-7-2 and IEC 61850-8-1. Having MMS does not mean that it is easy to implement the Control Model – I have seen many experts struggling with the Control Model.

The main reason why there was a decision made to implement an openIEC61850 using Java was (from my experience and understanding) simply because there was not a single software solution available that was affordable for R&D projects. Usually the solutions came in source code ... meaning to spent a lot of efforts (money and time) to get what people (researchers, students, Phd students, ...) were looking for.

This has changed a lot during the recent years. These days you could build on ready-to-go solutions that allow implementing affordable

devices interoperable with other devices.

There is a **FREE IEC 61850 evaluation software** (Client and Server) available that could be used for building compliant clients and server: A DLL plus application software (executable and source code for the application).

<http://blog.iec61850.com/2012/08/c-server-and-client-application-source.html>

The DLL runs for six months ... but could be purchased as well.

Posted by [Karlheinz Schwarz](#) at [6:31 AM](#) [1 comment](#): 

Labels: [conformance](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Java](#), [open source](#)

Want to listen to an IEC 61850 User?

Nick R. Burnham (Network Rail, UK) has presented in a nice Webcast how they use IEC 61850 in the railway electrification within Network Rail:

"IEC 61850 is a standard that is now gaining pace within the Electrical Supply Industry and one that is under scrutiny by Network Rail. One of the key advantages offered by IEC 61850 is **interoperability** based on the fact a standard communications interface is implemented between substation devices. This allows the manufacturer to diversify specific functionality whilst allowing communication with other devices."

[Check the Webcast "Network Rail and IEC 61850, a user's perspective of the standard"](#) [15 minutes video]


His summary is as follows:

Summary

- Vendor Supplied Software at the Root of Most Issues
- Network Rail Approve Devices not Software... This Needs to Change
- Users Must Engage With Suppliers... User Revolution!
- Greater Expert Presence is Required in the UK

I fully agree with his experience: Users need more education and experience in order to reach a **balance** between vendors and users. Today usually the benefit is on the vendors side.

I appreciate the work Nick and other experts around him have accomplished!

Posted by [Karlheinz Schwarz](#) at [12:33 AM](#) [No comments](#): 

Labels: [education](#), [IEC 61850](#), [railways](#), [Substation](#), [Substation Automation](#), [Training](#), [users](#)

Friday, February 15, 2013

BDEW veröffentlicht Smart-Grid Umsetzungs-Roadmap

Der BDEW (Bundesverband der Energie- und Wasserwirtschaft) hat am 11. Februar 2013 einen Plan veröffentlicht, in dem beschrieben wird, wie und in welchen Schritten sich Smart Grids realisieren lassen:

BDEW-Roadmap: Realistische Schritte zur Umsetzung von Smart Grids in Deutschland

[Die Roadmap kann hier herunter geladen werden](#) [pdf, 3,6 MB].

Der Plan geht davon aus, dass die Umsetzung eher Jahrzehnte dauert als Jahre! Smart Grids werden über einen lang dauernden Marathon erreicht – Sprinter sind fehl am Platz!

In Bezug auf die nächsten zehn Jahre führt die Roadmap in der Executive Summary aus:

“... Das kommende Jahrzehnt wird hierbei in drei Phasen unterteilt:

- Die Aufbau- und Pionierphase (2012 bis 2014),
- die Etablierungs- und Ausgestaltungsphase (2014 bis 2018) sowie
- die Realisierungs- und Marktphase (2018 bis 2022).

Inhaltlich werden zehn Schritte unterschieden: Wichtige Grundlagen für Smart Grids werden durch stringente Regelungen zur Abgrenzung sowie Interaktion von Markt und Netz, die Entwicklung eines konsistenten rechtlichen und regulatorischen Rahmens, Forschung und Entwicklung sowie **die Erstellung von Standards und Normen geschaffen. Diese Grundlagen müssen so schnell wie möglich entwickelt werden.** Darauf aufbauend soll zum Einen die Weiterentwicklung der Infrastruktur erfolgen (Sensorik, intelligente Messsysteme, Netzautomatisierung, Energieinformationsnetz).“

Ganz wesentliche Grundlagen bezüglich Informations-Bereitstellung, – Modellierung und –Austausch sind mit den Normenreihen bereits definiert und im globalen Einsatz:

- IEC 60870-5-104 (traditionelle Fernwirktechnik),
- IEC 61850 (Informationsmanagement für alle Prozesse in der Energieversorgung),
- IEC 61400-25 (IEC 61850 für Windenergieanlagen),
- IEC 62351 (Informationssicherheit),
- IEC 6168/70 (CIM),
- ...

Ein wesentlicher Aspekt bei allen Betrachtungen ist natürlich – kaum überraschend! – die Finanzierung und Rentabilität der Umsetzungen! Bei aller Nüchternheit, die in der Roadmap vorherrscht, wurde ein ganz wesentlicher Aspekt ausgeblendet: Die Notwendigkeit, hinreichend viele **Ingenieure und Techniker so auszubilden**, dass sie mit den vielen neuen **elektrotechnischen (!!)** und **informationstechnischen (!)** Lösungen nachhaltige Versorgungssysteme entwickeln, bauen und nutzen können!

Alleine der Aspekt IEC 61850 ist so umfassend, dass er kaum eben mal nebenbei erlernt und verstanden werden kann. Immer häufiger verstehen die Verantwortlichen in vielen Energieversorgungsunternehmen, dass für die “Kleinigkeit” wie IEC 61850 eine Schulung nachhaltige Vorteile bringt. **Nur so können Anbieter und Anwender auf Augenhöhe miteinander verhandeln und zusammenarbeiten.** Das habe ich diese Woche wieder während eines Trainings zu IEC 61850 bei einem großen Kraftwerksbetreiber erlebt. Ohne Ausbildung sind die Mitarbeiter (junge, ältere oder auch alte Ingenieure) dem Wohl und Wehe der Anwender ausgeliefert!

Es wäre sehr zielführend, wenn der BDEW die Ausbildung in Richtung IEC 61850 (und anderer Normen) forcieren würde! Vor wenigen Jahren

war das Thema IEC 61850 weitgehend tabu!

Posted by [Karlheinz Schwarz](#) at 4:18 AM [No comments:](#) 

Labels: [Ausbildung](#), [BDEW](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [Roadmap](#), [seminar](#), [Smart Grid](#), [smart people](#), [Training](#), [Verteilnetz](#)

Thursday, February 14, 2013

IEC 61850 in the Joint EURELECTRIC-EDSO Smart Grid Position Paper

The "Union of the Electricity Industry" (EURELECTRIC) and "European Distribution System Operator for Smart Grids" (EDSO) have assigned a very high priority to the application of IEC TC 57 standards, e.g., IEC 61850, CIM, IEC 60870-5/-6, IEC 62351, ... in the paper "DSO PRIORITIES FOR SMART GRID STANDARDISATION".

End of January 2013 they have published a comprehensive position paper on the standardization for smart grids:

[Access the paper "DSO PRIORITIES FOR SMART GRID STANDARDISATION"](#) [pdf, 590 KB]

A key clause puts IEC 61850 on a high priority (excerpt of one example):

3.3. Extended field data modelling standards (IEC 61850) to support demand response, DER and VPP

"While the IEC 61850 standard was **originally** addressing applications and communications within the substation, recent work is being undertaken for **extending** its applicability to distribution automation applications integrating field devices located outside the substation fence. **With its object oriented structure, IEC 61850 can provide comprehensive and accurate information models for various components of distribution automation systems, as well as an efficient solution for this naturally multi-vendor environment.** Some typical applications include: Volt/Var Control (VVC), Fault Localisation, Isolation and Restoration (FLIR), Outage Management System (OMS), Distribution State Estimator, Distributed Generation and Demand response Management, Load Forecast and Modelling (LFM), and other.

IEC 61850 is the only international standard for substation automation which is open for future application. Currently IEC 61850 is extended for use outside substations. The use cases of the different distribution automation concepts need to be considered in the information data models. Therefore the IEC 61850 data models shall cover all distribution automation objects. IEC 61850 allows an open and flexible design and operation of communication networks. IEC 61850 not only provides a protocol for communication but is a whole new concept for naming and configuring substations and power grids. The normative definition of logical nodes for DER is necessary for new smart grid appliances because process devices have to be described in such logical nodes for information exchange. Therefore it is important that current valid logical nodes in process protocols are not subject to change in the further standardisation process and to enable new devices to seamlessly comply with existing protocols without proprietary vendor solutions."

Another key issue is the support of System interoperability operability testing!!

"A **system interoperability testing** method including conformance

testing, "**profiles**" and "test use cases", should be provided by the end of 2013"

More to come – keep tuned to this blog.

Posted by [Karlheinz Schwarz](#) at 10:02 PM No comments: 

Labels: [distribution automation](#), [EDSO](#), [Eurelectric](#), [IEC 61850](#), [IEC 62351](#), [Smart Grid](#), [smart people](#), [smart solution](#)

Monday, February 11, 2013

TÜV SÜD organizes IEC 61400-25 (IEC 61850) Interoperability Workshop on 18.-19. March 2013

The USE61400-25 user group focuses on minimizing the interoperability risks of communication between devices or/and systems claiming conformance to the IEC 61400-25 standard. In order to fulfill this goal, interoperability workshops are held periodically. The next workshop will be held on 18.-19. March 2013.

This interoperability workshop is free of charge for all current USE61400-25 members. **Nonmembers** are cordially invited to join the workshop as well. To subscribe for the interoperability workshop [please return the signed registration form to the testing team](#) [Word doc].

The interoperability workshop will be held at
TÜV Süd, Ridlerstr. 65, Raum E005
80339 München, Germany

18th and 19th of March 2013.

18th March: 13:00 – 18:00

19th March: 9:00 – 12:00

[Download invitation for the IEC 61400-25 Workshop](#) [pdf]

Please note that the standard IEC 61400-25 is based on IEC 61850 in general and on IEC 61850-8-1 (MMS Mapping) in particular. The MMS Mapping is – to my knowledge – the solution that is used in most applications. The interoperability test is thus also a kind of an IEC 61850 interoperability test. as can be seen from the registration form:

IEC 61850-8-1

Test object provided (Only for participants) ^a					
	Annex A ¹	Annex B ¹	Annex C ¹	Annex D ¹	Annex E ¹
	WEB SERVICES ^a	OPC XML-DA ^a	MMS ^a	IEC 60850-80-1 ^a	DNP3 ^a
Clients ^a	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Servers ^a	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

One of the supporting [turbine manufacturers that offers IEC 61400-25 connectivity is REpower](#). In a paper Repower published recently they referred to IEC 61850 as the basis for IEC 61400-25. [See also blog post on the paper](#).

Posted by [Karlheinz Schwarz](#) at 8:17 AM No comments: 

Labels: [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [TÜV SÜD](#), [USE61400-25](#), [wind power](#)

IEC 60870-5-104 and IEC 61850 for Vattenfall's VHP-Ready (Virtual Heat and Power Ready) Version 3.0

Vattenfall Europe Wärme AG has published Version 3.0 (October 2012) of their technical specification for virtual power plants: **VHP-READY – Virtual Heat & Power Ready**. This version comprises a complete profile of models for use of both standards. A detailed list of Signals respective Logical Nodes and Data Objects has been specified.

The new version specifies the use of IEC 60870-5-104 and IEC 61850:

- IEC 60870-5-104 or IEC 61850 / 61850-7-420 (two options)
- TCP/IP
- SSL/TLS
- SNTP/NTP

[Download the complete specification version 3.0](#) [German only, pdf, 670 KB].

This specification is exactly what the market needs to do: Specify in some level of details **what is required for a typical application!**

Congratulation to Vattenfall to lead the market (to a great extent) in preparing and presenting a publicly available specification of a profile for virtual power plants based on two international Standards: IEC 60870-5-104 and IEC 61850 (IEC 61850-7-420).

Posted by [Karlheinz Schwarz](#) at 1:06 AM No comments: 

Labels: [IEC 60870-5-104](#), [IEC 61850](#), [models](#), [security](#), [SNTP](#), [TLS](#), [Vattenfall](#), [virtual power plant](#)

Thursday, February 7, 2013

IEC 62351 added to SGIP Catalog of Standards

Thirteen new standards have been added to the SGIP's Catalog of Standards (CoS), bringing the total number of standards currently in the CoS to 56. The newly added standards include also IEC 62351:

IEC 62351 Parts 1 – 7

The scope of the IEC 62351 series is information security for power system control operations. The primary objective is to undertake the development of standards for security of the communication protocols defined by IEC TC 57, specifically the IEC 60870-5 series, the IEC 60870-6 series, the IEC 61850 series, the IEC 61970 series, and the IEC 61968 series. Another objective is to undertake the development of standards and/or technical reports on end-to-end security issues.

- IEC 62351-1: Communication network and system security – Introduction to security issues
- IEC 62351-2: Glossary of terms
- IEC 62351-3: Communication network and system security – Profiles including TCP/IP
- IEC 62351-4: Profiles including MMS
- IEC 62351-5: Security for IEC 60870-5 and derivatives
- IEC 62351-6: Security for IEC 61850
- IEC 62351-7: Network and system management (NSM) data object models

[Note also this paper on TLS security issues](#) (published the other day).

The Transport Layer Security (TLS) protocol aims to provide confidentiality and integrity of data in transit across untrusted networks. TLS has become the de facto secure protocol of choice for Internet and mobile applications. DTLS is a variant of TLS that is growing in importance.

That is why security experts should read the paper.

Posted by [Karlheinz Schwarz](#) at 9:59 PM No comments: 

Labels: [Catalog of Standards](#), [IEC 62351](#), [security](#), [SGIP](#), [TLS](#)

Monday, February 4, 2013

IEC 61850-Why all the Hype?

A report written by two ABB experts asks "IEC 61850-Why all the Hype?".

"This question was on the mind of the operations manager of a municipal utility when he visited the ABB Smart Grid Center of Excellence (CoE) in Raleigh, N.C. He was considering developing a smart grid substation standard design using IEC 61850. ... He wanted to determine whether the IEC 61850 **standard is all hype or could meet their requirements.**"

The report concludes: "Our visitor was satisfied with the performance and ease of **access to real-time data enabled by the IEC 61850** architecture. He said that the engineering definition and structure defined in the standard will **simplify engineering and integration for the technical team.** He was convinced that **building a system on the foundation of the IEC 61850** standard **would more than satisfy** the goals of increased operational efficiencies, maximized system interoperability and support for implementation of advanced applications, which will ensure long-term system viability."

[Download the report "IEC 61850-Why all the Hype?"](#) [pdf, 168 KB]

Posted by [Karlheinz Schwarz](#) at 12:46 AM No comments: 

Labels: [ABB](#), [engineering](#), [IEC 61850](#), [integration](#), [Smart Grid](#), [USA](#)

Aging Infrastructure drives Use of IEC 61850

The aging infrastructure in the electric power delivery system drives the application of IEC 61850 conformant products. One example is the application of optical sensors in Mexico: "... the last decade, over two hundred failures of conventional instrument transformers occurred in the Mexican Transmission Electric System. ... Since 2004, four projects were developed about optical current transformers (OCT's) to identify its advantages and shortcoming ... **demonstrating that it is now a reality a protection scheme using optical instrument transformers and Digital relays** interconnected using a network according to **IEC 61850-9-2.**"

The project was also presented at the DistribuTECH 2013 last week in San Diego:


Lessons learned from first multivendor 400 kV transmission line protection scheme using optical CTs and IEC 61850-9-2 process bus protection relays

by James Ariza - Megger
Carlos Melendez - CFE
Nicolas Juarez - CFE
Rodolfo Colon - IIE

The presentation concludes:

The first multivendor 400 kV transmission line protection scheme using an IEC 61850-9-2 digital network for optical CT's and digital protection has been successfully installed and is in operation since May 2011. Correct operation and interoperability have been demonstrated during the commissioning tests as well as real fault on the line.

[A paper on the same project was presented at Cigre 2012 it could be downloaded \[pdf, 586 KB\]](#)

Posted by [Karlheinz Schwarz](#) at [12:12 AM](#) [No comments:](#) 

Labels: [Ethernet](#), [IEC 61850](#), [IEC 61850-9-2](#), [optical sensors](#), [sampled value](#)

Friday, February 1, 2013

Second and third day of DistribuTECH in San Diego

The second day was similar compared to the first day. I have talked about IEC 61850 and IEC 61400-25 to many domain experts that showed serious interest in my training services. Most had been quite surprised that there is a global interest in IEC 61850.

When I showed them the list of the 175+ training sessions I conducted over the last 10 years, they were really amazed.

The documents I have handed-out at the exhibition are now available for download:

[General Information about IEC 61850, Smart Grid, products, ... \[pdf, 4.1 MB\]](#)

[Training information, program example, list of references \[pdf, 3.0 MB\]](#)

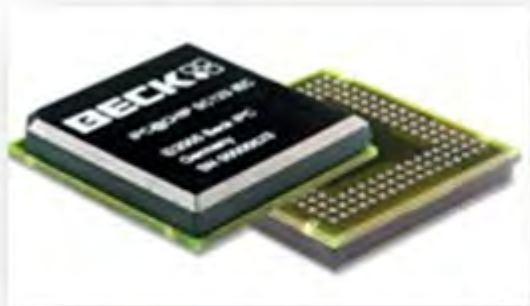
[Standards information, List of Logical Nodes, UML examples \[pdf, 850 KB\]](#)

[Brief description of Lite Gateway IEC 61850 / IEC 60870-5-104 \[pdf, 480 KB\]](#)

At the end of the day several interested people came by that wanted to learn more about IEC 61850 – they will be served today (Thursday, January 31, the last day of the DistribuTECH 2013).

The third day was quite busy. Several domain experts in the power distribution world contacted me to get the latest information regarding to IEC 61850.

Summary: This event was the most busiest and successful DistribuTECH I have visited since 2009! The situation regarding IEC 61850 is changing quite fast: vendors of various products for substations and distribution systems need to offer IEC 61850 connectivity even for IEDs that have been on the market for some time. One of the easiest and most convenient solutions seems to be the Beck IPC Chip that could be implemented on a small PCB and mounted in the existing housing – it's that easy:



More details on the chip, its architecture and IEC 61850 support could be found in the first document (General ...) listed above.

Posted by [Karlheinz Schwarz](#) at 3:46 AM [No comments:](#) 

Labels: [Beck Chip](#), [Distributech](#), [DNP3](#), [education](#), [Gateway](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Smart Grid](#), [SystemCorp](#), [Training](#)

Wednesday, January 30, 2013

First day of DistribuTECH in San Diego

This year's DistribuTECH exhibition seems to have a lot more booths than before. The huge hall has 34 rows full of large and small booths. When you walk the floor you see many products that provide IEC 61850 connectivity.



A lot of people I spoke to are in the process of developing IEC 61850 connectivity or are planning to do so in the near future.

The UCAIUG booth 1648 was visited by many people from all over:




The annual meeting of the UCAIUG IEC 61850 group focused on testing. The experiences show that IEC 61850 conformance tests are an absolute must for IEDs that claim to be conformant. But: The focus on testing will definitely move towards interoperability testing.

TÜV SÜD reported about their experience with testing. They are a strong supporter of interoperability testing. TÜV SÜD could play a major role in defining the needed requirements and rules and they could be a major organization to setting up test facilities.

ENTSO-E's activity to get involved in the quality improvement process of the standard and conformant products is welcome throughout the industry.

ENTSO-E has published a Research and Development Roadmap for the next 20 ... 30 years. Communication infrastructure is one of the key elements in the future power delivery system.

[Download the Roadmap.](#) [pdf, 1.7 MB]

Posted by [Karlheinz Schwarz](#) at 6:16 AM No comments: 

Labels: [conformance test](#), [ENTSO-E](#), [IEC 61850](#), [implementation](#), [interoperability](#), [interoperability tests](#), [UCA](#)

Tuesday, January 29, 2013

IEC 61850 and other protocols on embedded Platform

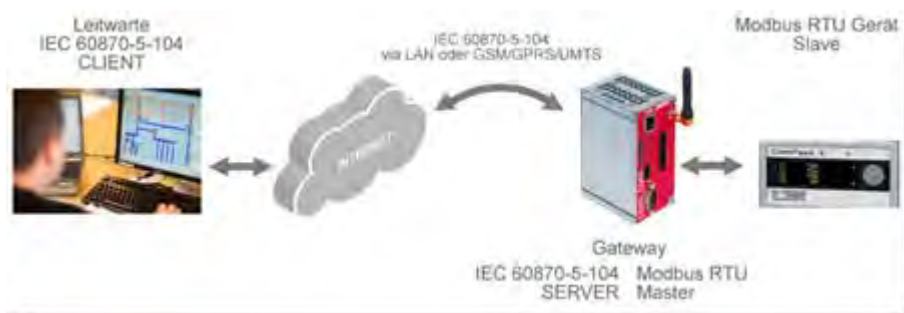
Beck IPC has launched a new website for their ready-to-go modules Com.Tom supporting many protocols to build a variety of applications that need to communicate through appropriate channels. The new website is now open in English as well:

<http://www.com-tom.de/products.php?l=en>



The core component of these boxes is the Beck IPC Chip that runs many protocols. Stack/API libraries for Protocols like IEC 60870-5-104, IEC 61850, Modbus, CANbus and many others are available and tested in applications.

See [References](#):



More to come soon.

These IEDs allow to implement various applications that require IEC 60870-5-104 or IEC 61850 connectivity or gateways in a short-time-to-market development. The protocol stacks come with an ready-to-go API. The APIs are using the same approach of Calls and Callback functions to be used by application software.

Posted by [Karlheinz Schwarz](#) at 4:49 AM No comments:

Labels: [Beck](#), [Beck Chip](#), [DNP3](#), [Gateway](#), [GPRS](#), [GSM](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [WiFi](#)

Sunday, January 27, 2013

Use of IEC 61850 for Electrical Systems Monitoring and Control in the Oil and Gas Industry

Laurent Guise and Patrick Montignies both from Schneider Electric Industries (Grenoble, France) have discussed the use of IEC 61850 for Electrical System Monitoring and Control Systems in the Oil and Gas Industry. The results can be found in a nice paper some years ago.

"Crucial industrial sites such as for Oil and Gas plants are requesting more and more **monitoring and control of their electrical installation** to increase the electricity availability of their process while optimizing the cost of operation.

While willing to implement an Electrical Monitoring and Control System (EMCS), users face the issue of choosing the right communication technology.

By the way an emerging technology – IEC 61850 – appears on the market. This technology promises real interoperability, while offering unprecedented capabilities for reducing the wiring and increasing the installation agility. Are all these promises a reality? What would be the most pragmatic way for taking the maximum benefits of this new technology while minimizing the risk? The object of this paper is to make a point of technology maturity, to identify the real benefits, but also some potential drawbacks.”

In the conclusion the authors state: “Is there a value to choose IEC 61850 for EMCS application? ... **there are definitely a lot of reasons for considering positively the usage of IEC 61850.**”

[Access the complete paper on IEC 61850 for Electrical System Monitoring and Control](#) [pdf]

Today, a few years after the paper was published, we can state that the situation has been improved since then. Especially the availability of **mature products for monitoring and control of any kind of processes and equipment installed in the many electrical systems** make it easy these days to implement IEC 61850 in short time to market – and for a reasonable price.

[To build a Gateway between IEC 61850 and any typically used RTU protocol is as easy as riding a bike.](#)

Posted by [Karlheinz Schwarz](#) at 3:50 PM No comments: 

Labels: [condition monitoring](#), [control](#), [DNP3](#), [gas](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [Modbus](#), [monitoring](#), [Oil](#), [Profibus](#)

Friday, January 25, 2013

Lite Gateway IEC 61850 to IEC 60870-5-104 at DistribuTECH in San Diego

NettedAutomation will demonstrate the following lite Gateway between IEC 61850 (process level with various I/Os) and IEC 60870-5-104 (RTU) at the DistribuTECH next week (29.-31. January 2013) in San Diego (booth 1648):



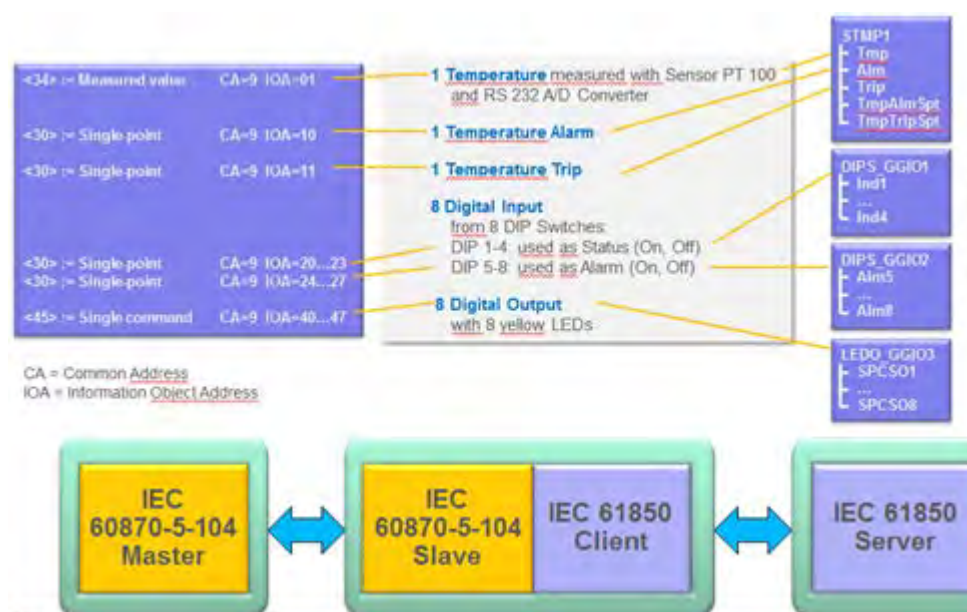
The components (HW and SW) can be used to build many useful topologies:

- Gateway IEC 61850 (client) to IEC 60870-5-104 (slave) – as shown in the picture

- Gateway IEC 60870-5-104 (master) to IEC 61850 (server)
- Gateway many serial links to IEC 60870-5-104 (slave)
- The two software packages from SystemCorp running on these platforms (IEC 61850 stack/API and IEC 60870-5-104 stack/API) can be used in any combination and with many communication channels (Ethernet, GSM GPRS, WiFi, Bluetooth, ...).
- The IEC 61850 server could – of course – be accessed directly by a remote client.
- Other protocols are available.

The box in the middle is a [Com.Tom Radio 2.0](#) and the right box is a [development kit DK61](#).

The following signals (data model) will be demonstrated:



I look forward to meeting you at the DistribuTECH in San Diego (CA) next week.

If you need help in using these lite components, please let us know.

Posted by [Karlheinz Schwarz](#) at 6:57 AM No comments:

Labels: [API](#), [application programming](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [lite](#)

Thursday, January 24, 2013

Is IEC 61850 held hostage by interoperability issues?

NO! There are in some cases minor issues that may have some impact on interoperability. In general: Interoperability at the communication level is provided!

Farel Becker and Andre Smit just published a paper with the title: "IEC 61850 feeds grid protection and control".

They ask: "IEC 61850 has been under scrutiny recently with claims of interoperability. But, are these claims valid? Can IEC 61850 improve and enhance protection and control system design today, or is it held hostage by interoperability?"

They conclude: "The functions and features, namely the use of GOOSE messages, made available today by the IEC 61850 standard can be used to greatly improve current substation and other application designs and help realize new methodologies to better protect, control

and automate the smart electrical grid of the future. **This, in itself, far outweighs perceived interoperability issues and keeps the industry on track to eliminate copper wires and expand system functionality and capabilities."**

[Read the complete paper "IEC 61850 feeds grid protection and control".](#)

Well written.

Posted by [Karlheinz Schwarz](#) at [11:39 PM](#) [No comments:](#) 

Labels: [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [interchangeability](#), [interoperability](#)

Sunday, January 20, 2013

Discount for Training one day prior to DistribuTECH 2013 San Diego (CA)

Discount for Training one day prior to DistribuTECH 2013 San Diego (CA):

TÜV SÜD conducts a One Day Seminar on IEC 61850 Edition 2, Security and Certification:

San Diego (CA)

January 28, 2013 (Monday, the day before the DistribuTech 2013 opens).

Please note the deeply discounted fee of **250 USD** !!!

Details:

<http://blog.iec61850.com/2012/12/tuv-sud-conducts-one-day-seminar-on-iec.html>

[Please contact us to get the discounted fee.](#)

Posted by [Karlheinz Schwarz](#) at [10:53 AM](#) [No comments:](#) 

Labels: [Distributech](#), [education](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [seminar](#), [Training](#), [TÜV SÜD](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Friday, January 18, 2013

SCADA Security at Iberdrola – Be serious about Security!


Iberdrola has been awarded a **2012 European SCADA Security Innovation Award**.

"Iberdrola is the largest energy company in Spain and operates multiple types of energy production plants (gas, coal, water, eolic, nuclear) in multiple countries in the European Union and Latin America. ... The history of Iberdrola is one of innovation. In early 2000 Iberdrola decided to create the CMDS, **a 24x7 Monitoring Center for the operations of their Critical Infrastructure**. Inside the scope of the CMDS, and with a codename of AURA, a long-term security program for the in-depth security of their SCADA networks was put in motion. ... In 2011, Iberdrola started two of the latest and most innovative projects to date: AURA.MARS and AURA CONSEG. ..."

[Read the press release from SANS.](#)

[Comprehensive presentation from Iberdrola "Step by Step: The Journey to Secure SCADA Systems"](#) [pdf, 5,3 MB]

It is really crucial to be serious about Security!!

Posted by [Karlheinz Schwarz](#) at [6:20 AM](#) [No comments:](#) 

Labels: [power systems](#), [SCADA](#), [security](#), [utilities](#)

Monday, January 14, 2013

IEC 61850 Extensions for Fault Passage Indications (FPI)

First Committee Draft (38/436A/CD) of IEC 62689-1 accepted by end of 2012: **Current and Voltage sensors or detectors, to be used for fault passage indication purposes** - Part 1: "General principles and requirements".

This standard will introduce a dedicated (extended) **IEC 61850 namespace** (based on existing and new Logical Nodes and Data Objects) to support integration of FPIs into power utility automation. In addition, it defines **different profiles of communication interfaces** to support the different cases of usage of these FPIs. Some of these cases of usage relies on the "concept" of extended substation, which is intended as the communication among IEDs through IEC 61850 located both along MV feeders and in the main substation, for most sophisticated FPIs version (for smart grids applications, for instance). Then such profile may not be limited to FPI devices, but may embrace features needed to support extensions of these substations along the MV feeder connected to the main substation themselves.

The scope of this standard is to define the minimum requirements for Fault Passage Indicators (FPIs) which are devices able to detect faults,

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[IEC 61850 For Water Supply System](#)

on networks from 1 kV up to 52 kV, providing indications about their localization (upstream or downstream the FPI's location) or about the direction of fault current. The localization (upstream or downstream) or the direction of the fault current may be detected directly from the FPI and/or from a central system using information from more FPIs and/or considering the features of the feeder/network where the FPI is installed (for instance in case of over-currents in radial operated networks without GD or in case of phase to earth faults in solid earthed radial operated systems).

Part 2 of the standard series will contain the dedicated (extended) **IEC 61850 namespace** (based on existing and new Logical Nodes and Data Objects).

Posted by [Karlheinz Schwarz](#) at 7:20 PM No comments: 

Labels: [distribution automation](#), [fault passage indication \(FPI\)](#), [IEC 61850](#), [IEC 62689-1](#)

IEC 61850 as Digital Interface for Instrument Transformers

The CDV (Committee Draft for Voting) of IEC 61869-9: Instrument Transformers - Part 9: "**Digital interface for instrument transformers**" is out for ballot and comments until 2013-03-01.

This document will replace and extend the so-called "9-2LE" that defines the first profile (or subset) of IEC 61850 for voltage and current sensors (Merging Units).

The new standard is based on experience gained since the publication of "9-2LE". There are a lot of new details in the configuration and description of the information models defined – in order to reduce the number of options.

The IEC 61869-9 standard will (when published):

- Replace IEC 60044-8 digital solution.
- Provide a product standard for instrument transformers with a digital interface according to 61850; similar to what IEC 62271-3 is doing for switchgear.
- Be backward compatible with the UCA International Users Group's Guideline for Digital Interface to Instrument Transformers Using IEC 61850
- Use IEC 61588-Ed2 for time synchronization, with an option for 1PPS.
- Be applicable for AC and DC measurements.
- Be using 100 Mbit/s or 1 Gbit/s Ethernet.
- Specify 4.800 digital output sample rate with 2 sets of values per message (2.400 messages/s) for general measuring and protective accuracy classes, regardless of the power system frequency.
- Specify 14.400 digital output sample rate with 6 sets of values per message (2.400 messages/s) for quality metering accuracy class, regardless of the power system frequency.
- Specify 96.000 digital output sample rate with 1 set of values per message (96.000 messages/s) for DC instrument transformer applications [likely to using high speed Ethernet end-to-end].

Proposed conformance classes are (with detailed PICS in the draft):

- class a: the minimal set of services required to transmit MU data using sampled values;
- class b: class a capabilities plus the minimal set of services

[Peak Load Shaving with Batteries – Isn't that smar...](#)

[The Intelligent Energy Network of the Future – IT'...](#)

[Hydro-Québec's Vision in their Distribution System...](#)

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► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

required to support GOOSE messages;

- class c: class b capabilities plus the implementation of the IEC 61850 series' information model self-descriptive capabilities;
- class d: class c capabilities plus services for file transfer and either one or more of unbuffered reporting, buffered reporting, or logging.

Posted by [Karlheinz Schwarz](#) at 7:08 PM No comments: 

Labels: [current](#), [IEC 61850](#), [IEC 61850-9-2](#), [IEC 61869](#), [IEC 61869-9](#), [merging unit](#), [sampled value](#), [Sensors](#), [voltage](#)

IEC 61850 Extensions for Control Systems in Thermal Power Plant

Part 90-13 of the IEC 61850 series is under way. The draft document specifies the additional common data classes, logical nodes and data objects required for the use of IEC 61850 **in** Thermal Power Plants.

Some years ago the **power plant control systems** started to connect to the **power plant internal power delivery system** for the power loads inside a power plant.

In a whitepaper dated 2007 Joerg Orth, ABB AG, Mannheim, published an interesting white paper on the connection **between** the two systems based on IEC 61850: "Future power plant control - Integrating process & substation automation into one system"

"Today's power plants are highly automated. All subsystems of large thermal power plants can be controlled from a central control room. One subsystems area is the electrical auxiliaries for the unit transformer, the grid connection, excitation, synchronization, generator/unit protection, auxiliary transformers, HV-, MV- and LV-switchgear. In the past, these electrical devices **were all hardwired to the DCS and I/Os**. To this day, horizontal communication between electrical devices is still hardwired. In the last decade, serial communication protocols were introduced. Unfortunately, standardization of these protocols went in different directions. Today there are several standards on the market. ... The future is talking **IEC 61850 providing solutions for seamless integration concepts** for new and refurbishment projects."

These days the development goes a step further: IEC 61850 extensions for power plant **internal (!) control** functions. This is a new approach for internal control functions, because it has an impact on the power plant control system – not only on the internal and external substations.

The current draft of IEC 61850-90-13 defines, for example the following specific Logical Nodes for Thermal Power Plants:

EJCL	Power plant joint control function.
ESEQ	Start / stop sequencer.
ESPD	Speed monitoring.
EGTU	Gas turbine production unit.
EUNT	Thermal unit operating mode.
ESTU	Steam turbine production unit. For some data objects see below
EBCL	Boiler control function.
...	...
MENV	Environmental data

MGAS	Gas-flow measurement.
MOIL	Oil-flow measurement.
MSTE	Steam-flow measurement.
MEXH	Exhaust Gas Mass Flow.
...	...

Draft **settings** of the LN **ESTU** (Steam turbine production unit):

Turbine type (steam, gas, oil)
Turbine rated speed [s ⁻¹]
Turbine moment of inertia J [kgm ²]
Maximum transient overspeed [s ⁻¹]
Runaway speed [s ⁻¹]
Rated power in turbine mode [MW]
Rated flow in turbine mode [kg/s]
High pressure inlet maximum pressure [Pa]
Intermediate pressure inlet maximum pressure [Pa]
Low pressure inlet maximum pressure [Pa]
High pressure control valve rated oil pressure [Pa]
High pressure control valve rated closing time [s]
Intermediate pressure control valve rated oil pressure [Pa]
Intermediate pressure control valve rated closing time [s]
Low pressure control valve rated oil pressure [Pa]
Low pressure control valve rated closing time [s]

As can be seen from this example, IEC 61850 arrived at the modeling and communication of the power plant internal control system level. More to come. The draft has been written by the IEC TC 57 WG 18. It will be discussed at its next meeting in March 2013 in Nice (France). WG 18 has already published the LNs for **Hydro Power Plants** (IEC 61850-7-410 Ed2).

[ABB Whitepaper on IEC 61850 in Power Plants written in 2007 by Joerg Orth](#) [pdf]


Posted by [Karlheinz Schwarz](#) at [1:01 AM](#) [No comments:](#) 

Labels: [ABB](#), [IEC 61850](#), [iec 61850-7-410 Edition 2](#), [thermal power plant](#)

IEC 61850 For Water Supply System

The **Hanover water supply** implements an IEC 61850 based protection and control system for a new 6 kV switchgear solution. As this example shows, IEC 61850 is used also in medium voltage power systems outside typical substations of power utilities.

[Read complete report "Secured power supply for Fuhrberg waterworks with ABB switchgear and Relion® protection"](#) [pdf]

Posted by [Karlheinz Schwarz](#) at [12:15 AM](#) [No comments:](#) 

Labels: [ABB](#), [IEC 61850](#), [protection](#), [Substation](#), [Substation Automation](#), [water works](#)

Friday, January 11, 2013

Peak Load Shaving with Batteries – Isn't that smart?

What does a power system make smart? Smart meters? Hm, ... there

are many possibilities to make the energy delivery smarter.

One interesting approach is to **shave peak load with batteries**. I guess this is known for decades! Isn't it? More and more people are digging into the possibilities to do it in large scales.

A team of researchers has published an interesting paper with the title: "Using Batteries to Reduce the Power Costs of Internet-scale Distributed Networks". They came to the conclusion that batteries could **save up to a third of power costs** ... you don't believe it? Read the paper:

[Download paper "Using Batteries to Reduce the Power Costs of Internet-scale Distributed Networks"](#).


IEC 61850 based monitoring and control systems could help to get the job done! The basic tools (embedded controllers with IEC 61850 servers and clients) are available. Let's use them. Battery models are already defined (and under development) in IEC 61850-7-420. The following is a proposal for battery management for IEC 61850-90-9:

3.1 LN: Battery Management System

Name: DBMS

DBMS class																					
Data name	CDC	Explanation	M/O/C																		
LNName		Shall be inherited from Logical-Node class (see IEC 61850-7-2)																			
System logical node data																					
		LN shall inherit all mandatory data from common logical node class	M																		
		Data from LLN0 may optionally be used	O																		
Status information																					
OpMode	ENS	<div>Operating mode:<table><tr><th>Value</th><th>Explanation</th></tr><tr><td>0</td><td>Not applicable / Unknown</td></tr><tr><td>1</td><td>Standby</td></tr><tr><td>2</td><td>Charging</td></tr><tr><td>3</td><td>Discharging</td></tr><tr><td>4</td><td>Balancing</td></tr><tr><td>5</td><td>Maintenance charge</td></tr><tr><td>6</td><td>Error</td></tr><tr><td>99</td><td>Other</td></tr></table></div>	Value	Explanation	0	Not applicable / Unknown	1	Standby	2	Charging	3	Discharging	4	Balancing	5	Maintenance charge	6	Error	99	Other	M
Value	Explanation																				
0	Not applicable / Unknown																				
1	Standby																				
2	Charging																				
3	Discharging																				
4	Balancing																				
5	Maintenance charge																				
6	Error																				
99	Other																				
WhRem	ASG	Energy capacity at last full charge	O																		
VHiLim	ASG	Highest allowed DC bus voltage at present operating state	M																		
VLoLim	ASG	Lowest allowed DC bus voltage at present operating state	O																		
ChgALim	ASG	Highest allowed charging current at present operating state	M																		
DisALim	ASG	Highest allowed discharging current at present operating state	M																		
OvrVAIm	SPS	Module/cell overvoltage alarm	O																		
UndVAIm	SPS	Module/cell undervoltage alarm	O																		
OvrTmpAlm	SPS	Module/cell over temperature alarm	O																		
UndTmpAlm	SPS	Module/cell under temperature alarm	O																		
ChgOvrAAIm	SPS	Charge current limit alarm	O																		
DisOvrAAIm	SPS	Discharge current limit alarm	O																		
ShCtAlm	SPS	Module/cell short circuit alarm	O																		
EqTms	ASG	Time to next equalisation	O																		
EqDurTms	ASG	Duration of next equalisation	O																		
ChgRampLim	ASG	Highest allowed charge ramp rate	O																		
DisRampLim	ASG	Highest allowed discharge ramp rate	O																		
Measured values																					
MaxCelTmp	MV	Highest cell temperature	O																		
MaxCelV	MV	Highest cell voltage	O																		
MinCelTmp	MV	Lowest cell temperature	O																		
MinCelV	MV	Lowest cell voltage	O																		

More battery related models are underway.

Posted by [Karlheinz Schwarz](#) at 3:37 AM [No comments:](#) 

Labels: [batteries](#), [IEC 61850](#), [IEC 61850-90-9](#), [load shaving](#), [Smart Grid](#), [smart](#)

Saturday, January 5, 2013

The Intelligent Energy Network of the Future – IT'S HERE TODAY

The project Web2Energy is one of the first projects that implements **TODAY** a crucial "Intelligent energy network of the future". When the project started some years ago, the aim was far in the future. But today (early 2013): The **objective of the project has already been implemented!**

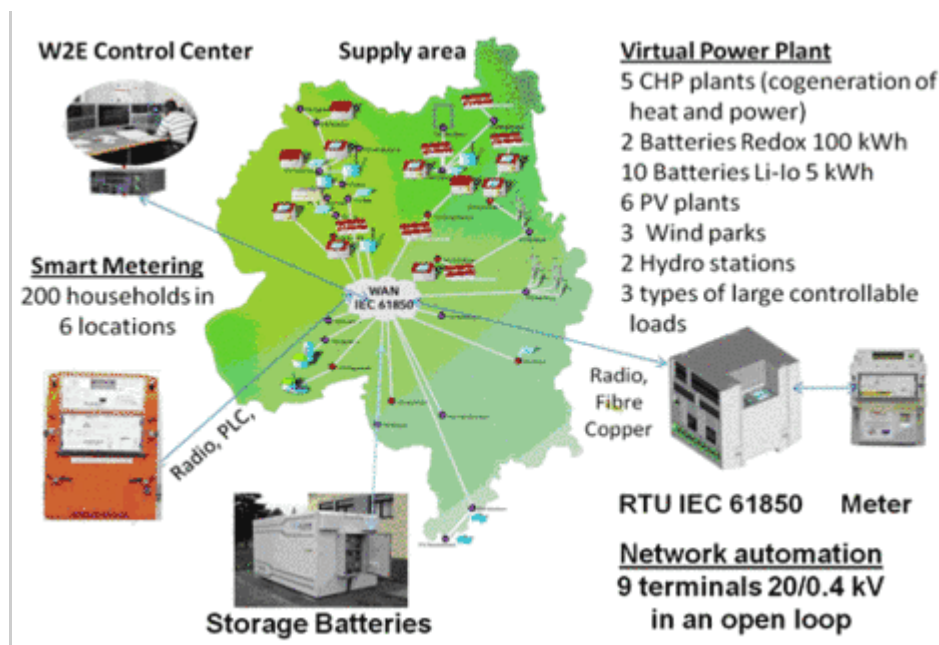
HSE AG ([HEAG Südthessische Energie AG](#)) invited several partners to establish a Smart Grid in their energy supply system by installation of communication links to power producers, grid terminals and the consumers.

The second year of the project was the most significant period. 4 complete work packages had to be finalized coordinated by a successful project management:

1. Application of the **IEC 61850 standard** for the whole communication system
2. Design und Architecture of the Information- and Communication Systems
3. W2E – Control centre based on CIM – data face (Common Information model in accordance with **IEC 61968/70**)
4. Installation of the innovative solution components and preparation of the trial operation.

Thanks to the involvement of experienced domain and standards experts like Dr. Michael Buchholz, Christoph Brunner, Maco Jannsson, and other experts, the project has become a big success for the realization of Smart Grids and the use of IEC 61850 and IEC 61968/70 (CIM).

It was estimated that such a high volume of approvals of new solutions in the practice of distribution networks – at it is shown in the following Figure – **is first time realized worldwide**. It builds an important basic for the prospective dissemination of the innovations for "Smart Distribution" ... based on IEC and CIM:



Source: Web2Energy

The Website of the project provides a huge number of up-to-date papers describing the project, the reached objectives, how IEC 61850 and CIM are used ... to build a real Smart Grid.

[Website with links to some 40 papers and reports – many about IEC 61850.](#)

For example the paper

[Seamless data communication and management over all levels of the Power Systems](#)

by A. Naumann, B.M. Buchholz, P. Komarnicki, C. Brunner

concludes as follows:

"In the framework of the European lighthouse project WEB2Energy with 14 European partners from 6 countries the 3 pillars of Smart Distribution are first time integrated and executed in the real operations of the 20 kV distribution network of the "HEAG Südheissische Energie AG" around Darmstadt. The complete communication loop from the network control centre down to the electric sockets of the consumers is seamless closed by the **strong application** and the needed extensions of **the communication standard system IEC 61850**. ... The impact of the project findings on the further work on both standard series is considered. The results of the project have a pilot character but the **servers RTU** and **battery boxes** are brought to **maturity for praxis applications**. These products are open for further use."

The IEC 61850 Stack/API from [SystemCorp](#) have been used for the IEC 61850 connectivity.

The **wait for Smart Grid solutions is over** – thanks to Smart people applying smart standardized solutions.

Posted by [Karlheinz Schwarz](#) at 6:12 AM No comments:

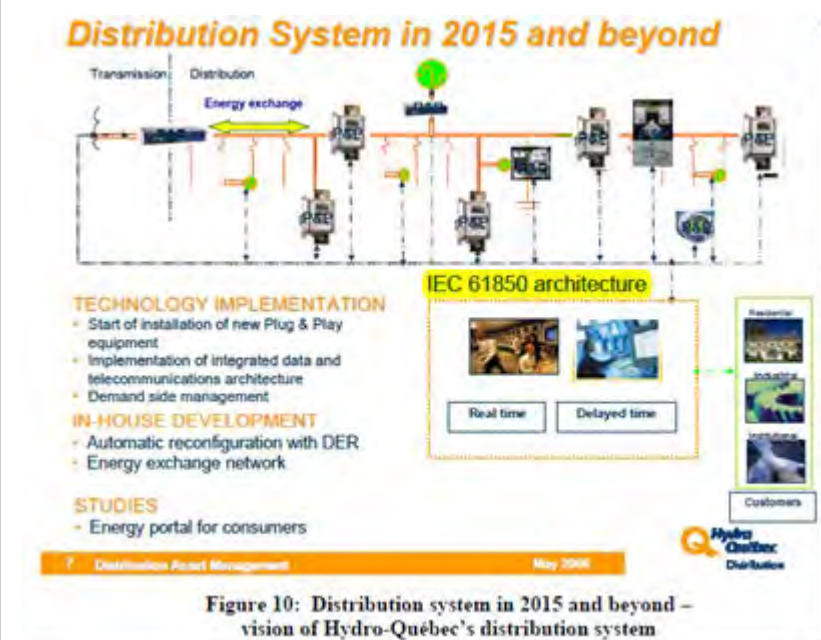
Labels: [Brunner](#), [Buchholz](#), [CIM](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [Smart Grid](#), [smart people](#), [smart solution](#)

Thursday, January 3, 2013

Hydro-Québec's Vision in their Distribution System Automation Roadmap from 2005 becomes True

Hydro-Québec published an interesting Vision in the "Distribution System Automation Roadmap – 2005–2020" already in 2005. Now, 2013 (some eight years later) we can say that their expectation was quite written.

For the period 2015 – 2020 they expected (in 2005!) that the "Equipment interoperability standards should be completed. The controlled island and energy exchange network possibilities will be better known following the developments from 2010 to 2015, and more specific projects will be started up." The overall communication system they expected after 2015 is IEC 61850! See figure from the Report:



Their estimation is still valid and applicable to many other utilities, countries and regions. I wish more utilities in 2013 will develop their detailed Roadmap how to get prepared for the future energy systems control and automation – if they take IEC 61850 into account or not! Installing huge amounts of IEDs and collecting 100.000's of data points is an issue that has to be considered carefully.

Hydro-Québec implemented a huge network to "manage the **450,000 data points** generated from the first phase of the project, 5 regional control centers front end systems were setup to receive the information. ... more than **2000 persons are involved** with the project, directly or indirectly. The **sheer quantity of data** produced by the pole-top devices makes it attractive and useful to a wide range of groups. ... We had planned the technology side in detail and very carefully, we also had planned the human factor (we thought). Today, looking back, we realize the technology aspects have been easy to handle and work with when required, but **the sheer number of people involved** has created an environment which is currently slow to react. ..."

[Download the Case Study "Utility Automated and Integrated Data & Control for 4000 Pole-Top Switches and Protection Relays" to read more about the project](#) [pdf, 68 KB]

As noted several times it is crucial to understand that IEC 61850 (when it's applied in the near future more often in the distribution world) is a solution that is intended to provide long-term unification – and that will require a "sheer number of people" that need education in how to use IEC 61850 based systems.

Haste makes Waste!!

[Download the complete Roadmap dated 2005](#) [pdf, 1.6 MB].

Posted by [Karlheinz Schwarz](#) at 4:54 AM [No comments:](#) 

Labels: [distribution automation](#), [Hydro Quebec](#), [IEC 61850](#), [Roadmap](#), [Training](#)

Tuesday, January 1, 2013


January 28-31, 2013 – The next Chance to Meet you at the DistribuTech 2013 in San Diego (CA)

Just as a quick reminder, the next possibility to meet you is from January 28-31, 2013 in San Diego (CA):

- One day training with TÜV SÜD
- DistribuTech booth of the UCA International Users Group [Booth 1648]

[More details could be found here.](#)

I look forward to seeing you there.

Posted by [Karlheinz Schwarz](#) at 7:29 AM [No comments:](#) 

Labels: [Distributech](#), [education](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [seminar](#), [Training](#)

January 01, 2013 – First Successful Use of Public Information on IEC 61850 in 2013

First of all, I hope that the New Year 2013 will bring you **peace**, **health**, **success**, and **happiness** – as well as a **better understanding** of IEC 61850, IEC 60870-5-10x, DNP3, IEC 62351 and how these standards can be applied to provide open and secure information exchange in the energy world.

One of my objectives in 2013 will be to continuously provide you useful information about the use of the above listed standards and related issues.

One of the first experts that retrieved 2013 useful information on IEC 61850 provided by Karlheinz Schwarz wrote me today (2013-01-01):

*"But I was inquisitive and was looking for more on this topic. Interestingly, I found a wonderful document, **WRITTEN BY YOU**, at*

http://www.nettedautomation.com/download/pub/DT-Tampa-Paper_2010-03-24.pdf.

Page 15/16 of this document describes the matter [of statistical and historical statistical information models] clearly. I need to read this one more time to understand deeply. But I am writing this email to just to let you know that I am getting sincerely impressed with your work on IEC standard. I am feeling lucky that I am in touch with you.

Regards, ..."

Thanks a lot.

Enjoy the huge source of information provided by one of the most experienced experts in the field of information exchange for energy systems.

Posted by [Karlheinz Schwarz](#) at 7:20 AM [No comments:](#) 

Labels: [2013](#), [DNP3](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [open standards](#),

[security](#)

Saturday, December 29, 2012

Cyber Incidents grew in 2012 – High in Energy Sector

"The Department of Homeland Security's United States **Computer Emergency Readiness Team** (US-CERT) leads efforts to improve the nation's cyber security posture, coordinate cyber information sharing, and proactively manage cyber risks to the Nation while protecting the constitutional rights of Americans. US-CERT strives to be a trusted global leader in cyber security—collaborative, agile, and responsive in a dynamic and complex environment." ([Source: US-CERT](#))

The organization just published a must-read [summary document covering various issues from the last three months \(October – December 2012\)](#). You will find a bunch of very useful information about what has happened and what could happen next.

One focus of US-CERT is the energy sector: From October 2011 to September 2012 "ICS-CERT received and responded to **198 cyber incidents** as reported by asset owners and industry partners. **Attacks against the energy sector represented 41 % of the total number of incidents.**"

The large-scale and fast growing deployment of IEDs (Intelligent Electronic Devices) in the whole energy sector (including the huge domain of electric power systems) necessitates the **development and application of appropriate security measures**.

The year 2013 will be a challenging year to keep the power flowing: the aging infrastructure, the need for smart generation, delivery, and use of power **requires smart people that will develop smart processes and smart devices**. And: All decisions and solutions to keep the power flowing, the sky blue and grass green **MUST be accompanied with existing and new security measures!**

Security is more than just a buzzword!

I hope that the responsible managers in power systems have increased the budget for increasing security activities for 2013 (and beyond).

Posted by [Karlheinz Schwarz](#) at [9:52 PM](#) [No comments:](#) 

Labels: [Cyber Security](#), [security](#)

Friday, December 28, 2012

IEC 61400-25 is based on IEC 61850

During the year 2012 I have received more often the question about the relation between IEC 61400-25 and IEC 61850.

The most crucial issue in understanding IEC 61400-25 is this: The standard series IEC 61400-25 is based on the series IEC 61850 (mainly part 7-x, 8-1). A lot of definitions and basics defined in IEC 61850 are not repeated in IEC 61400-25. The part 6 (Configuration language) is not referenced in IEC 61400-25 at all and so on.

Could part IEC 61850-6 be used for IEC 61400-25? Yes, it could be used in almost all implementations of IEC 61400-25. Why? Because usually the implementation of the communication uses the mapping to MMS according to IEC 61850-8-1 which is referenced in IEC 61400-25-

4.

To really understand IEC 61400-25, one needs to have a very good basic understanding of IEC 61850.

The standard IEC 61850 could be understood as extended IEC 61850 information models. There are a few special definitions in IEC 61400-25-2 which deviate partly from IEC 61850-7-3 and 7-4.

Example: LN WGEN – Generator

That model comprises among other data objects the objects for 3 phase currents and voltages for the stator and for the rotor:

StaPPV	DEL	Generator stator 3 phase phase-to-phase voltage
StaPhV	WYE	Generator stator 3 phase phase-to-ground voltage
StaA	WYE	Generator stator 3 phase current
RtrPPV	DEL	Generator rotor 3 phase phase-to-phase voltage
RtrPhV	WYE	Generator rotor 3 phase-to-ground voltage
RtrA	WYE	Generator rotor 3 phase current

The argument why the electrical measurements are contained in the LN WGEN is simple: The Generator generates voltages and currents ... so these measurements are an integral part of the generator! Full stop. In IEC 61850 the modeling approach is to find the smallest parts of information to be exchanged by a function to be modeled.

The electrical measurements in IEC 61850-7-4 are contained in the LN MMXU. To indicate the use for the stator or rotor could be indicated by a prefix in the instance name: Sta_MMXU.A and Rtr_MMXU.A.

PPV	DEL	Phase to phase voltages (VL1,VL2, ...)
PNV	WYE	Phase to neutral voltage
PhV	WYE	Phase to ground voltages (VL1ER, ...)
A	WYE	Phase currents (IL1, IL2, IL3)

Note how the instance names are build (according to IEC 61850-7-2 Edition 2):

LNName	[LN-Prefix] LN class name [LN-Instance-ID]
LN-Prefix	m characters (application specific); it shall start with an alpha character
LN class name	4 alpha characters, upper case (for example, logical node name as defined in IEC 61850-7-4)
LN-Instance-ID	n numeric characters (application specific) m+n ≤ 12 characters

During the ongoing maintenance work on the first five parts of IEC 61400-25 it could be expected that the information models of IEC 61400-25-2 and IEC 61850-7-x will be harmonized as much as possible.

Note that the models may be different – there may be two model, but there is only one real world. The real world does not change depending on models! On the other side, models should be harmonized to a high degree ... to prevent confusion. I have seen models implemented for a wind turbine that use MMXU instead of the models in WTUR.

The key issue is: different people and groups have different understanding of modeling!

Posted by [Karlheinz Schwarz](#) at [1:35 AM](#) [No comments:](#)

Labels: [harmonization](#), [IEC 61400-25](#), [IEC 61850](#), [modeling method](#), [models](#)

Monday, December 24, 2012

Europe: Smart Grid Standards are Here or on the Way

Just before end of 2012 a set of comprehensive documents provided by the CEN-CENELEC-ETSI Smart Grid Coordination Group (SG-CG), being responsible for coordinating the ESOs reply to M/490 (Mandate), have been published.

In 2012, the SG-CG worked intensively to produce the following reports (approved by the CEN and CENELEC Technical Boards in December 2012 - to be approved by ETSI Board early January 2013):

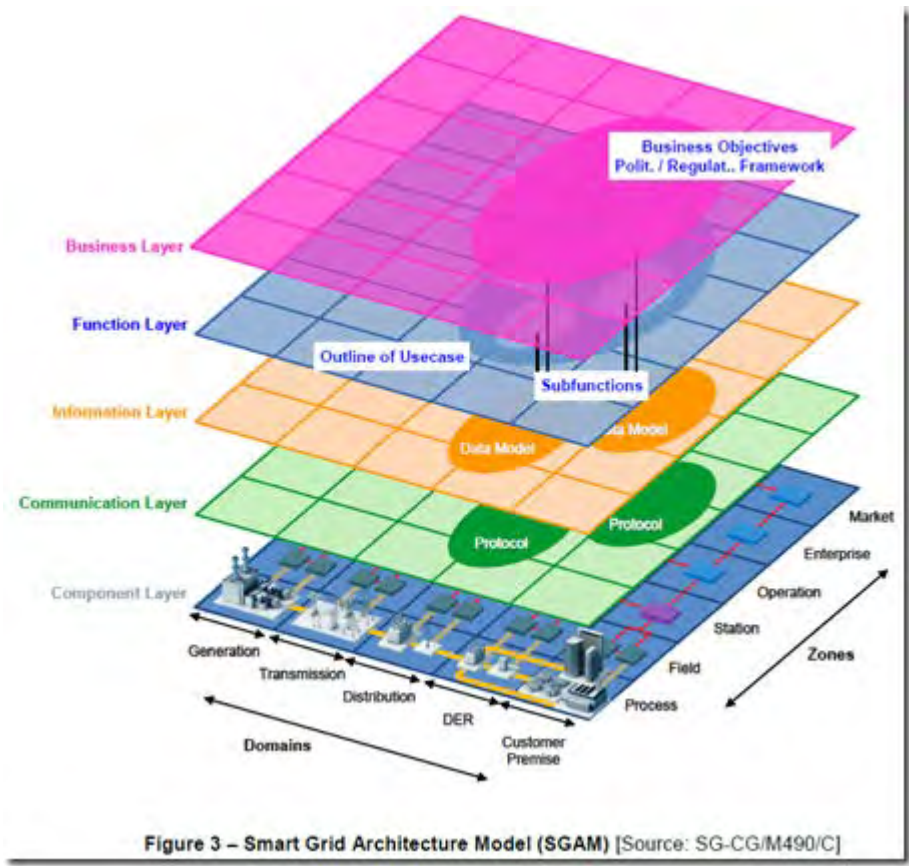
- [Reference Architecture](#)
- [First Set of Consistent Standards](#)
- [Sustainable Processes](#)
- Investigate standards for [information security and data privacy](#)

In addition, SG-CG produced a [Framework Document](#) which provides an overview of the activities. It describes how the different elements mentioned above fit together as to provide the consistent framework for Smart Grids, as requested by M/490.

The documents are very comprehensive and detailed! It is really surprising what experts have put together in relatively short time!! Congratulation!

Please find two small excerpts form the above listed documents:

The Smart Grid Architecture Model (SGAM) provides some kind of overview about the complexity of the European Power Grid (applicable globally) – the available standards and those that need to be defined are positioned in that model:



The model could be used as a guideline.


The CEN-CENELEC-ETSI Smart Grid Coordination Group published a “First Set of Standards” ... no surprise that IEC 61850 plays a major role today and in the future. Example excerpt:

	Generation				Transmission				Distribution				DER	
Standard	Generation management system	Substation automation systems	EMS Scada system	WAMS	FACTS	Substation automation systems	Feeder Automation	Distributed Power Quality control system	FACTS	DMS SCADA and GIS system	DER management systems	DER EMS and VPP systems		
EN 61400-25		X				X	X	X						
EN 61400-25-2	X										X	X		
EN 61400-25-3											X	X		
EN 61400-25-4											X	X		
EN 61508														
EN 61850-6		X		X	X	X	X	X	X		X	X		
EN 61850-7-1														
EN 61850-7-2	X	X		X	X	X	X	X	X		X	X		
EN 61850-7-3	X	X		X	X	X	X	X	X		X	X		
EN 61850-7-4	X	X		X	X	X	X	X	X		X	X		
EN 61850-7-410	X	X				X	X	X			X	X		
EN 61850-7-420		X				X	X	X			X	X		
EN 61850-8-1	X	X		X		X	X	X			X	X		
EN 61850-9-2	X	X		X		X	X							

There are – of course – many other standards listed.

In the coming years there is a need for more simple and secure IEC 61850 based devices that could provide the huge amount of signals from and for the process and field zones for power generation, transmission, distribution, DER and customer premises.

The [com.tom components](#) (implementing IEC 60870-5-104, -103, IEC 61850, IEC 61400-35, DNP3, ...) are likely to play a major role.

Posted by [Karlheinz Schwarz](#) at [10:00 PM](#) [No comments:](#) 

Labels: [CEN](#), [CENELEC](#), [CIM](#), [ETSI](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC 62351](#), [Smart Grid](#), [smart solution](#)

Friday, December 21, 2012

Pay Now Or Later! Life Cycle Cost of Automation System neglected

People responsible for huge automation projects can focus on the **cost for installing and commissioning** a system OR on the cost for **operating and maintaining** a system. A reasonable approach would be to figure out what the **System Life Cycle Cost** are likely.

Yesterday I read in a technical magazine about a very bad example of focusing first on minimum costs for installing and commissioning and neglecting System Life Cycle Cost. In this case the whole automation system is completely refurbished a few years after the system was put in operation. The refurbishment has cost some 15.000.000 Euro. Unbelievable.

The 2 times 34.6 km "Lötschberg Alpine Base Tunnel" (Switzerland) was build between 1999 and 2007. The project's cost were some 4.000.000.000 Euro. The crucial priority for building the tunnel was meeting the calculated costs and deadlines for opening the tunnel for operation. The project was finished on time and the costs were in the limits set! Perfect! ... compared to many huge projects ...

But! A running system has to run for years! Very often little efforts are spent to assure that the system remains "clean" and maintainable and expandable even after many years.

In the case of the Lötschberg Tunnel the operation costs were far to high due to the fact that there were very little efforts made during planning and engineering phase to allow a smooth information flow between the many devices and systems. There were many **islands of information**.

The technical infrastructures had been tendered and realized as separate systems for: Fire protection, Ventilation/ A/C, Lighting control, Escape and evacuation, Cross tube doors, Power supply, Water supply, ... Many gateways, protocol inverters, and and had to be installed to let **components communicate and share information**. The 24*7 operation of the tunnel required personnel on site to run behind alarms: during the first year of operation the many systems produced between 1.000 and 5.000 Alarms per day (!!!). Even after some improvement two experts had to process some 30 alarms per day ... causing operating costs (including the people to look after the alarms) of some 4.000.000 Euro per year!

This was far to high!

What to do now? It was decided soon (in 2009) to refurbish the complete automation and SCADA system build mainly by a SINGLE vendor's solution. Cost for refurbishment: some 15.000.000 Euro. The new system is scheduled to take over the control of the tunnel mid 2013. The operation and maintenance cost are expected be reduced from 4.000.000 Euro to 1.500.000 Euro per year. WOW!

It was reported also that due to the overtime of the service and maintenance personnel many of these people left the company. I guess

they were frustrated ... or?

Don't focus on message encoding of one or the other protocol. Always focus on the **SYSTEM** and **Life Cycle Cost**.

Missing capabilities to smoothly share information for the some 100.000 signals of the tunnel system have let the costs of operating and maintaining the system sky-rocketed to 4.000.000 Euro per year!

IEC 61850 is intended to provide a smooth and secure information sharing solution – independent of a SINGLE small, medium or big vendor!

Lesson learned: Open (vendor independent) information sharing could have a crucial impact of the Life Cycle Cost.

Do you care about Life Cycle Cost? Yes!? If the answer is Yes, then IEC 60870-5-104, IEC 61850, IEC 61400-25 and DNP3 are recommended options for the future needs of energy system information sharing.

[Access a report from the main contractor \(vendor\) of the refurbished system for the Loetschberg tunnel project](#) [pdf, en].

[Another report published in Dec 2012](#) [pdf, de]

Posted by [Karlheinz Schwarz](#) at 9:51 PM 1 comment: 

Labels: [DNP3](#), [IEC 60870-5-104](#), [iec 61400-25-4](#), [IEC 61850](#), [multi-vendor peoject](#), [open standards](#), [SCADA](#)

Europe: More on Security for Smart Grids

The European Network and Information Security Agency (ENISA) has published on Dec 6, 2012 a new report titled:

Appropriate security measures for smart grids

Guidelines to assess the sophistication of security measures implementation

The report provides "guidance to smart grid stakeholders by providing a set of minimum security measures which might help in improving the minimum level of their cyber security services. The proposed security measures are organised into three (3) sophistication levels and ten (10) domains, namely:

1. Security governance & risk management;
2. Management of third parties;
3. Secure lifecycle process for smart grid components/systems and operating procedures;
4. Personnel security, awareness and training;
5. Incident response & information knowledge sharing;
6. Audit and accountability;
7. Continuity of operations;
8. Physical security;
9. Information systems security; and
10. Network security."

Does any of these documents make any system more secure? No! The security will increase only if **smart people implement** appropriate measures! There are many documents that suggest needed measures – the text written is sometimes nothing else than toner on paper or pixels on a screen.

What to do? Invest in doing something. Don't wait until the perfect measures are defined and accepted by every manager! That will never


happen. Security is an ongoing process that required permanent improvements of measures.

The report recommends "Organisations wishing to establish, implement, operate, monitor and **continuously maintain and improve** an appropriate level of smart grid security, must also carefully and continuously consider and assess the actual level of preparedness and the related security risks they face.

A risk assessment should be performed throughout the **system life cycle**: during requirements definition, procurement, control definition and configuration, system operations, and system close-out."

Security measures should be taken from the very beginning of planning to use automation and information systems. The big show-stopper is that all these measures cost money and need increased resources (manpower, software and hardware, ...). In the domain of DNP3, IEC 60870-5-104, IEC 61850 and IEC 61400-25 basic measures are defined in the documents of the **series IEC 62351**.

[Download the complete report \[84 pages. pdf\]](#)

Posted by [Karlheinz Schwarz](#) at 8:44 PM No comments: 

Labels: [DNP3](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [security](#), [Smart Grid](#), [smart people](#)

U-Bahn-Fahrplan Energiewende – Eine gute Übersicht

Energiewende – ein Begriff, der international bekannt ist! Was ist darunter zu verstehen? Sehr viel!! Es geht um Energie – weit über Strom-Erzeugung, –Transport, –Verteilung und –Verbrauch hinaus.

Eine sehr gut zu lesende und sehr leicht verständliche Zusammenfassung auf 16 Seiten sollte jedem Bürger über 15 Jahre als Pflicht-Lektüre empfohlen werden sollte!

Sehr interessant ist der "U-Bahn-Fahrplan", der alle wesentlichen Aspekte der Energiewende grafisch darstellt:




[Hier können Sie die komplette Grafik "Gesamtübersicht Energiewende" herunterladen](#) [jpg, 1,6 MB]

[Download der Zusammenfassung](#) [16 Seiten, pdf, 4 MB]

Noch Fragen?

IEC 61850 wird in vielen, zur Realisierung der Energiewende notwendigen Technologien eine große Bedeutung zukommen – Mit Sicherheit!

Bildquelle: [IFEU-Institut](#)

Posted by [Karlheinz Schwarz](#) at 9:34 AM [No comments:](#) 

Labels: [Energiewende](#), [energy storage](#), [erneuerbare Energien](#), [IEC 61850](#), [PV](#), [Smart Grid](#), [smart people](#), [smart solution](#)

Monday, December 17, 2012

IEC 61850 Edition 2 Eases the use of the Standard

Is that really true? **Sure it is.**

First of all, when I talk about "IEC 61850 Edition 2" in this post I mean the Edition 2 of the **core parts** like IEC 61850-6, -7-x, and -8-1.

Most of the definitions of these Edition 2 core parts **have not been touched!** Several "overheads" in the former edition have been removed! There are a few cleaned-up definitions (that had already been solved during the tissue process), and there are several new definitions (mainly in the model documents 7-3 and 7-4). New logical nodes like STMP (Supervision Temperature) have no impact on the other definitions – they are independent new definitions for NEW applications.

Let's look at examples of the "overhead" of mandatory data objects in each and every logical node in edition 1 of part 7-4:

The common data objects in **ALL** logical nodes in IEC 61850-7-4 Edition 1 required the following four (4) mandatory objects:

NamPlt	LPL
Mod	ENC
Beh	ENS
Health	ENS

According to IEC 61850-7-4 Edition 2 this has been **reduced to one single mandatory** (1) data object for all but one LN - LLN0:

Beh	ENS
-----	-----

This could save a lot of memory and processing ... we have learned to improve the standard – that is what most people expected! Or?

Most basic definitions in **common data classes** are still the **SAME**; a lot of devices (edition 1 or edition 2 based) work smoothly together when we look of basic use cases:

SPS (single point status):

stVal	BOOLEAN
q	Quality
t	TimeStamp

DPS (double point status):

stVal	CODED ENUM
q	Quality
t	TimeStamp

MV (measured values):

mag	AnalogueValue
q	Quality
t	TimeStamp

Now when we compare these basic "signal" types with ... we will figure out that there is almost NO real difference! Please check the following mapping from IEC 61850 to DNP3 (according to IEEE P1815.1 Draft Standard for Exchanging Information between networks Implementing IEC 61850 and IEEE Std 1815 (Distributed Network Protocol - DNP3):

Mapping for DPS (double point status):

61850	DNP3 Point Type	Count	alternate	Count
stVal	DBBI	1	BI	2
q	DBBI	quality - stVal	BI	quality - stVal
t	DBBI	time - stVal	BI	time - stVal

DBBI = Double-Bit Binary Input

BI = Binary Input

Do you think this is a crucial difference?

Some people want to make us believe that IEC 61850 is complex. Check on your own, please. If you need help, let me know.

Posted by [Karlheinz Schwarz](#) at [12:20 PM](#) [1 comment:](#) 

Labels: [DNP3](#), [Gateway](#), [IEC 61850](#), [IEEE 1815](#), [mapping](#), [SCADA](#)

What is the Scope of IEC 61850?

The title and scope of IEC 61850 has been extended from "substations" to "power utility automation" many years ago. The title of all new parts and Edition 2 of revised parts (e.g., IEC 61850-7-1 Edition 2) is:

Communication networks and systems for power utility automation

The scope of IEC 61850 (e.g., as defined in IEC 61850-7-1 Edition 2) has been extended to:

- hydroelectric power plants,
- substation to substation information exchange,
- information exchange for distributed automation,
- substation to control centre information exchange,
- information exchange for metering,
- condition monitoring and diagnosis, and
- information exchange with engineering systems for device configuration.

The written scope of standards can be used to ... but it does not constrain the use.

The scope of IEC **60870-5-104** is defined as follows: This part of IEC 60870 applies to telecontrol equipment and systems with coded bit serial data transmission for monitoring and controlling **geographically widespread processes**.

Does this preclude to use 104 as substation bus? No, not at all. It is in use in many substations - at least in Germany.

And when it comes to "widespread processes", e.g., PV systems that need to be monitored and controlled, it is natural to use DNP3 or 104, or? ... today ... yes. When it comes to TCP based communication there is a very little (or almost no) difference between one protocol and the other. When you look at the overhead generated by TCP/IP ... !


The main issue is: What will it cost to **plan, procure, install, rent, configure, ... operate the network infrastructure?** The crucial costs are still in the **hardware, wires, signal-converters, commissioning,**

configuration, testing, service, maintenance, and SECURITY measures to be implemented – that's what I have seen in several "modern" approaches to control a PV system from a DSO. Saving a few minutes in the configuration with one or the other protocol is relatively **negligible**.

When we talk about cost, let's look at the **end-to-end cost** and **life-cycle cost** - not just looking at differences in protocols and scopes of standards.

Have a look at the resources needed to encrypt and decrypt messages at transport protocol layer: The resources for making the transport layer secure requires many more resources than those needed for one protocol message or the other.

Focus on the SYSTEM – which is more than looking at SCADA protocols.

Posted by [Karlheinz Schwarz](#) at [11:31 AM](#) [No comments:](#) 

Labels: [commisioning](#), [cost saving](#), [DNP3](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [protocol](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Friday, December 14, 2012

TÜV SÜD conducts One Day Seminar on IEC 61850 in San Diego (CA) on January 28, 2013

TÜV SÜD conducts a One Day Seminar on IEC 61850 Edition 2, Security and Certification in

San Diego (CA)

January 28, 2013 (Monday, the day before the DistribuTech 2013 opens).

What does IEC 61850 Edition 2 mean?

Is the wait for IEC 61850 over?

What is the co-existence of DNP3 (IEC 60870-5-104) and IEC 61850?

What are the security solutions for these standards?


How to ensure that devices are interoperable?

These and many other questions will be discussed during the seminar.

[Details and registration can be found here.](#) [early bird rate before January 10]

Note that TÜV SÜD has a booth at DistribuTech [Booth 624], the TÜV SÜD experts will be available during the DistribuTech. Karlheinz Schwarz will be at the UCA International Users Group [Booth 1648].

[Contact us, in case you want to meet us.](#) We can set a date and time for a comprehensive discussion in advance.

Posted by [Karlheinz Schwarz](#) at [10:39 PM](#) [No comments:](#) 

Labels: [Distributech](#), [Edition 1](#), [Edition 2](#), [education](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 62351](#), [seminar](#), [TÜV SÜD](#), [USA](#)

Stromausfälle und ihre (katastrophalen) Folgen

Strom kommt aus der Steckdose! Oder? Ja – natürlich! Wie kommt er in die Steckdose? Wen interessiert das schon! So ein paar Techniker – die sollten das wissen!

Strom ist nicht so unterhaltsam wie eine Oper oder ein Konzert! Wirklich? Allerdings! Nur - Strom unterhält uns doch alle: **Ohne Strom keine Er- und Unterhaltung!** In jeglicher Hinsicht. Was passiert, wenn bei der Aufführung einer Oper das Licht ausgeht, die Aufzüge und Rolltreppen stehen bleiben, die Lüftungs- und Klimaanlage ausfallen, die Handynetze ihren Geist aufgeben, ... und die Tankstellen keinen Kraftstoff mehr verkaufen können ... laut einer Studie gibt es in Berlin ganze zwei Tankstellen mit einer Notstromversorgung!

In meiner Kindheit habe ich meine Mutter erlebt, als sie gerade beim Waschen war, fiel der Strom aus; sie sagte mir, dann kann ich ja in der Zeit (mit dem elektrischen Bügeleisen) bügeln! Während ihrer Kindheit hätte das wahrscheinlich funktioniert.

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[Where is the sun shining?](#)

[Two new Papers on IEC 61850 Sampled Value Exchange...](#)

Was bei einem Blackout geschieht - Folgen eines langandauernden und großräumigen Stromausfalls. Unter diesem Titel wurde 2011 eine umfangreiche und interessante Studie veröffentlicht.

[Zusammenfassung der Studie](#) [3 Seiten, pdf]

[Komplette Studie des Büros für Technikfolgen-Abschätzung beim Deutschen Bundestag](#) [251 Seiten, pdf]

Anmerkungen von einem mir bekannten pensionierten Experten, der die Herausforderungen der Energieversorgung von Berufswegen sehr gut kennt:

Die Studie umfasst 261 Seiten. Allein die Zusammenfassung ist 31 Seiten lang. Der Text von Prof. Popp verdichtet dies auf 3 Seiten. Im Februar dieses Jahres war im gesamten europäischen Stromnetz nur noch eine Reserve von ca. 1000 MW verfügbar. Der Ausfall eines einzigen Kernkraftwerkblockes (z. B. ein Block in Philippsburg) hätte zum Totalausfall des gesamten Stromnetzes geführt. So knapp war es noch nie. Aber weil „wieder“ nichts passiert ist, wird diese Extremsituation von der Bevölkerung schlicht nicht wahrgenommen.

Unser Umgang mit dieser so wichtigen Infrastruktur wie der Stromversorgung kann nur noch als total unverantwortlich bezeichnet werden.

Da die Kommunikationsmöglichkeiten bei einem totalen Stromausfall sehr rasch wegbrechen (selbst Notausgaben von Zeitungen entfallen, denn wie sollen Journalisten an verlässliche Informationen kommen, wie sollen Notausgaben hergestellt und wie verteilt werden), erreichen Informationen über die Folgen eines längeren Stromausfalles nur noch gerüchteweise und eher lokal die Bevölkerung. Diese kann den tatsächlichen Umfang an Beeinträchtigungen bis hin zu eingetretenen Schäden oder gar zu beklagenden Opfern höchstens erahnen. Eine Wiederherstellung einer dann wieder nutzbaren Infrastruktur ist bisher nicht überlegt, auch nicht geübt. Wie soll das dann funktionieren? Was wären die Folgen?

Wir haben und pflegen die Meinung, dass wir ein technisch hochstehendes Land sind. Mir wird schummrig. Der Vorfall kürzlich in München müsste doch einigen die Augen geöffnet haben. Der lange Ausfall in New York noch viel mehr. Aber wir "spielen" weiterhin mit unserer so wichtigen Infrastruktur und meinen, "der Markt" sorgt dafür (mit Geldbewegungen?!), dass das Gleichgewicht zwischen Erzeugung und Nutzung ständig eingehalten ist. Was ein Irrtum. Mich bringt die Ignoranz noch zum Wahnsinn (oder um).

Sein Fazit: Wann werden die notwendigen Schlussfolgerungen gezogen und tatsächlich konsequent umgesetzt?

Was fällt uns – neben dem Aufbringen von Markierungen für Fahrradwege in Innenstädten – noch alles ein, um die Energieversorgung nachhaltig zu sichern? Es reicht nicht aus, keine Ideen zu haben, man muss auch unfähig sein sie umzusetzen!

Heute ist dafür alles „smart“ (was übrigens auch „gerissen“ bedeutet). Wir sollten uns wieder auf das besinnen, was bisher zu der eigentlich unglaublich hohen Verlässlichkeit der elektrischen Stromversorgung geführt hat: **Der Sachverstand, die Vernunft und die gekonnte Beachtung physikalischer Gesetzmäßigkeiten** – nicht das Geld und nicht der Markt.

Intelligente und sichere elektrische Energieversorgungsnetze wurden bereits zu Beginn der Elektrifizierung erfunden und bis heute weiterentwickelt. Elektrische Sicherungen, Schutz- und Überwachungseinrichtungen sind

- [November](#) (12)
- [October](#) (18)
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Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

seit
über 100 Jahren phänomenale Geräte zum Schutz von Leben und
technischen
Einrichtungen. Ohne diese „smarten“ Geräte wäre ein fehlerfreies und
ausfallsicheres elektrisches Energieversorgungssystem undenkbar und
die
Versorgung mit elektrischer Energie viel zu gefährlich. Siehe auch:

<http://blog.iec61850.com/2012/03/smart-grids-19th-century-invention.html>

Posted by [Karlheinz Schwarz](#) at 5:39 AM No comments: 

Labels: [blackout](#), [reliable power delivery](#), [safe energy](#), [schutztechnik](#), [stromausfall](#)

Thursday, December 6, 2012

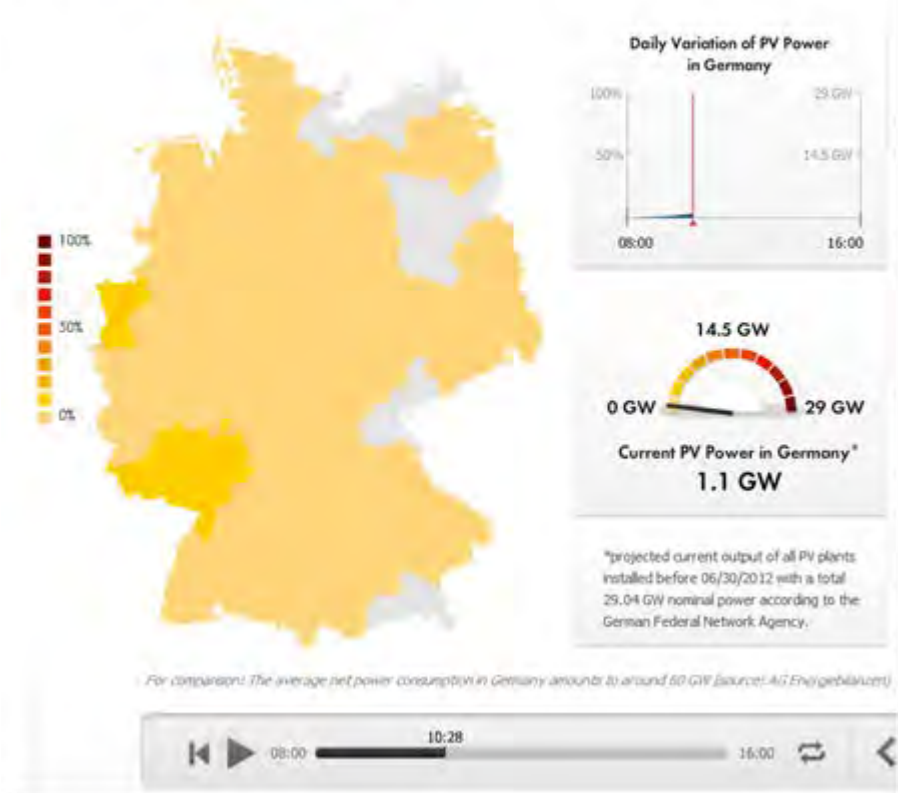
Where is the sun shining?

If you want to figure out where in Germany the sun is shining, you have several possibilities: check with a **weather related website** or check the **PV power production**.


Today (2012-12-06 10:28) the PV Power was 1.1 GW ... the sun was shining in the south-western part – where Karlsruhe (my home town) is:

Performance of Photovoltaics (PV) in Germany

Relative output from 12/06/2012 - 10:28 CET



[Up-to-date and historical PV power performance provided by SMA.](#)

Posted by [Karlheinz Schwarz](#) at 1:37 AM No comments: 

Labels: [photo voltaic](#), [PV](#), [renewables](#)

Monday, December 3, 2012

Two new Papers on IEC 61850 Sampled Value Exchange Models

Several well known experts from Australia (David M.E. Ingram, Pascal Schaub, Richard R. Taylor, and Duncan Campbell) have spent some time on analyzing the applicability of IEC 61850 Sampled Value exchange methods and IEEE 1588 time synchronization for high voltage substations. Read what they have figured out:

The first paper focuses on **“Performance analysis of IEC 61850 sampled value process bus networks”**:


Process bus networks are the next stage in the evolution of substation design, bringing digital technology to the high voltage switchyard. Benefits of process buses include facilitating the use of Non-Conventional Instrument Transformers, improved disturbance recording and phasor measurement and the removal of costly, and potentially hazardous, copper cabling from substation switchyards and control rooms. This paper examines the role a process bus plays in an IEC 61850 based Substation Automation System.

[More details and download link.](#)

The second paper is on: **“Performance analysis of PTP components for IEC 61850 process bus applications”**

New substation automation applications, such as sampled value process buses and synchrophasors, require sampling accuracy of 1 μ s or better. The Precision Time Protocol (PTP), IEEE Std 1588, achieves this level of performance and integrates well into Ethernet based substation networks. This paper takes a systematic approach to the performance evaluation of commercially available PTP devices (grandmaster, slave, transparent and boundary clocks) from a variety of manufacturers.

[More details and download link.](#)

Posted by [Karlheinz Schwarz](#) at [12:38 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-9-2](#), [process bus](#), [real-time](#), [sampled value](#), [time synchronization](#)

Wednesday, November 28, 2012

IEC 61850 – Is Interoperability of Devices reached?

Increased and Sustainable Interoperability of intelligent devices in the power delivery domain is one of the crucial objectives of IEC 61850 and IEC 61400-25 (Wind Power). Interoperability is reached to a quite high degree – sure, **there are a few examples where we see some challenges to improve** one or the other technical problem!

My personal experience is that there is **still some room for improvements** – in the standard series IEC61850 and IEC 61400-25 and in the implementations and use of various vendors’ devices. One reason that causes headaches is linked to the **many options** in the standards. Vendors very often interpret the mandatory (m) and optional (o) designation as m=minimum, o=oops there is something we can ignore. Users often expect that they can decide to use mandatory and optional definitions – they expect that vendors have to implement almost all options.

There is – of course – a huge lack of understanding what and how to implement IEC 61850 and how to use standard compliant devices; and

to figure out what goes wrong. **Education of vendors and users** is one of the most highly recommended actions to improve interoperability!

The other day I was called to help solving a six months' discussion between two vendors of IEC 61850 compliant products, a third vendor using their devices, the project management and the user.



It took me (with a helmet and security jacket and security shoes) less than a day on the site (a medium voltage substation in a new coal fired 920 MW power plant) to figure out the **reason of a non-interoperable behavior** of the power plant control system (IEC 61850 client) that had a problem with one device type. The control system wants to set the TrgOps (trigger options) of the report control blocks in all devices. It sends a SetURCBValues service with the value [x111 11xx]. All but one devices accept this value (even they do not support one of the 5 bits that can be set to 1). One device supports only three out of the five [x100 11xx] – setting 3rd and 4th Bit true is not accepted and causes a

negative SetURCBValues message (according to the definition in IEC 61850-7-2).

This **minor issue causes a big trouble** because the client (power plant control system) cannot set the General Interrogation to true – and cannot use it !!

I expect that this non-conformity will be fixed soon. It is not a big issue – but it caused six months trouble and created a **lot of frustrations!**

If the **right expertise would get involved** in such discussions at an **early stage** it is likely that many of the non-conformities would be **solved very soon**. **Comprehensive education** is required when it comes to IEC 61850 – **the earlier the better**. Be aware: **IEC 61850 is not just another protocol**.

[Some complaints about the many options in the standard series are discussed in a paper published the other day.](#)

"... the world needs — there is a user group already associated with IEC 61850 — is some type of organization that will work through 61850, come up with a subset that eliminates all the options and drive that down to the vendors and say, "here, do this." "

This is a great approach. The main reason this has not yet been done is mainly the absence of users in the many discussions in the standardization working groups and the UCAIUG (UCA international users group), and in other discussions – and the lack in education of the users community.

Some pressure from the utilities on the vendors community to **fix the relatively few known non-conformities in existing devices and tools** would help to get rid of a lot of frustrations and to reach a higher level of interoperability. Many users are – not yet – in a position to figure out which device is conformant and which is not! **A lot of these issues are independent of the question optional or mandatory and could easily be solved.**

Recommendation #1:


People implementing and using the standard need (more) education.

Recommendation #2:

See recommendation #1.

[Some discussion on Education.](#)

[Read statement of Vattenfall on Education for IEC 61850 \[2007!!\]](#)

Posted by [Karlheinz Schwarz](#) at **11:54 PM** [6 comments:](#) 

Labels: [conformance](#), [education](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [peopleware](#)

Wednesday, November 21, 2012

Beck IPC mit IEC 60870-5-104 und IEC 61850 auf der SPS/IPC/Drives in Nürnberg

Wenn Ihnen die Themen **E-Mobility**, **Smart Metering** und **Smart Grid** via IEC 61850 und IEC 60870-5-104 sowie M2M Kommunikation schon einmal begegnet sind, dann sollten Sie sich unbedingt die **Beck com.tom Produkte** ansehen:



Sie finden Beck IPC auf der SPS/IPC/Drives in Nürnberg:
vom 27. - 29. November
in Halle 9, Stand 341

Ein kostenloses Gastticket steht unter folgendem Link als Download zur Verfügung:

[guestcard_sps-ipc-drives-2012_de.pdf](#)

Posted by [Karlheinz Schwarz](#) at 7:58 AM No comments: 

Labels: [Beck](#), [Beck Chip](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#)

Urgently Needed: A Dumber, Tougher Grid

[A "request" published by the famous IEEE Spectrum today \(2012-11-21\)](#) asks for a

Dumber and Tougher Electric Grid !!

Why?

"Since the hurricane and "nor'easter" that devastated the New Jersey and New York coasts two weeks ago, leaving millions without heat, gasoline and electricity, there has been a lot of loose talk about how a smarter grid might moderate the effects of such catastrophes in the future.

The smart grid will indeed have a role to play—especially in speeding recovery. As Massoud Amin of the University of Minnesota recently put it, "a more resilient, secure and smarter infrastructure...would localize impacts and enable a speedier restoration of the services.

However, what we need even more urgently than a more agile and interactive grid incorporating advanced computing and communications

in all dimensions is a **grid that's basically old-fashioned, stupid and really, really tough**. ... brittle wooden electricity poles would be replaced with stronger steel poles, or the distribution lines ..."

My personal experience is that many "dump" people have not allowed many "smart(er)" people to exactly to do that: replace xx by yy ... very often they were not allowed to do so! To make the system more robust is known form more than 130 years!!

[Read paper on "Smart Grids – A 19th century invention"](#)

"Since the 19th century engineers have developed, tested, used on a large-scale and continuously improved suitable solutions for the safe and reliable operation of the rapidly growing supply of ever more applications with electrical energy. During the sustained further development of the supply systems, it is necessary to handle the available resources (energy sources, technical installations and individuals with experience) as well as the laws of physics both responsibly and in a "smart" manner."

The rallying cry should be: **to do this** (replacement of poles and "dump" people, ...) **and not stop doing the other** (implementing smart(er) equipment and smarter ways to deal with energy and especially electric power).

While I am writing these lines I listen to a radio report telling that part of the city Karlsruhe (my home town) is in dark: a huge blackout ... electricians are on their way to check substations what has caused the outage ... they recommended to have a flash lighter at hand – just in case ... one of two transformers tripped ... they are working on the other to take over ...

[News on Karlsruhe blackout \(German only\).](#)

More to come ... I mean more outages to come ... have a flash light in all rooms ... in your car ...

Posted by [Karlheinz Schwarz](#) at 7:20 AM [No comments:](#) 

Labels: [blackout](#), [dumb](#), [outage](#), [Smart Grid](#), [smart people](#), [smart solution](#)

Smart(er) Grids in Denmark – supported by IEC 61850

Denmark says, that it is a world leader when it comes to developing tomorrow's green, flexible and intelligent power system - a power system where the generation, transport and consumption of power is linked intelligently.

The power system will become the backbone of the energy system of tomorrow, featuring completely new electricity-generation sources and new types of electricity consumption - a power system characterized by flexible generation and a high level of renewables.

IEC 61850 and IEC 61970 (CIM) are part of tomorrows Danish energy system.

[Download comprehensive Brochure "Smart Grid in Denmark 2.0":](#)

IMPLEMENTATION OF THREE KEY RECOMMENDATIONS FROM THE SMART GRID NETWORK

- SMART GRID CONCEPT
- **INFORMATION MODEL FOR DATA COMMUNICATION**

ROAD MAP FOCUSING ON THE ROLE OF THE GRID COMPANIES

Internationally, two standards for Smart Grids are singled out in particular, each including a number of part-standards and related standards. **One is the IEC 61850 standard**, which was originally developed for substations but which has today been developed to cover a wide range of other areas, e.g. DER units. The information model in IEC 61850 is based on the so-called Logical Nodes, whereby information can be structured in a harmonized way. **The other standard is the IEC 61970 standard**, which was originally developed for control centre environments, but which today, via related standards, covers a wide range of system activities in the power system, for example electricity markets. The information model in IEC 61970 is called the Common Information Model - CIM.

[Further information and links could be found here.](#)

Posted by [Karlheinz Schwarz](#) at [6:13 AM](#) [No comments:](#) 

Labels: [CIM](#), [Denmark](#), [IEC 61850](#), [IEC 61970](#), [Smart Grid](#)

Get ready for Edition 2 of IEC 61850 Core Standards - One Day Presentation

TÜV SÜD Embedded Systems (Munich) offers a one day presentation titled:

Get ready for Edition 2 of the IEC 61850 Core Standards

One Day Training on IEC 61850 includes a the visit to the TÜV SÜD Embedded Systems Level A Lab:

December 13th, 2012
Munich (Germany)

Edition 2 of the IEC 61850 Core Standards have been already published (part 4, 6, 7-1, 7-2, 7-3, 7-4, 7-410, 8-1, 9-2) and part 10 (Conformance Testing) will be published by the end of 2012. Whether you have an already certified Device or you are planning to develop a new implementation, the new aspects of Edition 2 of the IEC 61850 Core Standards have to be considered, because it will soon become a major market differentiator.

[Download program and registration information for the IEC 61850 training](#) [pdf]

See you there soon.

Posted by [Karlheinz Schwarz](#) at [5:35 AM](#) [No comments:](#) 

Labels: [certificate](#), [Edition 1](#), [Edition 2](#), [education](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [test lab](#), [testing](#), [Training](#), [TÜV SÜD](#)

Monday, November 19, 2012

Are RTUs dead?

Which definition of RTUs do you mean? Do you mean **Reach The Universe?** Yes, these RTUs will live forever. Let me know what you mean by RTU.

When we talk about RTUs, we should **differentiate** between functions, I/Os and processor platform. In the past (some 10 years ago) an RTU

was more or less well defined by its functions, I/O wires/terminals and platforms. Many of them are still in use and a lot more will be installed in the years to come.

Today we have many many more **functions** (those we know well, and those we could think of), **hardwired I/Os**, **serial I/Os** (Ethernet, ...), **hierarchies of I/Os** (or RTUs or just IEDs), and many more **very powerful platforms**.

Whenever we talk about an RTU, we **should list** the functions it implements, hardwired I/Os, serial I/Os (Ethernet, ...), hierarchies of I/Os (or RTUs or just IEDs), and the powerful platform. I have seen yesterday a substation ruggedized box with an 8 port Ethernet switch, some 20 I/O wired terminals, with IEC 61850 and other protocols, and programmable applications (C/C++, IEC 61131-3 CoDeSys, simple web PLC). Is this box an RTU, a bay controller, a PLC, a gateway, a substation computer, (condition) monitoring device, an Ethernet Switch? **Its a bit of everything!**

In my experience utility people use a new name for the "interface" to a substation: Substation Gateway.

In any case we should describe what we mean by a term (e.g., RTU), and should describe any box independent of its name.

"Names are sound and smoke", it says in Goethe's Faust. To make sure this is not the case, companies are putting a lot of money on name inventors. The name RTU was invented some 20+ years ago - a good name so far. We can keep the name - but have to define what we mean.

What do you think about this interpretation: **RTU = Reach The Universe** (of a substation or power plant or ...). That is broad enough to cover everything.

We have tried many times to find a name for IEC 61850 - we failed so far. We should not try anymore to find a name. A single name would mis-lead. If we talk about IEC 61850 we have to clearly describe what we mean!! Just saying: My device conforms to IEC 61850 doesn't mean anything. What does IEC 61850 Edition 2 mean? Nothing!! There is NO IEC 61850 Edition 2 at all! What? See some discussion:

A. <http://blog.iec61850.com/2012/08/iec-61850-edition-1-2-or-3-and-uml.html>

B. <http://blog.iec61850.com/2012/07/current-series-iec-61850-comprises-19.html>

C. <http://blog.iec61850.com/2010/03/what-is-edition-1-and-edition-2-of-iec.html>

The issue is that the semantic is carried by a name. The semantic **MUST** be defined by somebody. If many definitions exist then we have to be very careful. Ask always what people mean by RTU, IEC 61850 Edition 2, Fizzlipuzzli, ... You belief to know what RTU and IEC 61850 Edition 2 mean. Are you sure? And you agree, that you do not know what Fizzlipuzzli means (except a few people that know me). I don't know what Fizzlipuzli means either. ;-) ... it is something nobody knows. I use it for a function or a device to make sure that nobody associates it with something real he/she knows.

During the first meetings of the IEC 61400-25 (IEC 61850 extensions for wind turbines) we had a serious discussion on "Reports" ... we could not reach an agreement. Because I was discussing the IEC 61850 Report(ing Model). The other person discussed a Report from a turbine containing 10 minute statistical values of wind speed and power produced etc. That's the reason lawyers first define the terms they use in a contract!!

Posted by [Karlheinz Schwarz](#) at [10:43 PM](#) [No comments:](#) 

Labels: [Gateway](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [RTU](#), [SCADA](#)

Friday, November 16, 2012

Less than 200 Outages in New York still to be repaired

As of today (Friday, 2012-11-16 05:00 a.m.) there are **168 outages** left to be repaired.

[Updates could be found here.](#)

Posted by [Karlheinz Schwarz](#) at [2:23 AM](#) [No comments:](#) 

Labels: [outage](#), [power distribution](#), [power outage](#)

Security: Is SCADA the next Playground for Hackers?


The number of vulnerabilities in the SCADA world keeps on growing rapidly in 2012. The number of security flaws found within ten months is far bigger than the number of flaws found during the whole previous period starting from 2005.

This is something that should worry all of us – from shareholder to managers and technical people all over. After Stuxnet, it looks like that SCADA systems are one of the next targets of hackers.

[Download](#) an up-to-date paper on “SCADA Safety in Numbers” [pdf, 2 MB]

Keep going to convince your management, ... to be more serious with regard to SCADA and other automation systems security!

Doing nothing is not an option!!

Posted by [Karlheinz Schwarz](#) at [1:26 AM](#) [No comments:](#) 

Labels: [SCADA](#), [security](#)

Wednesday, November 14, 2012

What does a PIXIT provide?

PIXIT stands for “Protocol Implementation eXtra Information for Testing”. The objective is to provide crucial information for the test lab.


One example is the value for the “Maximum number of clients that can set-up a 2-party association simultaneously”, e.g., value=16. Does this mean that the maximum number of clients is restricted to 16? No! The value of 16 is used by the Testlab to run test cases. The number can be much bigger!

The PIXIT document for a SystemCorp IEC 61850 IED lists for the stack/API a value of 16 – BUT the stack/API and the IED supports up to 255 clients!

If you want to know what a device supports, you should read technical specifications of the IED. A lot of vendors use the PIXIT also as a kind of technical specification. The PIXIT documents should contain a note

that the values given in the PIXIT document may be restricted for testing purposes only. PIXIT documents should also show the limits of the IED when applied in real applications.

[Download](#) PIXIT Document for a specific IED.

Posted by [Karlheinz Schwarz](#) at 4:53 AM [No comments:](#) 

Labels: [conformance](#), [conformance test](#), [IEC 61400-25](#), [IEC 61850](#), [PICS](#), [PIXIT](#), [test lab](#), [testing](#)

Gezielte Kostensenkung in Offshore-Windparks durch IEC 61400-25

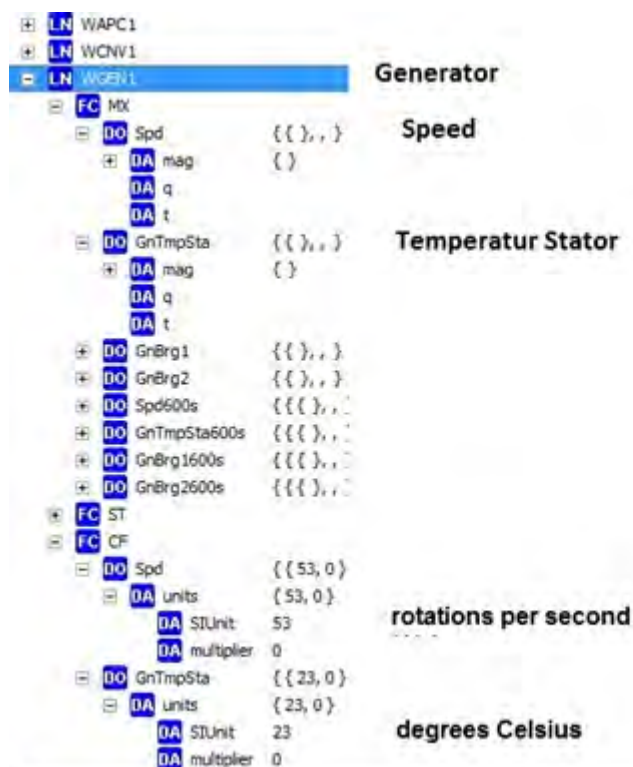
BTC (eine 100%-Tochter der EWE) hat auf der Husum WindEnergy 2012 über den Einsatz von (unter anderem) IEC 61400-25 berichtet.

Titel der Präsentation: Gezielte Kostensenkung in der Betriebsphase von Offshore- Windparks durch IT-Unterstützung

IEC 61400-25 liefert einen Beitrag zur Kostensenkung:

“Um die Werte über unterschiedliche Anlagen und Parks hinweg vergleichbar zu machen, werden die Daten auf Kanäle eines **harmonisierten Datenmodells** gemappt, das **nach IEC 61400-25** aufgebaut ist.”


A typical model for the WGEN (Wind Generator) is depicted in the following figure:



This model (from IEC 61400-25-2, and extended by the vendor) is completely defined by an SCL file (excerpt for Speed and Temperature):

```
<LN lnType="My-WGEN" lnClass="WGEN" prefix="" inst="1">
  <DOI name="Spd">
    <SDI name="units">
      <DAI name="SIUnit">
        <Val>53</Val>
      </DAI>
      <DAI name="multiplier">
        <Val>0</Val>
      </DAI>
    </SDI>
  </DOI>
  <DOI name="GnTmpSta">
    <SDI name="units">
      <DAI name="SIUnit">
        <Val>23</Val>
      </DAI>
      <DAI name="multiplier">
        <Val>0</Val>
      </DAI>
    </SDI>
  </DOI>
```

[Download](#) der gesamten Präsentation von BTC [pdf].

Posted by [Karlheinz Schwarz](#) at 3:56 AM No comments: 


Labels: [IEC 61400-25](#), [IEC 61850](#), [SCL](#), [wind power](#), [wind turbine controller](#)

IEC 61850 certified products as per June 2012

KEMA has recently published an updated Test Register (version 2012-06-18). Since version 2011-11-28 the following IEDs have been tested:

2 new Clients and 40 new servers

Click [HERE](#) for the complete list [pdf]

Posted by [Karlheinz Schwarz](#) at 3:27 AM No comments: 

Labels: [certificate](#), [conformance test](#), [IEC 61850](#)

Friday, November 2, 2012

More than 15.000 Outages in New York to be repaired

Hurricane Sandy (October 2012) has hit the power delivery system of Con Edison New York. A few days later (2012-11-03) there are still more than 15.000 outages to be repaired! Take into account that several 100.000 transformers are part of the whole system. According to the Annual report 2011 Con Edison of New York Electric Operations added or replaced more than 3,200 transformers in 2011!!

The affected areas are listed on a interactive map. See excerpt:

Outages on 2012-11-03 (the map below shows the situation on this date):

Active Outages: 15,831
Affected Customers: 386,506

Progress has been made to get power back to all:

on 2012-11-04 (11.30 p.m.):

Active Outages: 13,565
Affected Customers: 172,240

on 2012-11-13 (12:17 a.m.):

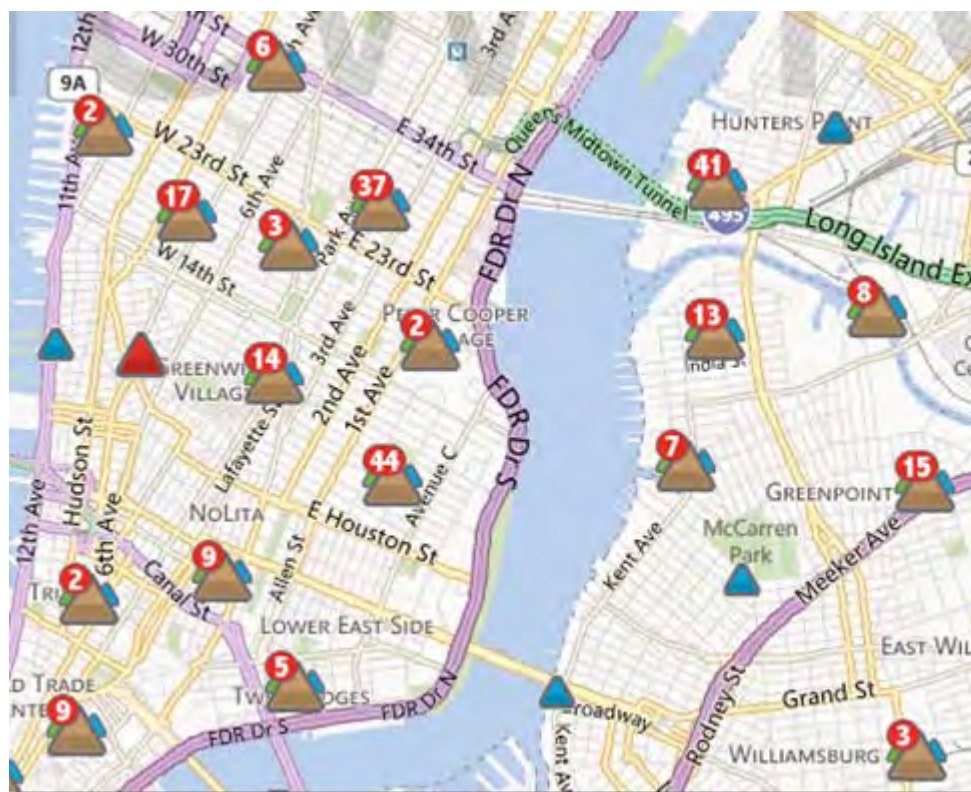
Active Outages: 492
Affected Customers: 837

on 2012-11-16 (05:01 a.m.):

Active Outages: 168
Affected Customers: 174

on 2012-12-20 (10:00 a.m.):

Active Outages: 30
Affected Customers: 629



Source: Con Edison

[Visit the complete interactive Map of outages \(updated every few minutes\).](#)

[A brief overview of the CON EDISON SYSTEM AND LIC power system could be found here \[pdf\].](#)

I wish the New Yorkers and any other people that this impact on a power system will not happen any more!

Posted by [Karlheinz Schwarz](#) at 11:16 PM 1 comment: 

Labels: [distribution](#), [power distribution](#), [power outage](#)

Wednesday, October 31, 2012

IEC 61850 and 61499

OpenPCS 2012, infoteam's established programming system is compliant to the standard IEC 61499. There is an increasing demand for application development for distributed systems coming from grid providers and manufacturers in the power industry. OpenPCS 2012 kills two birds with one stone and combines IEC 61850 and 61499: in cooperation with TQ, Infoteam is demonstrating the control of photovoltaic components at the SPS/IPC/DRIVES. Take your chance and visit Infoteam Software AG in Hall 7A, Booth 130, in Nuremberg, Germany, 27.-29.11.2012.

[Link to IEC 61850 and IEC 61499 news report.](#)

More to come related to IEC 61850 and IEC 61499.

Posted by [Karlheinz Schwarz](#) at [1:05 AM](#) [No comments:](#) 

Labels: [IEC 61499](#), [IEC 61850](#), [PV](#)

Sunday, October 28, 2012

Living without Power – Impact of Hurricane Sandy on IEC 61850

Hurricane Sandy is about to hit the U.S. east coast. This impacts the travel to and from the east coast. Additionally, early winter weather conditions in Europe delays flights within Europe ... so that several WG 10 experts going to Houston (TX) will arrive one day later. That's a minor issue.

But more crucial: It is likely that Sandy will cause power outages for hours, days or weeks. What does it mean to live without power? According to the www.naturalnews.com it could be summarized as follows:

Most Americans have simply never lived without power for any extended period of time. No power means:

- No internet (OMG!)
- No TV (gasp!)
- No recharging cell phones.
- No hot showers.
- No laundry machines.
- No dishwashers.
- No heating of your home.
- No lights.
- No toasters or ovens.
- No computers.
- No radios unless you have a wind-up radio or spare batteries.

For some period of time as well:

- No police response services
- No fire response
- No ambulances

Having some renewable sources (PV panels, Solar heating, ...) on your roof and more distributed power systems (storage, ...) would help to survive to some extend!

I wish all people that are hit by power outages all over that it will not be so severe the days to come!

Posted by [Karlheinz Schwarz](#) at [3:12 PM](#) [1 comment:](#) 

Labels: [IEC 61850](#), [IEC TC 57 WG10](#), [power outage](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Thursday, October 18, 2012

ENTSO-E: European Utilities are Coming Back Onboard of IEC 61850 Standardization Work

Congratulation to the experts of the ENTSO-E that have figured out (and convinced their management!!) that **it is a good idea to get – again (!!!) – involved in the international standardization and implementation of IEC 61850!!! Welcome back (home)!**

The standardization work is going on for some 17 years these days. The vendors have dominated the standardization work so far – it is great to see utilities to come back (home) in order to reach a balance between benefits for users and vendors.

[See a description of the situation in 2007 with the title:](#)

Do users really get what they expect?
Do they get interoperable IEDs and tools?
What about multi-vendor projects?

Many utilities all over have understood the benefit of the standards – but are still waiting to harvest the fruits. I am confident that the situation is much better than what people write in some public statements.

I am conducting a three day training here in Frankfurt (Germany) ... with many attendees from users!! ... attendees from BIG utilities in Asia, New Zealand, Africa, and Northern Europe! More to come!


Don't worry! We are still at the very beginning of the journey to IEC 61850 based information exchange!

[Read the new publications from ENTSO-E on interoperability issues in IEC 61850.](#)

ENTSO-E is back on the track to a bright "interoperable" future!

Again: **Congratulation for coming back home!** I would appreciate to meeting with the ENTSO-E expert(s) during the next IEC TC 57 WG 10 meeting in Texas end of October 2012 – (un)fortunately I have to travel to Australia next week (for 10 days) and then to the U.S. to helping experts in implementing IEC 61850!

[I look forward to meeting more "ENTSO-E" experts at one of my next training courses in South Africa, U.S. or Europe.](#)

Posted by [Karlheinz Schwarz](#) at 1:38 PM No comments: 

Labels: [education](#), [ENTSO-E](#), [hands-on Training](#), [IEC 61850](#), [standardization](#)

Monday, October 15, 2012

FDIS IEC 61850-7-410 Edition 2 approved

The FDIS on IEC 61850-7-410 Edition 2:

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Communication networks and systems for power utility automation –
Part 7-410: Basic communication structure –
Hydroelectric power plants – Communication for monitoring and control

has been approved by 100 per cent of the national committees!!

This is a major step towards applications of IEC 61850 in hydro power plants.

[Please find some information about the new content of IEC 61850-7-410 Edition 2.](#)

Posted by [Karlheinz Schwarz](#) at 9:31 PM No comments: 

Labels: [hydro power](#), [IEC 61850-7-410](#), [iec 61850-7-410 Edition 2](#)

Next Step towards a Web Service Mapping in IEC 61850

IEC TC 57 has published the

Draft IEC TR 61850-80-3 (Document 57/1292/DC):
Communication networks and systems for power utility automation –
Part 80-3: Mapping to Web Services – Requirement Analysis and
Technology Assessment

This document will serve as a basis for the creation of a new Specific communication service mapping (SCSM): the future IEC 61850-8-2.


The document (written by WG 17) is circulated in order to get feedback from a wider range of experts, mainly on the global approach and on the requirements of each involved domain.

The TC 57 P-members are invited to submit comments to this draft by 2013-01-04 at the latest.

The following solutions are considered as candidates:

1. OPC UA
2. IEC 61400-25-4 Annex A
3. DPWS (Devices Profile for Web Services)
4. IEC 61968-100 (TC 57 WG 14 approach of using XML)
5. RESTful Web Services over Websockets
6. XMPP (Extensible Messaging and Presence Protocol)

It is still the objective to chose ONE of these solutions and publish it as IEC 61850-8-2 in the future.

Posted by [Karlheinz Schwarz](#) at 9:22 PM No comments: 

Labels: [IEC 61400-25](#), [iec 61400-25-4](#), [IEC 61850](#), [iec 61850-8-2](#), [mapping](#), [Web Service](#)

Sunday, October 14, 2012

Are SCADA System Vulnerabilities Real?

Yes, the vulnerabilities are really real! One of the latest reports came from the ICS-CERT ALERT the other day.

[ICS-ALERT-12-284-01](#)

Excerpt: "... the vulnerabilities are exploitable remotely by **authenticating** to the service **using hard-coded credentials**.

[IEC 61850-5 Edition 2 FDIS Published for Ballot](#)

[2012/2013 Training Opportunities in Frankfurt, Cap...](#)

[Beck DK61 Library Update Available](#)

[MMS, IEC 61850-8-1, and IEC 62351 \(Security\)](#)

[How Does IEC 61850-3 Apply for IEDs Outside Substa...](#)

[Java SDK for MMS and IEC 61850 available](#)

[Introduction to IEC 61850 – two Papers available f...](#)

► [September](#) (19)

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► [February](#) (21)

► [January](#) (15)

► [2011](#) (159)

► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

Exploitation of these vulnerabilities would allow attackers to remotely connect to the server and **executing remote code**, possibly affecting the availability and integrity of the device.”

Recommendation: Take the security risks very serious – technical people, managers, accountant people, researcher, consultants, vendors, users, ... ALL!!

More to come.

Get prepared to expect the unexpected.

Posted by [Karlheinz Schwarz](#) at [10:31 AM](#) [No comments:](#) 

Labels: [control systems](#), [IEC 62351](#), [SCADA](#), [security](#)

Friday, October 12, 2012

NEW Smart Grid Interoperability Panel (SGIP)

The Smart Grid Interoperability Panel (SGIP) started the next phase that is based on a private/public partnership funded by industry stakeholders in cooperation with the U.S. federal government.

SGIP’s mission is to provide a framework for coordinating all Smart Grid stakeholders in an effort to **accelerate standards harmonization** and **advance the Interoperability of Smart Grid devices and systems**.

[The new website of SGIP has just opened.](#)

For those that are looking for the role IEC 61850 and other IEC TC 57 standards are playing in the SGIP, please check the following page:

[IEC 61850 in the List of Standards.](#)

Posted by [Karlheinz Schwarz](#) at [11:25 PM](#) [1 comment:](#) 

Labels: [DNP3](#), [ICCP](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [SGIP](#), [SGIP 2.0](#), [Smart Grid](#), [TASE.2 ICCP](#)

Wednesday, October 10, 2012

RePower reports on successful applications of IEC 61400-25 in North America

Amir Zohar and Frank Wolfmeier (both from RePower) have published a great paper on the use of IEC 61400-25 (based on IEC 61850) in the North American wind energy market in the magazine “North American Windpower” (issue October 2012).

Industry At Large: Data Management

Establishing A Common Wind Turbine Communication Standard

A common communication standard for wind turbines could alleviate many of the challenges inherent in wind turbine data management.

BY AMIR ZOHAR & FRANK WOLFMEIER

“Wind farm owners and operators have been quick to recognize that this

standard will facilitate the integration of their projects. EDF Renewable Energy (formerly enXco) is currently completing the installation of its first of two projects with IEC6140-25. ... **SCADA companies are beginning to notice the potential of IEC 61400-25.**

The wind energy industry is constantly aiming to increase efficiency as it strives to become competitive with traditional power generation. ... and **having a standard for communication will help overcome these issues and other operational difficulties."**


I have met Amir Zohar recently in Denver (CO). He is a smart engineer that believes and trusts in the standard IEC 61400-25 – he sees a bright future of the application of this standard in the wind industry all over.

[Access the article on IEC 61400-25 in the "North American Windpower" \(issue October 2012\).](#)

[RePower offers Wind Turbines with IEC 61400-25.](#)

[2012/2013 IEC 61400-25/61850 Training Opportunities in Frankfurt, Cape Town, Atlanta \(GA\), and Phoenix \(AZ\)](#)

[Introduction to IEC 61850 and IEC 61400-25 – two Papers available for download.](#)

Posted by [Karlheinz Schwarz](#) at 11:49 AM No comments: 

Labels: [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [North America](#), [REpower](#), [seminar](#), [Training](#), [USA](#)

Thursday, October 4, 2012

Condition Monitoring of Assets with IEC 61850

Asset Management using IEC 61850 is one of the important areas of future power delivery systems. Transformer monitoring in the Distribution Network is one of the crucial solutions to keep the power flowing. IEC 61850 and IEC 61400-25 have a lot of logical nodes and data objects.

The presentation of a paper by Karlheinz Schwarz at the Distributech 2010 was attended by some 40 experts. Good questions were discussed at the end of the presentation. The paper has an attachment with the names of all 283 published Logical Nodes of all standards of the series IEC 61850 and IEC 61400-25.

Click [HERE](#) for the paper [PDF, 670 KB]

Click [HERE](#) for the presentation slides [PDF, 300 KB]

[Recently another paper on the same subject was presented by Rod Hughes and Christoph Brunner.](#)

More to come soon.

Posted by [Karlheinz Schwarz](#) at 12:51 AM No comments: 

Labels: [asset management](#), [condition monitoring](#), [IEC 61400-25](#), [IEC 61850](#), [monitoring](#), [Sensors](#)

IEC 61850 – As seen by The Very Large Power Grid Operators (VLPGO)

IEC 61850 defines several aspects on how devices interoperate and how the interoperation is engineered and guaranteed to run in multiple vendor projects. [Earlier this year we have seen a public statement by ENTSO-E on the use of IEC 61850 compliant devices and tools.](#)

Another huge organization has added to the ENTSO-E statement: The Very Large Power Grid Operators (VLPGO). The “association of the 16 largest Power Grid Operators serving more than 70% of the electricity demand in the world and providing electricity to 3 billion consumers”.

I guess this is true – then I would expect that these 16 power grid operators could **easily “control” what vendors have to deliver** – deliver IEC 61850 compliant solutions that **meet the needs** of these companies!! And they could have an appropriate influence on the standardization work.

[Download the VLPGO statement on IEC 61850.](#)

Instead of purchasing what they really want and need, they complain about the standardization groups: that the standardization organizations “should from the PGO perspective be more directive within the standard.

They should not allow different suppliers to implement standards differently.

In particular, a strong standardization degree at the interfaces between tools (vendor specific or third-party) is required. Moreover, stability, or at least backward compatibility of the standard should be guaranteed. ... Consequently, **we would like to strongly suggest to all IEC61850 stakeholders to take the appropriate actions in order to ensure the success of IEC61850 and to make sure** the standard – and the technologies developed around it – remain sustainable and provide significant benefits for all stakeholders and the community.”

I am wondering that (obviously) the few utilities that deliver 70% of the electric demand have an interesting view on what the IEC TC 57 (and other groups) could manage and gain.

IEC COULD NOT control what and how vendors implement and what users use!!

This could (more or less) easily be controlled by the user communities: by just purchasing products that meet the users’ requirements only. Why did the many utilities purchase automation systems that did – to some degree – not meet their requirements? Were they not precisely specified or did they not understand how to write the specifications? Or? My experience is that in many cases the technical people of utilities had not been involved in purchasing IEC 61850 based systems! Several utilities hired me for a training of their engineers AFTER they the vendors commissioned the systems. Engineers told me that they were responsible for the service and maintenance of the systems – having NO CLUE what IEC 61850 is!!

Engineers of a well known group of large utilities in Europe told me some two years ago that they were not allowed to conduct lab tests or build pilot projects ... in one case a utility expert told me that they had to stop their special group of experts on IEC 61850 to get prepared for the new technology – instead their management believed that the vendors do all things right.

There is a saying: “Pay now or pay later”. From the perspective of the years 2000-2002 utilities refused to “pay” for the standardization and for “controlling” the implementation into products. They have decided to “pay” later: 2012, 2013, ... I look forward to see them paying.

Back to the standardization: IEC standardization work is a democratic process and: the work is done by people attending the meetings and contributing to the technical work. If the user communities would have been shown up more often and contributed to the technical to a higher degree, then we would not see these statements flying around today. The users (especially the 16 BIG ONES in the VLPGO) should GET INVOLVED (by letting their experts getting more deeply involved or by providing resources for people that are already involved ...) instead of **"strongly suggest to all IEC61850 stakeholders to take the appropriate actions in order to ensure the success of IEC61850 and to make sure ..."**.

I would have expected a statement like this: **"VLPGO member companies offer increased and appropriate resources (many more experts getting involved and funding Millions of Dollar or Euro for common activities) in order to ensure the success of IEC61850 and to make sure ..."**. The VLPGO member companies – somehow – have to provide more resources than it was the case in the last 10 years or so.

It is time to educate more people from the many stakeholders to understand how IEC standards are defined and what it means to have a standard published. The standardization groups can lead the horse to the water – but they cannot make the horse drink the water!

Vendors, users, system integrators, and consultants should work more closely together to make sure that everybody gets a benefit from the standard. One possibility to support this goal could be to set-up a **European Users Group for IEC 61850**! This group could be a subsidiary of the UCAIUG – it would be easier (especially for utility experts) to travel within Europe than across the Atlantic. By the way, the UCAIUG is – from my point of view – more a Vendors Group!

Finally: The vendors have spent a lot of time and money in defining the standards and to implement them!!! Thanks a lot for their engagement! Keep going!

Posted by [Karlheinz Schwarz](#) at [12:38 AM](#) [4 comments:](#) 

Labels: [ENTSO-E](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [standardization](#), [standards](#), [users](#), [Users Group](#), [vendors](#), [VLPGO](#)

Tuesday, October 2, 2012

Download IEC 61850 Blog Content as single PDF Document (Oct. 02, 2012)

For those readers of the blog that want to get the complete content as a single pdf document, it is just a click away ... it contains the 710 posts from 2008 until 2012-10-02. Once you have downloaded the file you can easily browse the content ... search

[Download all posts of the IEC 61850 blog in a single pdf \[16.8 MB, 510+ pages DIN A4\]](#)

Enjoy!

Posted by [Karlheinz Schwarz](#) at [2:30 AM](#) [No comments:](#) 

Labels: [blog](#), [DNP3](#), [ICCP](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#)

News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Monday, October 1, 2012

IEC 61850-5 Edition 2 FDIS Published for Ballot

IEC has published the FDIS for ballot until 2012-11-30:

57/1286/FDIS

Part 5 Ed2: Communication requirements for functions and device models

Extensions in Edition 2 of part 5:


- requirements for communication between substation automation systems to utility automation systems;
- including the interfaces for communication between substations (interfaces 2 and 11);
- requirements from communication beyond the boundary of the substation

Note that part 5 does **NOT DEFINE FUNCTIONS!!** The scope states:

"The description of the functions is **not used to standardize the functions**, but to **identify communication requirements** between Intelligent Electronic Devices ... **Standardizing functions and their implementation is completely outside the scope of this standard.**"

There are other parts of IEC 61850 that go beyond the issue of determining the communication requirements: e.g., part IEC 61850-90-7 defines behavior at the electrical coupling point of a PV inverter. Depending on the configuration (input) of the various settings of a specific model the electric output of the inverter has to follow the "FUNCTION" that is described in the Logical Node model!

[See example of the frequency-watt mode control function.](#)

Posted by [Karlheinz Schwarz](#) at 8:51 PM No comments: 

Labels: [Functions](#), [IEC 61850-5](#), [implementation](#), [PICOMS](#), [real-time](#), [requirements](#)

2012/2013 Training Opportunities in Frankfurt, Cape Town, Atlanta (GA), and Phoenix (AZ)

Frankfurt (Germany), 17.-19. October 2012

SEATS ARE AVAILABLE / DISCOUNTED FEE

3 day IEC 61850/61400-25 Seminar/Hands-on Training (NettedAutomation) with several embedded Controller Development Kits (RTOS, ...), Starter Kit (Windows DLL), and several other demo software.

[Details for Frankfurt \(Germany\) can be found here](#)

Cape Town (South Africa), 11. February 2013

1 day course on introduction and status of Edition 2 of Series IEC 61850, IEC 61400-25 (Wind), and IEC 62351 (Security); Q&A session

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► January (15)

[Details for Cape Town can be found here](#)

Atlanta, GA, (USA), 06.-08. March 2013

Phoenix, AZ (USA), 11.-13. March 2013

3 day Seminar on Power and Energy System Communication covering IEC 61850, IEC 61400-25, DNP3, NIST Interoperability Roadmap, Smart Grids, ... Security; Hands-on Training (NettedAutomation) with several embedded Controller Development Kits (RTOS, ...), Starter Kit (Windows DLL), and several other demo software

[Details for the US events can be found here](#)


Frankfurt (Germany), 06.-08. May 2013

Frankfurt (Germany), 16.-18. October 2013

3 day IEC 61850/61400-25 Seminar/Hands-on Training (NettedAutomation) with with several embedded Controller Development Kits (RTOS, ...), Starter Kit (Windows DLL), and several other demo software

[Details for the event in Frankfurt \(Germany\) can be found here](#)

[NettedAutomations IEC 61850 Training Modules and Experience](#)

Posted by [Karlheinz Schwarz](#) at 10:57 AM No comments: 

Labels: [DNP3](#), [education](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [seminar](#), [Training](#)

Beck DK61 Library Update Available

An updated IEC 61850 library (v1.36.07) is now available for Beck IPC Development Kits. This replaces what is being shipped on the DK61 disks.

The Beck DK-61 IEC 61850 library v1.36.07 with example application with source can be found on the following website website:

<https://www.systemcorp.com.au/support.html>

<https://www.systemcorp.com.au/component/content/article/23-software/70-iec-61850-single-chip-solution-presentation.html>

Revision history can be found in the On-line API Manual:

https://www.systemcorp.com.au/PIS10API/_release_notes.html

<https://www.systemcorp.com.au/PIS10API/index.html>

Posted by [Karlheinz Schwarz](#) at 7:15 AM No comments: 

Labels: [API](#), [application programming](#), [Beck Chip](#), [development kit](#), [IEC 61400-25](#), [IEC 61850](#), [stack](#), [SystemCorp](#)

MMS, IEC 61850-8-1, and IEC 62351 (Security)

Just a brief information on security in the MMS mapping of IEC 61400-25-4 and IEC 61850-8-1.

ISO 8650-1 (ACSE) defines the details of Authentication referred to in IEC 62351-4:

Excerpt of 62351-4:

► [2011](#) (159)

► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

5.3 ACSE

5.3.1 Peer entity authentication

Peer entity authentication shall occur at association set-up time. Authentication information shall be carried in the calling-authentication-value and responding-authentication-value field of the authentication functional unit (FU) of the ACSE AARQ and AARE PDUs respectively.

¹ This allows for the ACSE authentication to be used over either the secure or non-secure profiles to achieve stronger authentication.

TS 62351-4 © IEC:2007(E)

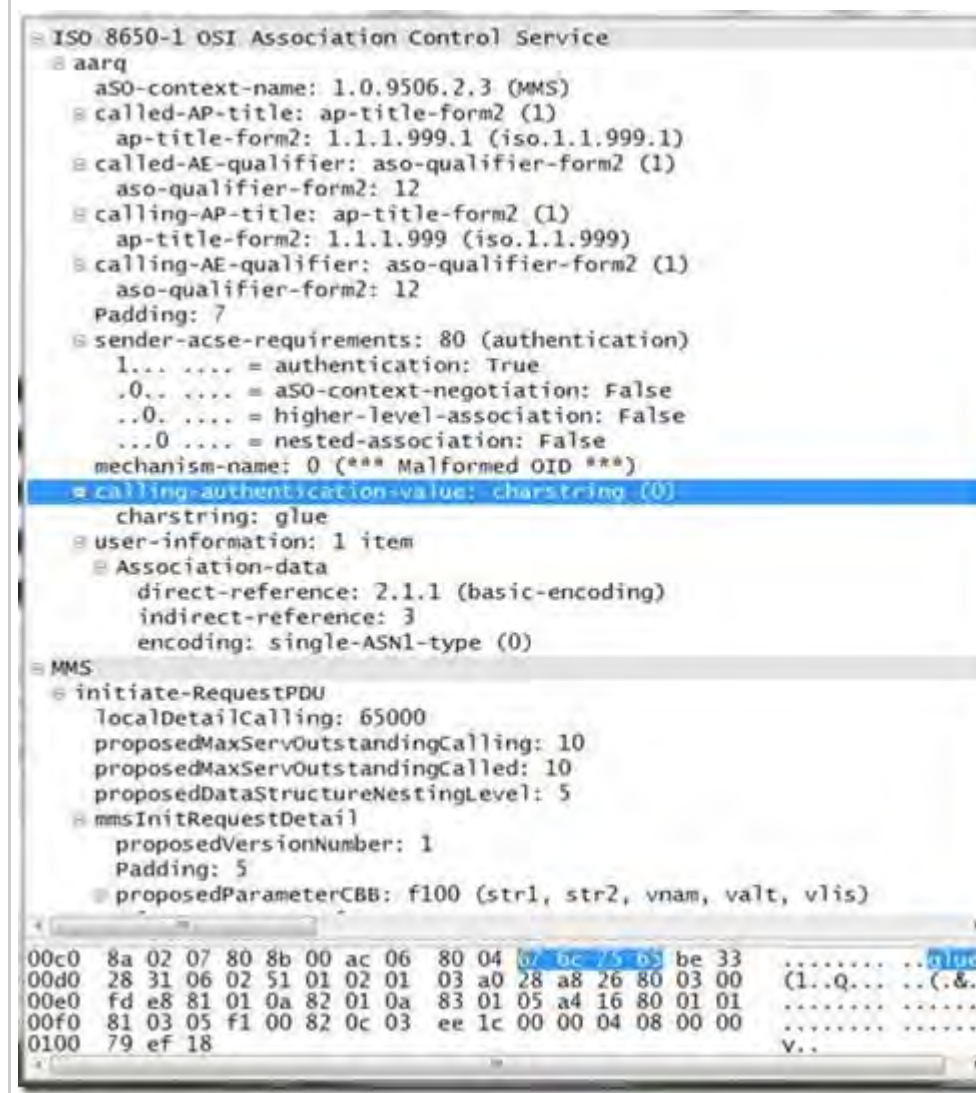
– 9 –

The bit strings for the sender-ACSE-requirements and responder-ACSE-requirements fields of the authentication FU shall be DEFAULTED to include the authentication FU, when ACSE security is in use. Otherwise, the bits shall be DEFAULTED to exclude the authentication FU (this provides backward compatibility).

The calling-authentication-value and responding-authentication-value fields are of type authentication-value that is further defined in ISO 8650 as a CHOICE. The CHOICE for the Authentication-value shall be EXTERNAL. The presentation context shall include a reference to the abstract syntax that is used for the EXTERNAL.

The ACSE mechanism-name field shall be used to denote the format of the authentication value field being conveyed. The definition of the mechanism-name field (both for AARQ and AARE) shall be:

See example of ACSE AARQ in Wireshark (connecting to an IEC 61850 IED, password "glue" – in plain text):



So, it would be sufficient to refer to IEC 62351-4 in IEC 61400-25-4 Edition 2 and in IEC 61850-8-1.

The following experience may be yours as well:

1. Think of an IEC 61400-25-4 / IEC 61850-8-1 MMS Server in an IED.
2. MMS allows to set a username and password.
3. The client is for example the Omicron IED Scout.
4. You can use a password to protect the access to that server (to some extent).
5. Many clients do not support to use a password to be sent to the server. So access from a couple of SCADA clients is not easy to manage ... or even not possible at all.

It is highly recommended that the user community feeds back their experience with MMS passwords to the standardization groups like IEC TC 57 WG 10, 15, 17, 18, 19, ...

[If you have a special experience or requirement on MMS password exchange, please let me know.](#)

Thanks for your feedback.

Posted by [Karlheinz Schwarz](#) at 6:57 AM No comments:

Labels: [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [security](#)

How Does IEC 61850-3 Apply for IEDs Outside Substations?

I have been contacted several times on the question: "What are the requirements in IEC 61850-3 (General requirements, EMC, EMI, ...) that have to be applied in DER, SA, ... Wind turbines, Hydro Power stations?"

In IEC 61850-3 these applications are partly excluded (57/1246/CDV) says under

6.7.1 Electromagnetic environment

"... In addition to the mentioned electrical plants, Electricity Utilities can install apparatus in

control centers, radio repeaters, or **low voltage distribution points in industrial, commercial or residential areas**. These locations are covered by **other generic standards or product standards**. ..."

An IED for a Hydro power plant, PV inverter, other DER or DA application to become compliant with IEC 61850-3 requires some definition in IEC 61850-3 for these domains. Pointing to "other standards" is to fuzzy.

I would highly appreciate to get your opinion which most crucial standards for other areas than HV/MV substations are applicable. We could then summarize the result and publish some guidelines ... hints.

[Please contact me in case you have some useful hints on the applicability of IEC 61850-3 outside substations.](#)

Posted by [Karlheinz Schwarz](#) at [6:37 AM](#) [No comments:](#) 

Labels: [DER](#), [distribution automation](#), [EMC](#), [EMI](#), [IEC 61850-3](#), [outside substations](#)

Java SDK for MMS and IEC 61850 available

Monfox (Cumming, GA, USA) implemented the **DynamicOSI™ Java MMS SDK** as a **Standalone** platform-independent software development kit and API which implements the core message defined in ISO 9506 **Manufacturing Message Specification (MMS)** required for implementation of most client and server MMS and IEC 61850 / 61400-25 applications.

The SDK is a simple Java MMS service-based API and OSI protocol stack for performing MMS operations over OSI/RFC1006 (TCP/IP). It provides a 100% Java, fully-interoperable, standard-compliant implementation for:

- Core MMS services from ISO 9506-1
- OSI Association Control Service Element (ACSE)
- OSI Presentation Layer
- OSI Session Layer
- OSI Transport Layer
- RFC1006 (OSI over TCP/IP)
- IEC 61850 Client/Server Support

[More information on MMS in Java for IEC 61850 can be found here.](#)

Posted by [Karlheinz Schwarz](#) at [6:13 AM](#) [No comments:](#) 

Labels: [API](#), [IEC 61400-25](#), [IEC 61850](#), [iso 9506](#), [Java](#), [Java SDK](#), [MMS](#)

Introduction to IEC 61850 – two Papers available for download

Karlheinz Schwarz (SCC) has presented two papers on IEC 61850 in Macau (2008). The papers can now be downloaded for free:


The first document gives an overview about the common aspects of the new international standard series IEC 61850 and how it is applied and extended to meet the requirements for al-most the whole electrical energy supply chain. It discusses the reduction of total life cycle cost of power utility automation systems using standard compliant devices, communication and tools.

[IEC 61850 beyond Substations – The Standard for the whole Energy Supply System](#) [pdf, 174 KB]

The second document gives an overview about the application of the new international standard series IEC 61850 and IEC 61400-25 for condition monitoring of primary equipment and monitoring of any process information. It discusses the basic monitoring concepts of IEC 61850 using the many information models (status information and measurements) and communication services for reporting, logging, GOOSE, sampled values, and recording

[Advanced Condition Monitoring of Primary Equipment with the Standard Series IEC 61850 AND IEC 61400-25](#) [pdf, 432 KB]

.

Posted by [Karlheinz Schwarz](#) at [5:59 AM](#) [No comments:](#) 

Labels: [condition monitoring](#), [energy supply](#), [IEC 61400-25](#), [IEC 61850](#), [monitoring](#)

Friday, September 28, 2012

Performances of Photo Voltaic Systems (PV) in Germany

Did you know that on May 25, 2012, 179 GWh electric power have been provided by PV systems?

You can view at any time the total output of all PV plants in Germany installed up to the specified cutoff date. The animated graphics demonstrate the role already played by photo voltaic systems in generating electricity in Germany today, and show that PV systems also contribute to reducing the high cost of midday peak demand.

[Link to current and historical performance of Photo Voltaic Systems \(PV\) in Germany provided by SMA](#)

[Note that SMA is supporting the application of IEC 61850 for managing PV systems.](#)

Posted by [Karlheinz Schwarz](#) at [9:01 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [photo voltaic](#), [PV](#), [SMA](#)

Wednesday, September 26, 2012

Mainova baut Anlage für Strom-zu-Gas-Technologie

“Die Mainova AG (Frankfurt) baut Pilotanlage zur Energiespeicherung! Frankfurt wird Modellstadt für die Power-to-Gas-Technologie: Die

Mainova AG wird die bundesweit erste Demonstrationsanlage bauen und betreiben, mit deren Hilfe Strom aus Wind und Sonne in Wasserstoff umgewandelt und in ein kommunales Gasnetz eingespeist wird.

Die Anlage wird am Mainova-Heizwerk in der Schielestraße errichtet und soll Ende **2013** in Betrieb gehen. Sie wird pro Stunde rund 60 Kubikmeter Wasserstoff erzeugen und so in einer Stunde 3000 Kubikmeter mit Wasserstoff angereichertes Erdgas in das Frankfurter Verteilnetz einspeisen ... die Strom zu Gas-Technologie wird für Versorgungsunternehmen aller Größenordnungen interessant werden“.

[Download die Pressemitteilung vom 25.09.2012.](#)

Damit (und mit weiteren Anlagen in der Planung) wird der vielversprechende Ansatz, Strom in Form von Gas zu speichern, ein gutes Stück vorangetrieben!

Posted by [Karlheinz Schwarz](#) at [10:44 PM](#) [No comments:](#) 

Labels: [power-to-gas](#), [storage](#), [Strom-zu-Gas](#)

Open Position: IEC 61850 and TÜV SÜD expand into the North American Market

TÜV SÜD is a well known authority in the testing of IEC 61850 IEDs with regard to IEC 61850 Conformance Tests, Functional Tests, Security Tests, and Safety Tests. They have been accredited from the UCAIUG [as an IEC 61850 test lab](#).

TÜV SÜD is currently expanding its service portfolio in the field of embedded systems, focusing on **safety and security** in the certification of machinery and installation control systems as well as networked embedded systems. In this context we focus on the following sectors: the energy industry (e.g. smart grid, smart meters and conformity/interoperability of communication networks and systems for distributed energy resources in accordance with **IEC 61850**), factory automation, chemical, oil and gas industry and rail (advanced security aspects).

TÜV SÜD is offering a new position for a Project Engineer for their Industrial IT Security and Smart Metering services in the USA.

[Please check the full description of the position.](#)

Posted by [Karlheinz Schwarz](#) at [11:50 AM](#) [No comments:](#) 

Labels: [conformance](#), [conformance test](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [test lab](#), [TÜV SÜD](#)

Tuesday, September 25, 2012

IEC 61850 in the U.S. – many Open Positions

An increasing number of open positions in the U.S. that require IEC 61850, one way or the other, are reported by [www.simplyhired.com](#):

[Check a list of 55 \(as per 2012-09-25\) descriptions posted during the last 30 days.](#)

[This is two times more than those that require knowledge in DNP3 \(as per 2012-09-25\).](#)

Many of the positions require experience in SCADA systems. This is an

indication that IEC 61850 will be used more and more beyond protection and control systems in substations.

More to come.

Posted by [Karlheinz Schwarz](#) at 6:40 AM [No comments:](#) 

Labels: [DNP3](#), [IEC 61850](#), [Job](#), [Open Positions](#), [USA](#)

MMS (ISO 9506) available for Download

The 2003 version of ISO 9506 (MMS, part 1 and 2) is available for download:

[Download ISO 9506-1 \(Services\)](#)

[Download ISO 9506-2 \(Protocol\)](#)

[Need help in MMS, IEC 61850, IEC 61400-25, ... contact us.](#)

Posted by [Karlheinz Schwarz](#) at 5:20 AM [No comments:](#) 

Labels: [download](#), [IEC 61850-8-1](#), [iso 9506](#), [MMS](#)

Saturday, September 22, 2012

IEC 61850 at the Remote Conference in Denver (September 18-19, 2012)

IEC 61850 was one of the highlights at the 2012 Remote Conference and Exhibition in Denver (CO) on September 18-19, 2012.

NettedAutomation conducted a Seminar on IEC 61850 and IEC 61400-25 and presented solutions for a short-time-to-market development.

Dan Nordell (a long-term utility expert and UCA expert from day one) explained to many experts that came by at the booth, what the benefits of the standards are:




The many discussions during the seminar and at the booth reviled the

growing interest in IEC 61850 and IEC 61400-25 in the USA. Several vendors of RTU and SCADA solutions, and utility experts reported that they are in the process of making decisions on how to get standard to implement or apply conformant solutions implemented in the near future.

[Many open positions in the USA are requesting – one or the other way – knowledge with regard to IEC 61850.](#)

How are you planning to get the needed knowledge on IEC 61850, IEC 61400-25 and MMS (ISO 9506)? [Contact NettedAutomation to get the right support.](#)

Posted by [Karlheinz Schwarz](#) at 7:44 PM [No comments:](#) 

Labels: [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [open position](#), [seminar](#), [Smart Grid](#), [source code](#), [Training](#)

Cyber Security issues for the Energy Systems

The U.S. Rice University has published a report on cyber security issues for the U.S. energy systems. This report **repeats saying that the industry needs to do something** – guess that is very true.

[Here is the report on Cyber Security.](#)

Posted by [Karlheinz Schwarz](#) at 8:05 AM [No comments:](#) 

Labels: [energy supply](#), [power systems](#), [security](#)

New publications of IEC TC 57 on IEC 61850, CIM and Security

IEC TC 57 has published several documents:

IEC 62351-5 TS Ed.2 approved as TS:

Data and communications security – Part 5: Security for IEC 60870-5 and derivatives

IEC 61850-90-7 TR Ed.1 approved as TR:


IEC 61850 object models for photovoltaic, storage and other DER inverters

[Here you can find information about the content of IEC 61850-90-7.](#)

IEC 61970-301 Ed.5 out for CDV ballot until 2013-01-04:
Common Information Model (CIM) base

Draft IEC TR 61850-90-2 out for comments by 2013-01-04:
Use of IEC 61850 for the communication between substations and control centres

IEC 61850-10 Ed.2 out for FDIS ballot until 2012-11-23:
Part 10: Conformance testing

Posted by [Karlheinz Schwarz](#) at 7:48 AM [No comments:](#) 

Labels: [CIM](#), [IEC 61850](#), [IEC 62351](#), [PV](#), [security](#)

Monday, September 17, 2012

TÜV SÜD lädt zur zweiten IEC61850-Laborbegehung ein

TÜV SÜD lädt zur zweiten IEC61850-Laborbegehung ein (Anmeldung bis Mittwoch, 12:00 Uhr möglich):

Einladung Labordemonstration Embedded Systems

München, 20. September 2012

Labordemonstration Embedded Systems

Nach Abschluss der Akkreditierung durch UCA, sowie der nahezu abgeschlossenen DAkkS-Akkreditierung laufen im Bereich Embedded Systems in den neuen Geschäftsräumen bereits die ersten Test- und Zertifizierungsprojekte an.

Unser Team möchte sich nun bei seinen Kooperationspartnern und Unterstützern mit einer Labordemonstration bedanken. In dem neuen Testlabor werden zunächst Eingebettete Systeme für das Smart Grid geprüft. Die zukünftige Energieversorgung braucht zur Messung und Regelung des Zustands der Netze intelligente Geräte, die miteinander kommunizieren und selbständig die Einspeisung von z. B. Erneuerbaren Energien in das Stromnetz regulieren. Diese Geräte werden auf ihre Kommunikationsfähigkeit nach IEC 61850 und ihre Eigenschaften nach VDE-AR-N 4105 geprüft und zertifiziert. Zusätzlich werden Tests und Zertifizierungen zur IT Sicherheit der Geräte und Infrastruktur durchgeführt.

Wir laden Sie recht herzlich ein, bei der Labordemonstration einen Blick hinter die Kulissen zu werfen.

Interesse? Bitte kontaktieren Sie Frau Ana Dominguez

TÜV SÜD AG

Embedded Systems (V-INM)

Barthstr. 16

80339 München / Munich

Phone: +49 89 5791 2195 (Munich)

mailto: ana.dominguez@tuev-sued.de

<http://www.tuev-sued.de/embedded>

Posted by [Karlheinz Schwarz](#) at 9:16 PM No comments: 

Labels: [AR-N 4105](#), [certificate](#), [conformance](#), [conformance test](#), [IEC 61850](#), [TÜV SÜD](#)

Saturday, September 15, 2012

NettedAutomations IEC 61850 Training Modules and

Experience

Please find a comprehensive description of training services provided by NettedAutomation including a list of training sessions (past events) and modules of training topics:

[Training on IEC 61850 offered by NettedAutomation \[pdf, 2.6 MB\].](#)

In addition to the theory of the standards it is the huge experience collected during 10 years of comprehensive training that makes the courses unparalleled.

[The next public training is scheduled for Frankfurt \(Germany\) on October, 17-19, 2012](#)

I hope to see several utility experts there, [see ENTSO-E statement on IEC 61850 and their complaint about the situation in High Voltage substations](#). Seats and a discount fee are available.

Posted by [Karlheinz Schwarz](#) at 6:40 AM No comments: 

Labels: [Edition 1](#), [Edition 2](#), [education](#), [ENTSO-E](#), [hands-on Training](#), [IEC 61850](#), [Training](#)


SystemCorp IEC 61850 Stack/API – Questions and Answers

SystemCorp has published a lot details on their website. Several often asked questions have been answered in Application Notes.

The recent notes deal with **GOOSE performance**, **Update call at server** side to provide **multiple values** (e.g., stVal, q, t) in **ONE call**, and Ethernet **raw package driver**.

The Application notes can be found here:

<https://www.systemcorp.com.au/support.html>

Posted by [Karlheinz Schwarz](#) at 6:16 AM No comments: 

Labels: [API](#), [application programming](#), [GOOSE](#), [IEC 61850](#), [SystemCorp](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Thursday, September 13, 2012

ENTSO-E statement on the IEC61850 standard

ENTSO-E representing 41 TSOs from 34 European countries has published earlier in 2012 a statement on IEC 61850 for the application in European Transmission Systems. The statement criticizes that the **level of interoperability expected** by the utilities has **not yet been implemented** by the vendors.

This is also my personal experience speaking to hundreds of utility experts all over. What happened? How can it be overcome?

The main reason for some challenges in getting a higher degree of interoperability is that the same utilities (from the 41 in ENTSO-E) that are now complaining DID NOT get enough involved in the standardization process AND NOT in the process of implementation and first pilot tests. The feedback (needed in such comprehensive standards) was very weak.

I was personally seriously impacted by the changes in the utility industry some 10 years ago: The industry has funded my (and other peoples) involvement in the standardization work until 2002 – to help to **make sure that the utilities' requirements got implemented in the standards!!** For the next 10 (crucial!) years after 2002 almost NO UTILITY expert showed up or was seriously involved. The vendors were finishing the standards without the "control" of the utility industry. AND: The first implementations and projects were not really watched and commented by the utility experts. The vendors still are preferably implementing turn-key substations often WITHOUT utility experts involved! Utility people usually have very little understanding what IEC 61850 means.

On one side it is **unfair to not really showing up and not getting sufficiently involved** in the process for the last 10 years and then – when some minor issues are still not solved – **complain that the TSO's requirements have not been fully met!** Several experts have tried some 10 years ago to convince several CEOs of big utilities to continue funding the standardization work! We did not have any chance!

By the way – the good sign is now that the ENTSO-E TSOs **WOKE UP!** Hope that they will get back to become again a **serious partner** in the international standardization and in the implementation and application of the standards.

[Download the ENTSO-E statement on IEC 61850](#)

In the meantime many other domain have decided to use IEC 61850 – in most cases the interoperability at a very high degree is reached in these applications.

All market stake-holders are invited to get involved – some may first need to get some education to understand that IEC 61850 is more than just another protocol.

The statement refers to **EPRI's UCA development that has cost some 50.000.000 USD !!** Where are the European utilities that are

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[NettedAutomations IEC 61850 Training Modules and E...](#)

[SystemCorp IEC 61850 Stack/API – Questions and Ans...](#)

willing to spend a reasonable amount of Euros to get the remaining requirements of the TSO implemented in the years to come?!

I look forward to receiving many enquiries for training courses from European TSOs in the years to come ;-)

[I have trained many utilities all over to help them to understand the standards, products, tools, and the vendors ...](#) often utility experts have NO clue what this is all about!

Posted by [Karlheinz Schwarz](#) at [12:39 AM](#) [No comments:](#) 

Labels: [ENTSO-E](#), [IEC 61850](#), [implementation](#), [interoperability](#), [interoperability tests](#), [standards](#), [utilities](#)

Wednesday, September 12, 2012

IEEE Award for Paper on Standards-based Smart Grid Automation

A paper co-written by Academic researchers and Power Industry experts **has won the Andrew P. Sage Award for Best Paper in the IEEE Transactions on Systems, Man and Cybernetics, Part C: Applications and Reviews for 2012.** The paper was nominated by Editor in Chief, Professor Vlad Marik.

“Distributed Power System Automation with IEC 61850, IEC 61499, and Intelligent Control” by Neil Higgins, Prof. Valeriy Vyatkin, Prof. Nirmal-Kumar C Nair and Karlheinz Schwarz fuses ideas from two distinct areas, Industrial Control and Power System Automation. It describes how synergies between two emerging Standards, IEC 61499 Function Blocks and IEC 61850 Communication Networks and Systems for Power Utility Automation, can be leveraged to create powerful and robust SmartGrid automation schemes.

IEC 61499 promotes portability, interoperability and configurability aspects of control systems, adding an object-oriented flavour to precursors like IEC 61131. The second edition of IEC 61499 due for release in late 2012 builds on experiences in the development and application of complying products and systems since publication of the Standard in 2005.

[Read the full news release.](#)

[Read the paper awarded \[1 MB\].](#)

Posted by [Karlheinz Schwarz](#) at [2:02 AM](#) [No comments:](#) 

Labels: [distribution automation](#), [IEC 61131-3](#), [IEC 61499](#), [IEC 61850](#), [Smart Grid](#), [smart people](#), [smart solution](#)

Monday, September 10, 2012

Third training of the TÜV SÜD Training Tour in Taipei a big Success

The third two day training on IEC 61850 in Taipei (Taiwan) was attended by 45+ experts. The discussions during the seminar on Monday (2012-09-10) showed that there are already several companies implementing IEC 61850 – more to come in the near future.

Opening address from Mr Bill Lin (Managing Director, TÜV SÜD Taiwan):

[ENTSO-E statement on the IEC61850 standard](#)

[IEEE Award for Paper on Standards-based Smart Grid...](#)

[Third training of the TÜV SÜD Training Tour in Tai...](#)

[Nice 5 minute video on IEC 61850 benefits from ABB...](#)

[Another Successful IEC 61850 Training – Beijing](#)

[Successful IEC 61850 Training in Seoul \(South Kore...](#)

[IEC 61850 at 17. Kasseler Symposium Energie-System...](#)

[REpower offers Wind Turbines with IEC 61400-25](#)

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Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)



Introduction by Professor S. L. Chen ... a promoter of IEC 61850 who looks very happy to have this event here in Taipei:



Dr. Strübbe (TÜV SÜD Munich/Germany) reports about global activities on Smart Grid and how TÜV SÜD is prepared to increase Certainty and add Value in the area of testing: conformance, security, functions, safety:



Most of the attendees ...



... listening to Karlheinz Schwarz:


智慧型電網能源資訊技術應用訓練課程 IEC 61850: How to get into the Market		
時間 Time	主題 Topic	講師 Speaker
9:00 - 9:30	報到 Registration	
9:30 - 9:50	長官致詞 Opening Welcome - introduction	
10:00 - 10:30	IEC TC 57 標準	Mr. Karlheinz Schwarz Netted Automation
10:30 - 10:45	休息 Teak Break	
10:45 - 12:00	IEC 61850 Ed2	Mr. Karlheinz Schwarz Netted Automation
12:00 - 13:00	午餐 Lunch Break	
13:00 - 14:30	IEC 61850	Mr. Karlheinz Schwarz Netted Automation
14:30 - 14:45	休息 Teak Break	
14:45 - 16:15	IEC 61850/ IEC 61400-25	Mr. Karlheinz Schwarz Netted Automation
16:15 - 16:30	Q&A & Local partners	TÜV SÜD AG Netted Automation

主辦單位將保留變更講題及講者之權利
● 贊助商：TUV SUD Taiwan
● 協辦單位：工業技術發展研究中心 工業技術研究院 財團法人工業技術研究院

Taiwan has nice people and a gorges coast line (Yehliu Geopark in the north):



The meetings with two well known companies in Taipei on Friday last week show that there is a huge interest in IEC 61850 in Taiwan and globally.

Posted by [Karlheinz Schwarz](#) at [12:48 PM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Taiwan](#), [Training](#), [TÜV SÜD](#)

Saturday, September 8, 2012

Nice 5 minute video on IEC 61850 benefits from ABB on YouTube

A fully automated distribution system can make the power grid much more reliable. The IEC 61850 standard can help us get there by overcoming the key hurdle of interoperability. This video provides three ways IEC 61850 is equipping utilities with the means to increase reliability and lower costs in distribution systems. Learn about these benefits and how IEC 61850 simplifies communication, data naming, IED configuration, and the engineering process.

[View video on IEC 61850 from ABB.](#)

Posted by [Karlheinz Schwarz](#) at [11:08 PM](#) [No comments:](#) 

Labels: [ABB](#), [configuration](#), [GOOSE](#), [IEC 61850](#), [MMS](#), [sampled value](#), [SCL](#), [video](#)

Another Successful IEC 61850 Training – Beijing

The second two day training on IEC 61850 in Beijing (China) was attended by some 30 experts from China. The interest was great ... the room size quite limited:

Opening address from Mr Wencai Zhu (Vice President, TÜV SÜD, Beijing):



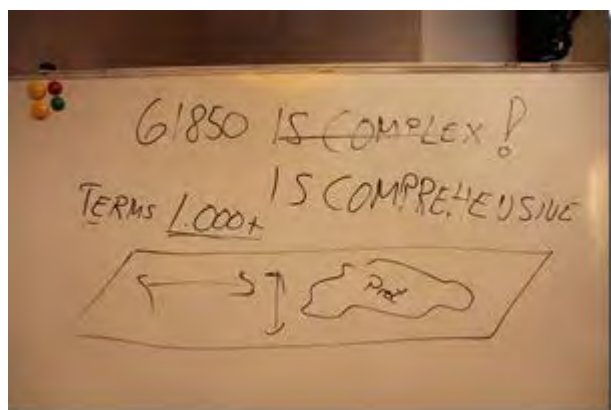
Dr. Strübbe (TÜV SÜD, Munich/Germany):



Attendees listen very carefully:



Karlheinz Schwarz pointed out that IEC 61850 is not complex – but very comprehensive! The standard series defines a couple of thousand terms like MMXU, PDIS, Pos, STMP.Tmp, ...



It is this sheer unlimited number of terms that looks like a complex standard – it is a huge language that defines a lot of nouns and verbs (like read, report, control, retrieve self-description, ... lower tap position, record disturbance data).

Students learned the basics of IEC 61850 and how to get their devices speak IEC 61850 and IEC 61400-25 using of the shelf stack/API software from SystemCorp.

The third training session is to start in Taipei (Taiwan) tomorrow – September 10, 2012.

Posted by [Karlheinz Schwarz](#) at 9:41 PM No comments:

Labels: [conformance test](#), [IEC 61850](#), [interoperability tests](#), [seminar](#), [test lab](#), [testing](#), [Training](#), [TÜV SÜD](#)

Successful IEC 61850 Training in Seoul (South Korea)

The two day training on IEC 61850 in Seoul (South Korea) was attended by some 60 experts from South Korea and the Philippines – a big success:

Entrance at the KTL building:



Auditorium:



Discussing (very good) questions:



The training was well received. The questions and discussions indicate that the industry is now in the process of implementing and using the new technology IEC 61850 and IEC 61400-25.

TÜV SÜD (one of the organizing companies) focused on the interoperability tests and functional tests of devices like PV inverter. TÜV SÜD offers services to test IEC 61850 conformity, [PV inverter functions defined in part IEC 61850-90-7](#), security, and EMC/EMI requirements.

One Test Lab – for many requirements.

Posted by [Karlheinz Schwarz](#) at [9:20 PM](#) [No comments:](#) 

Labels: [conformance](#), [conformance test](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [Korea](#), [photo voltaic](#), [seminar](#), [Training](#)

IEC 61850 at 17. Kasseler Symposium Energie-Systemtechnik


The 17. Kasseler Symposium Energie-Systemtechnik will be held in Kassel (Germany) on 11.-12. October 2012. One of the various issue is the information and **communication technology** and the extended focus on **electricity, gas and heating systems** that are understood to form "Hybrid Grids".

IEC 61850 will be discussed in the presentation "Standardisierte Anbindung von Anlagen nach IEC 61850" (Standardized connection of plants according to IEC 61850) by Martin Winter, SIEMENS AG.

[The complete Program \(German and English\) can be downloaded.](#)

[Online registration.](#)

I look forward to meeting you there. Want to discuss any IEC 61850, IEC 61400-25 or IEC 60870-5-104 related issue, let me know please.

Posted by [Karlheinz Schwarz](#) at [7:32 PM](#) [No comments:](#) 

Labels: [energy supply](#), [gas](#), [heat](#), [Hybrid Grid](#), [IEC 61400-25](#), [IEC 61850](#), [Siemens](#), [Smart Grid](#)


REpower offers Wind Turbines with IEC 61400-25

REpower offers a standardized IEC 61400-25 server with the REguard B IEC 61400-25. This is available for all new turbines – retrofit for REcontrol B is possible.

This interface is based on the international standard for wind power plants, IEC 61400-25. As one of the first wind turbine manufacturers, REpower has included this standard in its SCADA solutions. From the very beginning, they put all their experience into developing a standard that unites wind farms all across the world. Our aim is to one day achieve smooth worldwide communication among wind power plants and modules.

Interface B IEC 61400-25 comprises all features of the SCADA interface family – and more. Apart from delivering alarm messages, second values, 10-minute averages, status codes and operational data, this interface also enables wind turbine operation (starting, stopping, resetting). In addition, individual wind power plants, the power management unit and the wind measurement station can be accessed, controlled and monitored.

[Download more details on IEC 61400-25 from REpower.](#)

Posted by [Karlheinz Schwarz](#) at [3:58 PM](#) [No comments:](#) 

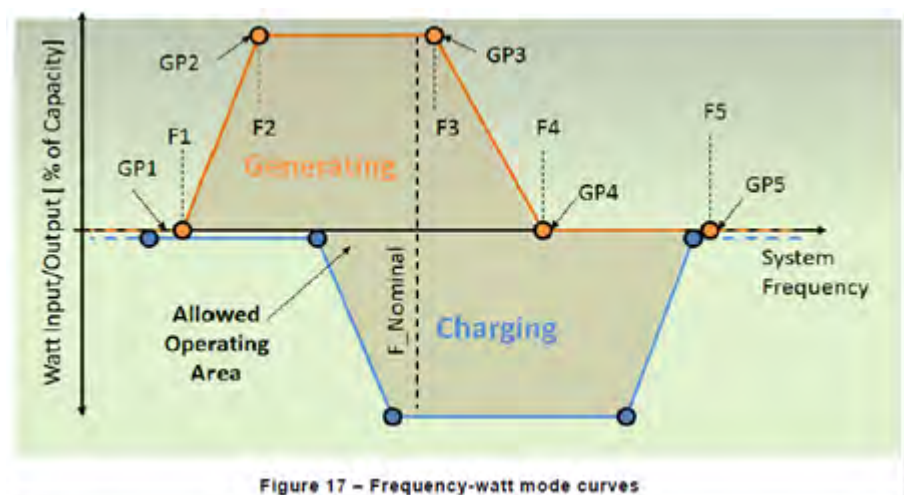
Labels: [IEC 61400-25](#), [REpower](#), [SCADA](#)

Friday, August 31, 2012

Details of Inverter-based DER Devices Modelled in IEC 61850-90-7

Functions and Information Exchanges for Inverter-based DER Devices are modeled in IEC 61850-90-7. What does this document provide? A lot of useful models for real functions needed (today and in the near future) in power distribution systems with massive renewable power fed into the grid. The main models can be found in a document published the other day (see link below).

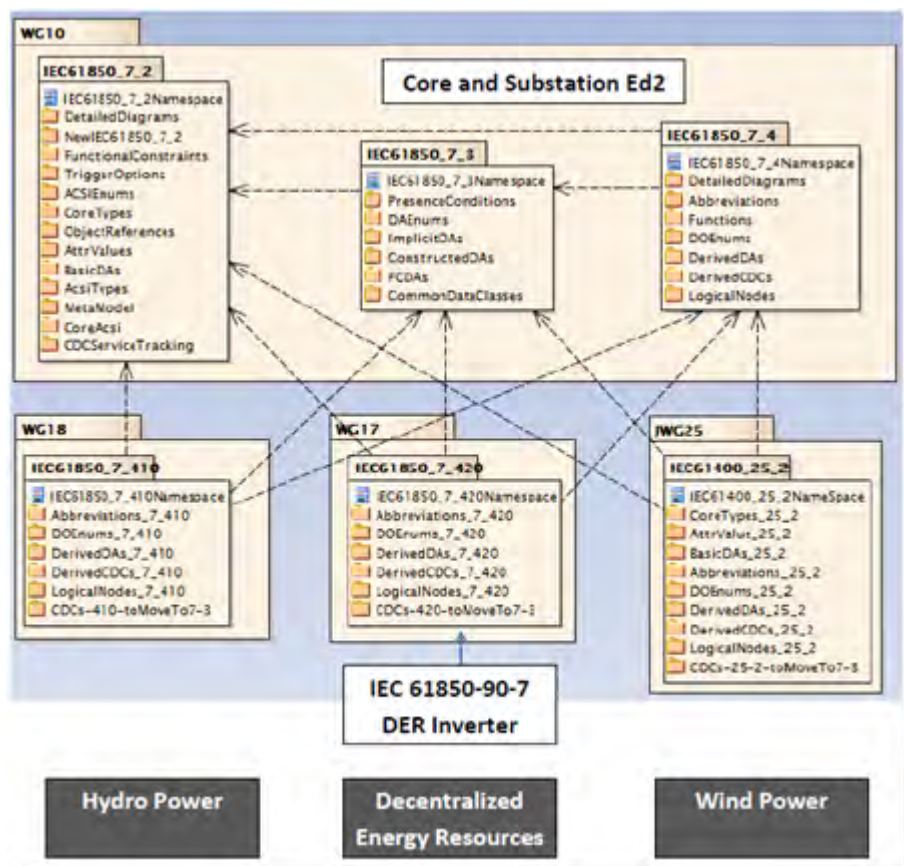
You can find many functions described and modeled in IEC 61850-90-7, e.g., frequency-watt mode:



This frequency-watt mode addresses the issue that high frequency often is a sign of too much power in the grid, and vice versa. These extreme deviations from nominal frequency can cause grid instability, particularly if they cause significant amounts of generating equipment to trip off-line.

One method for countering this over-power problem is to reduce power in response to rising frequency (and vice versa if storage is available). Adding hysteresis provides additional flexibility for determining the active power as frequency returns toward nominal.

The IEC 61850-90-7 has been written to meet crucial needs in the power delivery system. This document has to be seen in conjunction with other standards as depicted in the UML diagram below:



[The electrical measurements like voltage, current and frequency are defined in IEC 61850-7-4 Ed2.](#)

Note that the conversion of almost all models into UML (Enterprise Architect) will be completed soon. The huge model will be used to maintain the models in future. This is a crucial step toward tool based standardization.

[Download the models based on IEC 61850-90-7 \[pdf, 1.1 MB\]](#)

Posted by [Karlheinz Schwarz](#) at 11:17 PM No comments:

Labels: [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61850-7-4 Ed2](#), [IEC 61850-90-7](#), [inverter](#), [power management](#), [reactive power control](#), [renewables](#)

Vulnerability in the RuggedCom Rugged Operating System (ROS) – Bulletin from RuggedCom

RuggedCom has posted today (2012-08-31) some important information about the RuggedCom Private Key Vulnerabilities for HTTPS/SSL and SSH.

On that page you find crucial information about affected products, descriptions of the Vulnerabilities, fixes, and recommendations.

As this Vulnerabilities shows there is a need for an increasing **awareness of security issues** – and a need for more resources: to develop, implement and **apply** security measures – and education.


When did you talk last time with your management about making your system or IED more secure? Maybe it's time to talk to them again ... and again ... and again.

Do you know the most secure protocol? No? It is the protocol that never was developed, implemented, or in use. ;-)

I am kidding. Sure. The Internet was originally invented for "wide-open" communications. This is long-time ago. Today it could be assumed that many new application domains will use the "Internet Technology" to build the x-Webs (Energy-Web, Power-Web, Smart Grid Web, ...).

Be serious on security! Please!

[Access the RuggedCom Security Updates.](#)

Posted by [Karlheinz Schwarz](#) at 8:50 AM No comments: 

Labels: [IEC 61850](#), [RuggedCom](#), [security](#), [vulnerability](#)

C# Server and Client Application Source Code for IEC 61850 DLL

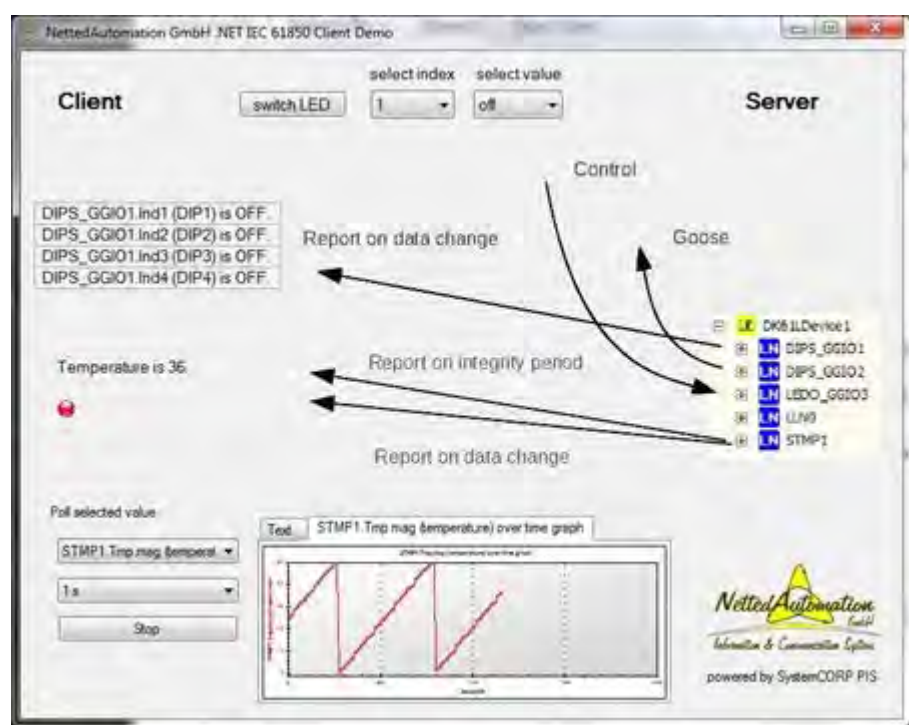
NettedAutomation has updated the C# Client AND SERVER application (GUI) of the [IEC 61850 Evaluation Kit \(DLL\)](#). You can use the SystemCorp DLL (dated back to 2010) from the evaluation package downloaded from the above NettedAutomation link. If you have installed the IEC 61850 DLL before March 2012 it **will not run** anymore on your PC (it runs for 6 just months). In that case you can install it on a different machine – maybe you have a new PC anyway since you tested the DLL.

The C# application **source code** and **executable code** as well as documentation and the appropriate SCL files for the client and the server are provided via the link below.

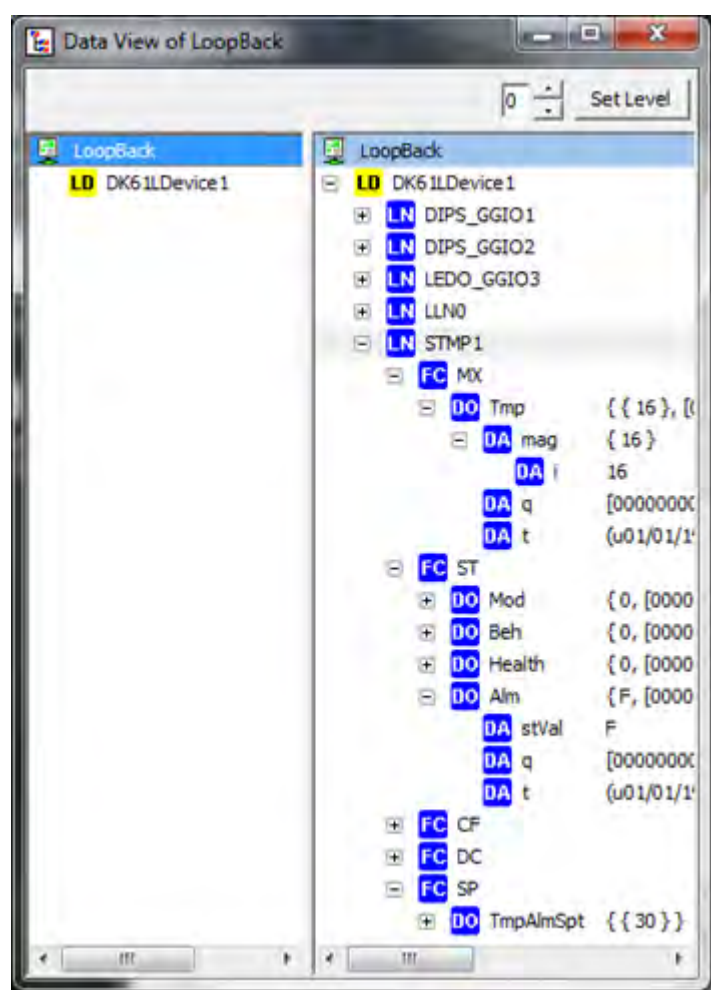
The new Server GUI supports manipulating values in the server application, e.g., the temperature and setting for temperature alarms at the server:



The client application allows to see results from polling and Reports:




You may just use another browser (e.g., the Omicron IEDScout) to connect to the server and retrieve the model and the values:



[Download the complete C# application examples for the IEC 61850 DLL](#) [zipped file, 1 MB].

[Details on downloading the DLL evaluation package could be found here.](#)

Posted by [Karlheinz Schwarz](#) at 8:24 AM No comments: 

Labels: [.Net](#), [API](#), [application programming](#), [applications](#), [C#](#), [dot Net](#), [IEC 61850](#), [source code](#), [stack](#), [SystemCorp](#)


IEC 61850 for SCADA! – Are you looking for a new Job?

Are you highly-motivated to use your IEC 61850 skills; like challenges; are you collaborative; is this what you are looking for? Read on...

Southern California Edison is "looking for highly motivated individuals who enjoy the challenge of working on key industry changing projects. They need your good ideas and your contributions to remain a leader in this industry. ... This position will report to the Power System Controls (PSC) SCADA Maintenance group. The successful candidate will work with the Centralized Remedial Action Scheme (CRAS) project team and the suppliers on the implementation of the system, learning the tools and processes required for the maintenance of the Central Controller systems."

A crucial requirement is the experience of **IEC 61850**, **DNP**, and **ICCP** (Inter-Control Center Communications protocols).

[Check the complete Job description.](#)

Posted by [Karlheinz Schwarz](#) at 6:31 AM No comments: 

Labels: [DNP3](#), [ICCP](#), [IEC 61850](#), [Job](#), [open position](#), [SCADA](#), [TASE.2](#), [TASE.2 ICCP](#)

Libraries – New License Policy for IEC 61850 Stack and API from SystemCorp

[SystemCORP Embedded Technology Pty Ltd \(Bentley WA 6102, Australia\)](#) offers a very modern and brand-new license policy for precompiled **Libraries (Windows and Linux)** for IEC 61850 Source code for their Stack and API effective August 2012 meeting the market demands.

The prices depend on the number of signals implemented: 1-100, 101-500, 501-1500, 1501-5000, 5000+

There are two options to chose from:

1. End User Server/Client (Windows and Linux); based on quantities
2. Re distributable Server/Client (Windows and Linux); royalty free with application

They offer the following services:


Built in Server & Client Function (based on ICD/CID configuration file)
Reporting (buffered and unbufferd)
MMS Services
GOOSE Publisher (Server) and Subscriber (Client)
Logging (Custom XML file format)(**)
Application Programming Interface (API) manual published on <http://www.systemcorp.com.au/PIS10API/index.html>

In addition to the new pricing it is also crucial to understand that the package comes with a build-in API that can be used by the application software immediately.

Most of the needed definitions in **edition 2** of the core documents (7-2, 7-3, 7-4, 8-1 and 6) have been implemented. Most **Object models** (LN, DO) **of other standards like IEC 61400-25-2 (Wind Turbines)** can easily be implemented using the corresponding models in the CID file.

[Contact SystemCorp by email for a quote.](#)

[Note also the new prices for the IEC 61850 source code.](#)

Posted by [Karlheinz Schwarz](#) at [2:31 AM](#) [No comments:](#) 

Labels: [API](#), [DLL](#), [Edition 1](#), [Edition 2](#), [IEC 61400-25](#), [IEC 61850](#), [Linux](#), [source code](#), [stack](#), [Windows](#)

Tuesday, August 28, 2012

Tissue Database for IEC 62439-3 PRP and HSR

Please note that the tissue database for the following standards is open for posting technical issues (tissues):

PRP (Parallel Redundancy Protocol) is a data communication network standardized by the International Electrotechnical Commission, Geneva, as IEC 62439-3 Clause 4

HSR (High-availability Seamless Redundancy) is a data communication network standardized by the International Electrotechnical Commission, Geneva, as IEC 62439-3 Clause 5

[Access for the tissue database.](#)

Posted by [Karlheinz Schwarz](#) at [5:42 AM](#) [No comments:](#) 

Labels: [HSR](#), [IEC 61850-90-4](#), [iec 62439](#), [PRP](#), [redundancy](#), [tissue process](#), [tissues](#)

BDEW Whitepaper on Security in Power Systems

The well-accepted dual-language BDEW Whitepaper

- Requirements for Secure Control and Telecommunication Systems
- Anforderungen an sichere Steuerungs- und Telekommunikationssysteme

is now available at a new link:

[Download Security Whitepaper \[pdf\].](#)

Posted by [Karlheinz Schwarz](#) at [1:09 AM](#) [No comments:](#) 

Labels: [IED](#), [Power Automation](#), [power systems](#), [security](#)

Monday, August 27, 2012

USE61400-25 Users Group at LinkedIn

The [USE61400-25 user group's](#) main objective is to ease the use of IEC 61400-25 and support users implementing the standard within the wind power industry:

[There has a new group on IEC 61400-25 been created at LinkedIn](#)


Note that IEC 61400-25 is build on IEC 61850. The crucial parts of IEC 61850, e.g., IEC 61850-7-2, -7-3, -7-4, -6, and -8-1 and various communication stacks and APIs can be re-used for most of the applications of wind power applications.

There is some crucial work going on to coordinate the future revision of IEC 61400-25 with IEC 61850.

IEC 61400-25 is also a topic on the training courses conducted at the Remote Conference in Denver (CO) on September 18/19, 2012 and in Frankfurt/M (Germany) on October 17-19, 2012:

[More details on the IEC 61850/61400-25 training sessions.](#)

[NettedAutomation](#) has also a booth the Remote Conference and Exhibition (booth #45) showing several software and hardware solutions for IEC 61850 and IEC 61400-25 (stack software, API, gateway between DNP3/Modbus/IEC60870-5-104 and IEC 61850, other embedded controller).

Posted by [Karlheinz Schwarz](#) at 2:00 PM No comments: 

Labels: [education](#), [IEC 61400-25](#), [IEC 61850](#), [LinkedIn](#), [seminar](#), [Training](#), [USE61400-25](#), [Users Group](#)

TÜV SÜD Conformance Test Lab for IEC 61850 accredited

TÜV SÜD (Munich, Germany) has been authorized on August 24, 2012 to perform IEC 61850 Conformance Testing (for servers) in accordance with the Users Group Quality Assurance Testing Program Procedures. TÜV SÜD is a third party test lab that offers Level A tests.


Congratulation!



TÜV SÜD
Barthstrasse 16
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Mr. Peter Phisterer
+49-(0)89-5791-3372
<mailto:Peter.Phisterer@tuev-sued.de>

It could be expected that this new test lab will speed up the tests for IEDs with IEC 61850 server functionalities – and it is likely that the total cost for a certificate will be lower than before.

The first tests run have already helped to improve the quality of products.

Posted by [Karlheinz Schwarz](#) at 2:20 AM [No comments:](#) 

Labels: [conformance](#), [conformance test](#), [IEC 61850](#), [server](#), [test lab](#), [TÜV SÜD](#), [UCA](#)

Thursday, August 23, 2012

New Source Code License Policy for IEC 61850 Stack and API from SystemCorp

[SystemCORP Embedded Technology Pty Ltd \(Bentley WA 6102, Australia\)](#) offers a brand-new license policy for IEC 61850 Source code for their Stack and API effective August 2012 meeting the market demands. The new policy is extremely suitable for manufacturers that plan to implement IEC 61850 into more than one product.

They offer the following easy to understand options:

1. Portable **Server AND Client** IEC 61850 Stack and **API** Source Code License for one (1) product
2. Extension License for Portable **Server AND Client** Stack and **API** Source Code License for an additional product
3. Unlimited Company Wide Portable **Client AND Server** IEC 61850 Stack and **API** Source Code License
4. Annual Service and Maintenance Contract

License fees stated under item 1, 2 and 3 are one off costs. No other license fees or royalties for re-distribution of customer products apply.

In addition to the new pricing it is also crucial to understand that the package comes with a build-in API that can be used by the application software immediately.

Most of the needed definitions in **edition 2** of the core documents (7-2, 7-3, 7-4, 8-1 and 6) have been implemented. Most **Object models** (LN, DO) **of other standards like IEC 61400-25-2 (Wind Turbines)** can easily be implemented using the corresponding models in the CID file.

[Contact SystemCorp by email for a quote.](#)

The IEC 61850 portable software stack and API comprises:

Server and Client Function using static CID configuration file with inbuilt functions:

- Reporting (buffered and unbuffered)
- MMS Services
- GOOSE Publisher (Server) and Subscriber (Client)
- Sampled Values Publisher (Server)
- Logging (Custom XML file format)(*)

Pre-compiled libraries based on platform:

- Windows™ Library (dll) and/or
- Linux Ubuntu Library and/or
- Standard Linux library matching customer tool chain and kernel definition for one embedded hardware platform(**)

Pre-compiled libraries are also available as stand-alone products (without the need of the source code purchase).

Application Programming Interface (API) published on

<http://www.systemcorp.com.au/PIS10API/index.html>

- 2 x free SystemCORP ICD Designer
- 1 x free SystemCORP eNode Workbench(***) allowing customer for

testing ICD/CID files and simulating simple server and client functions

Notes:

(*) Customer specific file formats on request. Engineering charges may apply.

(**) Porting to non-standard Linux tool chains/kernels or propriety software operating systems engineering charges might apply.

(***) Available from January 2013

Posted by [Karlheinz Schwarz](#) at [1:14 AM](#) [No comments:](#) 

Labels: [API](#), [DLL](#), [Edition 2](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [implementation](#), [Linux](#), [source code](#), [stack](#)

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News on IEC 61850 and related Standards

IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, DNP3, IEC 62351 (Security), ...

Thursday, August 23, 2012

Analysis of Indian Power Outage end of July 2012 published the other day

Guess you remember the biggest blackout that ever happened in India end of July 2012 – leaving several 100 Million people without power for some time!

A first comprehensive report has been published:

REPORT OF THE ENQUIRY COMMITTEE
ON GRID DISTURBANCE
IN NORTHERN REGION

16th AUGUST 2012
NEW DELHI

What happened on the 30th and 31st of July? A lot!

The Substation Protection Automation systems, for example, all over worked quite well. The report lists 100+ tripping events of protection devices !! That means many lines were taken out of service in order to protect the lines, switches, transformers, generators, ... Before a line is damaged by overload, it is disconnected from the power flow – it operates like a “smart” fuse. Indian people should be thankful that most protection functions worked well.

My summary of the report is:

- Experts figured out that the power delivery systems in India are very huge and very complex.
- Investments to maintain and operate these complex systems and to keep them stable with the growing demand were far too low.
- A list of short, medium and long term actions are suggested to prevent such events in the future.

One issue regarding communication is very interesting, the report states that: “The existing communication network should be **maintained properly. RTUs and communication equipments should have uninterrupted power supply with proper battery back up so that in case of total power failure, supervisory commands & control channels do not fail.**”

My personal experience in the early 1970s was **that battery back up systems are often badly maintained**. I was responsible for a brand-new centralized fire alarm system with 6,500 manual fire alarm detectors. The control system crashed at least once a week. As a young man (21) I could not accept that the manufacturer of that huge fire protection system did not act properly to investigate what the problem was; the customer was quite angry. I was too young to do my own deep inside analysis of the problem. I didn’t even have the instruments to do it. So, I quit my job and went back to school and university ... and came back to the same company after 7 1/2 years (and father of four kids). I started as an engineer in 1981 – in the area of communication for process automation (IEEE 802.3 Ethernet, IEEE 802.4 Token Bus, MAP, Profibus, ...).

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[Analysis of Indian Power](#)

Later somebody reported to me what the cause of the problems of the centralized system was: BADLY MAINTAINED Back-Up Power Supply before it was installed! The batteries were stored in the basement for one year – without anybody keeping an eye on it. The physical laws hit back after the batteries were installed.

A system is as weak as its weakest link.

I guess the results of the investigation are not new. Many engineers have warned all over all the time that more investment is needed to keep the lights on.

[Download the complete 70 page report \[pdf, 830 KB\].](#)

Posted by [Karlheinz Schwarz](#) at 12:26 AM 1 comment: 

Labels: [maintenance](#), [power outage](#), [power systems](#), [protection](#)

Tuesday, August 21, 2012

Security Issue with RuggedCom Network Devices

The operating system (ROS) used in RuggedCom network devices has (according to the ICS-CERT Operations Center) a problem with a private key which may be used by an attacker.

A report states, that “the vulnerability can be used to decrypt SSL traffic between an end user and a RuggedCom network device.”

[Access the complete Report from ICS-Cert.](#)


[The other day I said:](#)

It is HIGHLY recommended to ALL stakeholders in the energy industry to keep an close eye on the security issues!!

I hope that more responsible managers will understand that implementing the needed measures is crucial to meeting their mission (not looking to comply with a standard or other specification) – this costs money ... but it is a prerequisite for running your business in the future!

Don't expect that nothing will happen!

Experts, responsible for Substation Automation Systems that use ROS based network devices, should keep an eye on the issue!

Posted by [Karlheinz Schwarz](#) at 7:18 AM No comments: 

Labels: [RuggedCom](#), [security](#), [SSL](#), [vulnerability](#)

New Work Item Proposal – Mapping between DLMS/COSEM (IEC 62056) data models and IEC 61850 data models

It was just a matter of time before an official work item was suggested to look into some kind of “co-operation” of information models developed for **metering data** (DLMS/COSEM, IEC 62056) and **power system automation** (IEC 61850).

Here is the proposal: IEC TC 57/1276/NP with the title:

[Outage end of July 2012 p...](#)

[Security Issue with RuggedCom Network Devices](#)

[New Work Item Proposal – Mapping between DLMS/COSE...](#)

[IEC 61850 Course conducted by TÜV SÜD in Beijing \(...\)](#)

[Functional Constraint CO “Control” missing in IEC ...](#)

[TASE.2 für den Prozessdatenaustausch zwischen Leit...](#)

[Four additional IEC TC 57 Standards recommended fo...](#)

[IEC 61850 Course conducted by TÜV SÜD in Seoul \(So...](#)

[IEC 61850 Course conducted by TÜV SÜD in Taipei \(T...](#)

[IEC 61850-7-410 Edition 2 is out for ballot](#)

[Could more intelligent computers have prevented th...](#)

[IEC 61850 Edition 1, 2, or 3 and UML modeling?](#)

[Wind and Solar Power – Could have helped to preven...](#)

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- ▶ July (14)
- ▶ June (17)
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- ▶ April (10)
- ▶ March (12)
- ▶ February (21)

“Mapping between the DLMS/COSEM (IEC 62056) data models and the IEC 61850 data models”

The ballot closes 2012-11-23.


Data **derived** from current and voltage and other sensors play an important role in the electric delivery system: on all voltage levels and all over!

With more needs for monitoring and controlling the system, substation **automation functionality** will be needed at **any** voltage level. It would be an advantage if automation functions could tap information provided by revenue meters.

A crucial objective is to find out and document which data objects can be used from the **revenue meter** and how these data **objects map into the IEC 61850 information model**.

This activity shows that IEC 61850 (originally positioned at medium and high voltage substations) is a kind of a core technology for more and more applications throughout the electric power delivery system. It has the potential to **uniquely bridge the gap between islands of information** found in systems providing electric power (utilities, factories, power plants, ...).

[Models like the IEC 61850 MMXU are universally applicable to any voltage level of an A.C. electrical system.](#)

Posted by [Karlheinz Schwarz](#) at 1:01 AM No comments: 

Labels: [Automation](#), [DLMS/COSEM](#), [IEC 61850](#), [mapping](#), [meter](#)

Monday, August 20, 2012

IEC 61850 Course conducted by TÜV SÜD in Beijing (China), 06.-07. September 2012

IEC 61850亚洲培训 2012_北京

IEC 61850 : 如何应用

IEC 61850系列标准 由国际电工委员会第57技术委员会颁布 适用于电力设备自动化通信网络和系统。本标准可以应用于变电站内 变电站与调度中心之间 以及各级调度中心之间 是开发电力系统远动无缝通信系统的基础。采用该标准系列将大大提高变电站自动化系统的技术水平和安全稳定运行水平 节约开发、验收、维护系统的人力物力 实现完全的互操作性。另外 IEC 61850标准的第二版也适用于分布式能源系统的开发管理 如 可再生能源的发电和存储 。

TÜV南德意志大中华集团与中国电力科学研究院 通力合作 组织此次培训 将讲授应用IEC 61850涉及的所有实用知识与经验。培训第一天 将学习IEC 61850 第二版的理论知识 并讨论费用/利益的相关话题。培训第二天 集中研究通讯协议的实际应用 软件/硬件开发 并解释按照UCA 测试流程进行认证的步骤。

[All details of the IEC 61850 training like program and pricing are available for download.](#)

Posted by [Karlheinz Schwarz](#) at 9:03 AM No comments: 

Labels: [education](#), [IEC 61850](#), [seminar](#), [Training](#)

Wednesday, August 15, 2012

Functional Constraint CO “Control” missing in IEC 61850-7-2 Edition 2

► [January](#) (15)

► [2011](#) (159)

► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

Somebody asked me today: "I did not find the CO Functional Constraint among the Functional Constraint list in IEC61850-7-2{ed2.0}.pdf, section 12.3.3.2 FunctionalConstraint (FC). Please advise what does it represent?"

In IEC 61850-7-2 Ed1, IEC 61850-7-3 Ed1, and IEC 61850-8-1 Ed1 the control model was described partly in 7-2, 7-3 and 8-1. Now we have the complete control model defined in IEC 61850-7-2 Ed2 – without any mapping issue! in IEC 61850-7-3 Ed2 we have defined for controllable data objects (CDCs: SPC, DPC, ...) that the service is Control and the payload is as defined in IEC 61850-7-2 Ed2.

CDC: SPC, DPC, INC, ENC, BSC, ISC, APC, BAC adds the control service at the end of the CDCs for controllable data objects:

Services		
As defined in Table 39.		
parameters for control services		
Service parameter name	Service parameter type	Value/Value range
ctrlVal	BOOLEAN	off (FALSE) on (TRUE)

That is the reason why we have removed the FC=CO from IEC 61850-7-3 Ed2 (and IEC 61850-7-2 Ed2).

The FC=CO is introduced in the mapping in IEC 61850-8-1 Ed2.

From an implementation point of view (in MMS terms) it is more or less the same in Ed1 and Ed2 of the three parts. The description has changed – it is cleaner now ... if you know where to find it ... I agree it's a bit confusing ...

The Data Objects of CDC for settings like SPG, ING, ... are not using the control services to set a value! These CDCs just support SetDataValues (which is a write in MMS ...without the control state machines) and other services:

Service model of IEC 61850-7-2	Service	Service applies to Attr with FC
GenCommonDataClass model	SetDataValues GetDataValues GetDataDefinition GetDataDirectory	DC, CF, SP ALL except SE ALL ALL
Data set model	GetDataSetValues SetDataSetValues	ALL except SE DC, CF
Reporting model GSE model	Report SendGOOSEMessage	ALL except SE SP
Setting group control model	SetEditSGValues GetEditSGValues	SE SE, SG

Hope that helps to understand the (mainly editorial) changes in the three parts 7-2 Ed2, 7-3 Ed2, and 8-1 Ed2.

Posted by [Karlheinz Schwarz](#) at [12:55 PM](#) [No comments:](#) 

Labels: [CDC](#), [control](#), [Edition 1](#), [Edition 2](#), [IEC 61850](#), [iec 61850-7-2 Edition 2](#), [IEC 61850-7-3 Edition 2](#), [IEC 61850-7-4 Ed2](#)

Tuesday, August 14, 2012

TASE.2 für den Prozessdatenaustausch zwischen Leitzentralen der Gaswirtschaft

Die TASE.2 wird seit einigen Jahren für den Prozessdatenaustausch zwischen Leitzentralen der Gaswirtschaft eingesetzt. Im Februar 2012 hat die DVGW eine aktuelle Empfehlung zur Anwendung der TASE.2 in

der Gaswirtschaft herausgegeben.

[Die Empfehlung der TASE.2 kann heruntergeladen werden \[pdf, Deutsch\].](#)

[A comprehensive etz-Report introduces into TASE.2.](#)

Posted by [Karlheinz Schwarz](#) at [10:52 PM](#) [No comments:](#) 

Labels: [gas](#), [process control](#), [SCADA](#), [TASE.2](#), [TASE.2 ICCP](#)

Four additional IEC TC 57 Standards recommended for inclusion into the SGIP Catalog of Standards

Four additional IEC TC 57 Standards have been recommended for inclusion into the SGIP Catalog of Standards:

1. [IEC 60870-6-503](#): Telecontrol protocols compatible with ISO standards and ITU-T recommendations - TASE.2 Services and protocol
2. [IEC 60870-6-702](#): Telecontrol protocols compatible with ISO standards and ITU-T recommendations - Functional profile for providing the TASE.2 application service in end systems
3. [IEC 60870-6-802](#): Telecontrol equipment and systems - Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - TASE.2 Object models
4. [IEC/TR 61850-90-5](#): Communication networks and systems for power utility automation - Part 90-5: Use of IEC 61850 to transmit synchrophasor information according to IEEE C37.118

The IEC 60870-6 TASE.2 Series is also known as ICCP (Inter Control-center Communication Protocol). It could be understood (to some extent) as the predecessor of IEC 61850. According to the experts in SGIP "This standard likely represents the greatest standards success story in the industry." Why? Because it is the first IEC TC 57 standard that is applied all over in the communication between control centers of the electrical power delivery system as well as in many other domains like the gas delivery system.

[A comprehensive Report introduces into TASE.2.](#)

[Comparison of IEC 60870-5-101/-103/-104, DNP3, and IEC 60870-6-TASE.2 with IEC 61850](#)

[The German Gas Association DVGW recommends TASE.2 in a requirement document published in February 2012.](#) [pdf, German only]

Posted by [Karlheinz Schwarz](#) at [10:00 PM](#) [No comments:](#) 

Labels: [DNP3](#), [IEC 60870-6](#), [IEC 61850](#), [SGIP](#), [TASE.2](#), [TASE.2 ICCP](#)

Saturday, August 11, 2012

IEC 61850 Course conducted by TÜV SÜD in Seoul (South Korea), 04.-05. September 2012

KTL (Korea Testing Laboratory) has prepared for the Smart Grid businesses for many years. IEC 61850 has been the core technology in Smart Grid, and KTL now is progressing the international testing and certification organization of IEC 61850. KTL would like to invite the best experts of IEC 61850 over the world, and the training will be helpful for


the participants to develop new businesses and to find the best solution in Smart Grid.

Day 1 – Sep 4th

Day 2 – Sep 5th

Korean Testing Laboratory
87, Digital 26-gil, Guro-gu, Seoul,
KOREA (152-718)

[Further details of the IEC 61850 training like program and pricing are available for download.](#)

Posted by [Karlheinz Schwarz](#) at [6:05 AM](#) [No comments:](#) 

Labels: [API](#), [Edition 1](#), [Edition 2](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [seminar](#), [Training](#)

Thursday, August 9, 2012

IEC 61850 Course conducted by TÜV SÜD in Taipei (Taiwan), 10.-11. September 2012

智慧型電網能源資通訊技術應用訓練課程

An IEC 61850 Course will be conducted by TÜV SÜD in Taipei (Taiwan), 10.-11. September 2012.

[Access complete IEC 61850 course description in Chinese.](#)
[Information on all three IEC 61850 courses in English.](#)

培訓效益如下:

智慧電網的核心為能源資通訊技術(EICT)及傳統電網整合發展。近年來 各國政府為追求電網效率提升 莫不積極推動相關政策。因應國際間能源安全及智慧電網迅速發展 台灣以多年發展資通訊產業基礎 積極發展能源資通訊技術 期望與世界接軌。TÜV SÜD Taiwan為協助國內業者能於最短時間內掌握相關的核心技術與資訊 加速取得UCA授權TÜV SÜD發證的IEC 61850產品證書 成為全球智慧型電網供應鏈體系。特於2012年9月10-11日在台大集思會議中心舉辦 “智慧型電網能源資通訊技術應用訓練課程”。

Posted by [Karlheinz Schwarz](#) at [6:09 AM](#) [No comments:](#) 

Labels: [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [seminar](#), [Training](#)

Tuesday, August 7, 2012

IEC 61850-7-410 Edition 2 is out for ballot

IEC 61850-7-410 Edition 2:

Communication networks and systems for power utility automation –
Part 7-410: Basic communication structure – Hydroelectric power plants

–
Communication for monitoring and control

has been published for final ballot until 2012-10-05.

Changes in Edition 2 :

- Generic logical nodes in IEC 61850-7-410 Edition 1 that are not specific to hydropower plants have been moved to IEC 61850-7-410 Edition 2.
- The definitions of logical nodes have been cleaned up.
- Most of the modeling examples and background information has

been moved to IEC/TR 61850-7-510 Edition 1 (see example below).

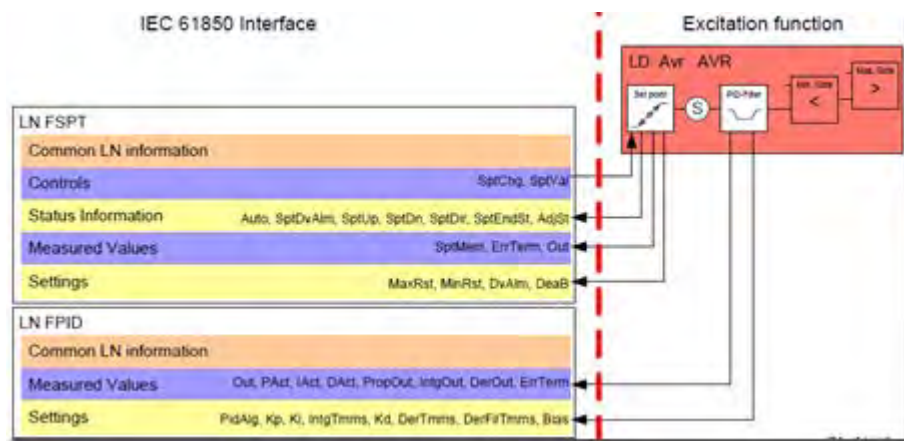
- New general-purpose logical nodes that are not included in IEC 61850-7-4 Edition 2, have been defined.

IEC 61850-7-410 Edition 2 defines 46 Logical Node classes and several hundred data objects:

LN Class Description

ACTM	Control mode selection.
AJCL	Joint control function, to balance total power from different sources.
APSS	PSS Control. Common information of a PSS function.
APST	PSS 2A/B filter. Represents a filter according to IEEE 421.5-20
APSF	PSS 4B filter. Represents a filter according to IEEE 421.5-2005
FHBT	Heart beat function of a controlling device.
FSCH	Scheduler. This LN represents a task scheduler
FXPS	Functional priority status.
HBRG	Turbine – generator shaft bearing.
HCAM	Combinator (3D CAM or 2D CAM)
HDAM	Hydropower dam.
HDFL	Deflector control.
HDLS	Dam leakage supervision.
HEBR	Electrical brake.
HGPI	Gate position indicator.
HGOV	Governor control.
HGTE	Dam gate.
HITG	Intake gate.
HJCL	Power plant joint control function.
HLKG	Leakage supervision.
HLVL	Water level indicator.
HMBR	Mechanical brake for the generator shaft.
HNDL	Needle control.
HNHD	Net head data.
HOTP	Dam overtopping protection.
HRES	Water reservoir.
HSEQ	Start / stop sequencer.
HSPD	Speed monitoring.
HSST	Surge shaft or surge tank.
HTGV	Guide vanes (wicket gate).
HTRB	Runner blades.
HTRK	Trash rack,
HTUR	Turbine.
HUNT	Hydropower production unit.
HVLV	Valve.
HWCL	Water control function.
IFIR	Generic fire detection and alarm function.
IHND	Generic physical human – machine interface.
KHTR	Heater.
PRTR	Rotor protection.
RFBC	Field breaker configuration.
SFLW	Media flow supervision.
SLEV	Media level supervision.
SPOS	Device position supervision.
SPRS	Media pressure supervision.
XFFL	Field flashing.

Voltage regulation example from IEC TR 61850-7-510 Ed1:



This figure shows the relation between an application function and the IEC 61850 object models.

IEC TR 61850-7-510 Ed1 (86 pages) is a comprehensive guide "how to use IEC 61850 for hydro power plants".

[Preview of IEC TR 61850-7-510 Ed1](#)

Posted by [Karlheinz Schwarz](#) at 10:45 PM 1 comment:

Labels: [Edition 2](#), [hydro power](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61850-7-410](#), [IEC 61850-7-510](#)

Saturday, August 4, 2012

Could more intelligent computers have prevented the ever biggest power outage in India?

Yes – and No! It all depends. Computers do what we want them to do. They don't get tired, work 24*7, are reliably doing their job. They do what it has been told by a specific **program** and **configuration**. And then there are a lot more crucial aspects to take into account.

What is needed are "intelligent actions to correct problems" in due time. The intelligence may be implemented by "smart" humans or "smart" computer programs. More important: Very crucial requirements for a stable **system** are the various **settings**, build-in **redundancies** and the various **reserves** (generators, lines, head-room in power flow, transformers, ...). These requirements are specified by humans! Depending on the level of risk responsible people are willing to accept, these requirements may vary greatly from one utility to another.

Depending on the settings used, build-in redundancies and the amount of the various reserves (generators, lines, transformers, ...) the total system costs may be low, moderate or high! Reducing redundancies makes the system less stable – in general. Reserves and redundancies could be quite expensive.


Building a stable system is not problem in principle – it could be build if you have "unlimited" resources. The question is more: What is the maximum cost an utility is willing to spent to meet a certain risk level? Risk analysis and the level of risk accepted are key – and how and when the operators use the reserves. If an operator uses a reserve in **normal operation**, he cannot use that reserve in a **critical situation** again – you cannot eat the cake and have it.

The power delivery systems are very complex – most people do not care what it means to plan, design, operate, maintain, extend, and use such complex systems! **Computers, high speed communication** and

even **IEC 61850** are all just tools. **Even a fool with a tool is a fool.**
And: **A fool with a tool can foul up a system much faster than a fool without a tool.**

The most crucial influence on power delivery systems is **man-made!**
During a seminar an electrical engineer told me that they had a lot of serious discussions with the accountants and management on how many transformers they were allowed to replace per year. They agreed to replace two per year. Great! But: They utility had 300 (!) transformers in operation. That means: It would take 150 years to finish the replacement program! Unless ...

Any question?

Posted by [Karlheinz Schwarz](#) at [1:20 PM](#) [No comments:](#) 

Labels: [IEC 61850](#), [power outage](#), [reliable power delivery](#), [Smart Grid](#), [smart people](#), [smart solution](#)

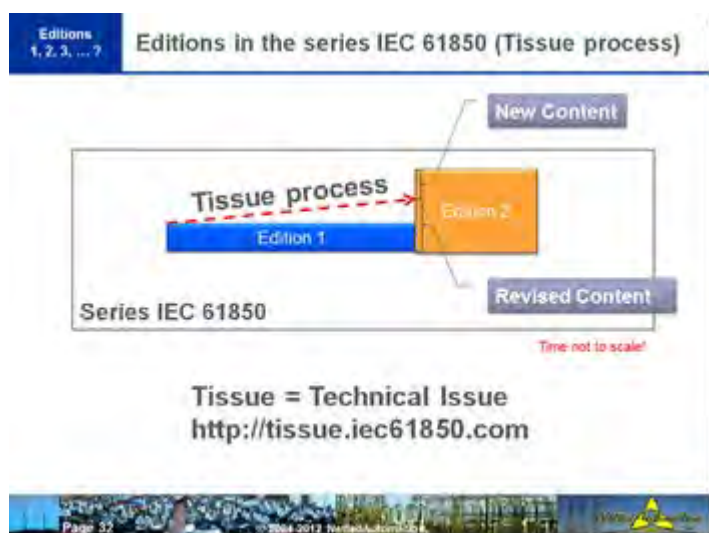
Thursday, August 2, 2012

IEC 61850 Edition 1, 2, or 3 and UML modeling?

Several parts of IEC 61850 have been improved through a maintenance process for the recent years. New features have been added the recent years. But what are the differences?

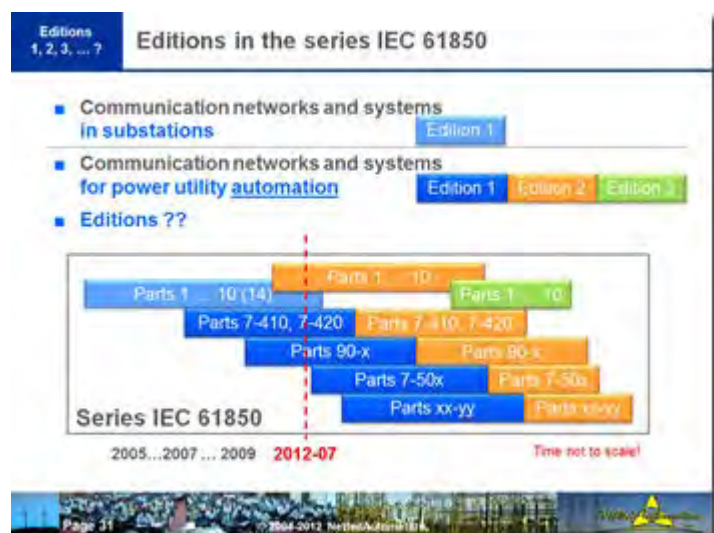
NettedAutomation has analyzed the differences between Edition 1 and 2 of various parts in detail. Many experts all over have asked for a detailed analysis, presentation and discussion of the differences. The result is a new comprehensive module of the seminars (covers one or two days – depending on the needs). A few slides from the new module are shown below.

One of the crucial issues is that a specific part Edition 1 has been improved from day 1 of its publication by the tissue process. Additional features have been added.



<http://tissue.iec61850.com>

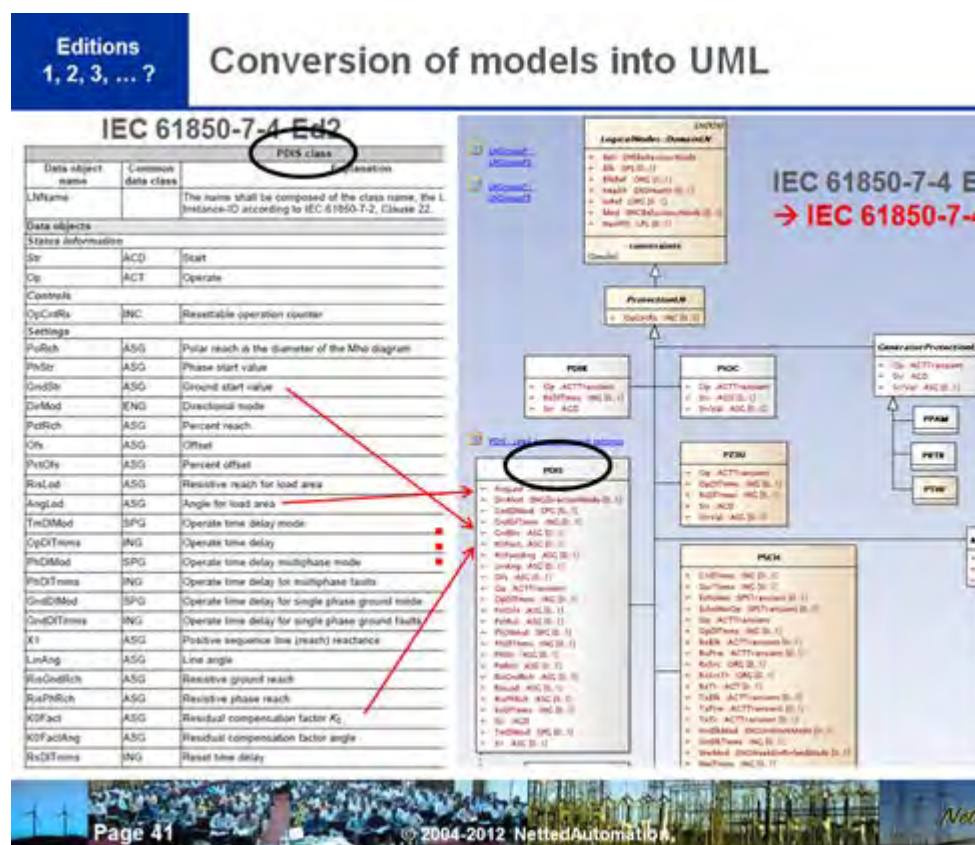
As of today we have parts with the old title and tag "Edition" 1", with the new title and tag "Edition 1" and several parts with the new title and tag "Edition 2":



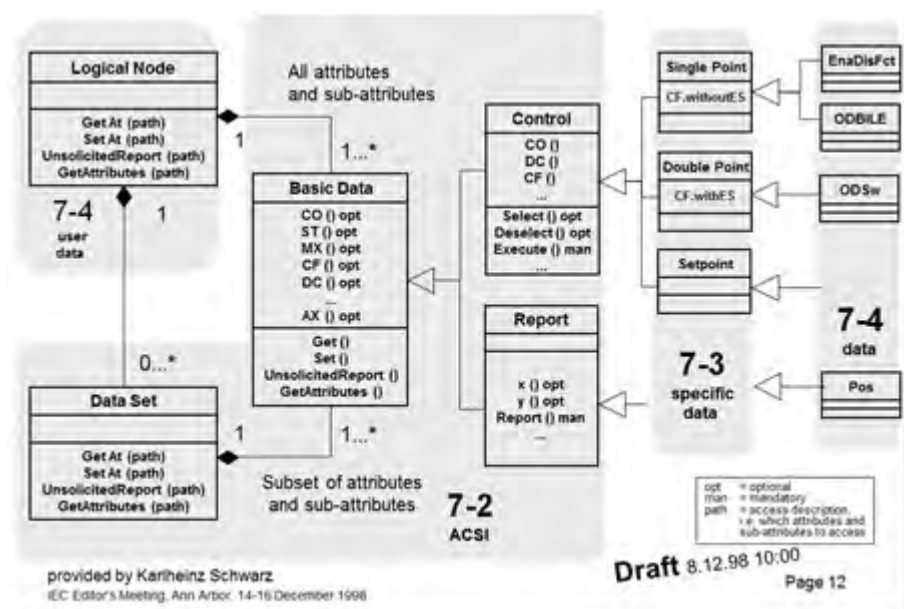
[A list of all published IEC 61850 parts can be found here.](#)

As the slide exposes: There will never be an Edition 2 of the standard series IEC 61850 ... some time down the road we will have parts tagged Ed1, Ed2, Ed3, Edx, ...

In addition to the maintenance process, WG 10 has (after some 14 years) converted the models in IEC 61850 to UML. The UML is intended to serve as a development and maintenance tool in the future standardization process. The following picture exposes the two notations: table (left) and UML (right).



During the Editors' meeting in Ann Arbor (December 1998) we discussed the use of UML before we published any information model !! It was a long way from first "ideas" and today's UML model – as you can see.



The various parts tagged Edition 2 and the new UML models are presented and discussed during special training courses. The basics are also covered in the public seminars.

Posted by [Karlheinz Schwarz](#) at 7:36 AM No comments:

Labels: [EDF](#), [Edition 1](#), [Edition 2](#), [IEC 61850](#), [IEC 61850 edition 2](#), [tissue process](#), [tissues](#), [UML](#)

Wednesday, August 1, 2012

Wind and Solar Power – Could have helped to prevent the Indian Power Outage this week

It was questioned if wind and solar power could have been used as a redundant power source in this weeks power outage in India. Yes it could – indirectly.

Wind and Solar power could help to keep the water in the big reservoirs in the mountains. Each MWh from wind turbines or PV systems would keep the "redundant" hydro energy in the storage reservoirs. In case of a shortage in the grid this "redundant" hydro power could be used to stabilize the grid. Especially this year in India and north of India the water levels in the dams are very low ... it would be a benefit not to "burn" the available hydro energy during the day when you could use the wind or solar power. There is one issue with not "burning" hydro power: usually you are paid by the amount of energy you put into the grid – not by keeping it for days or weeks. Making money and providing reliable energy supply are two different aspects.

[IEEE Spectrum: Lack of Rain a Leading Cause of Indian Grid Collapse](#)

In Europe there is work going on, to use the (surplus) wind power in northern Germany and pump water in the dams in Norway and use it as a huge hydro power storage ... and there is another very interesting storage possibility for wind and solar power: Wind Gas or Solar Gas!

What is that? Never heard about it?

<http://blog.iec61850.com/2012/06/two-mw-wind-to-gas-converter-build-for.html>

I would highly appreciate if I could produce my own gas, store it and use it in winter time (Sothern Germany).

It is just a little bit too expensive ... but the technology is available:

http://www.fronius.com/cps/rde/xchg/SID-7EA7CFA3-6E3959B6/fronius_international/hs.xsl/83_18098_ENG_HTML.htm

These ideas and technologies will help to convert the electrical grid into a Smart(er) Grid. Engineers have developed great solutions ... it is up to the decision makers to let them do their job!

By the way, Smart Grids have been invented by smart engineers since the 19th century:

<http://blog.iec61850.com/2012/03/smart-grids-19th-century-invention.html>

Posted by [Karlheinz Schwarz](#) at [10:55 PM](#) [No comments:](#) 

Labels: [hydrogen](#), [India](#), [power outage](#), [storage](#), [wind gas](#), [wind power](#)

IEC 61850 Asian Training Tour September 2012: Seoul, Beijing, Taipei

TÜV SÜD (Germany), SystemCorp (Australia), and NettedAutomation (Germany) are conducting three 2 days (MUST ATTEND) hands-on training in IEC 61850 in Asia:

1. Seoul (organized by TÜV SÜD Korea, Korean Testing Laboratory)

Day 1 – Sep 4th

Day 2 – Sep 5th

[Details for Seoul seminar.](#)

2. Beijing (TÜV SÜD China, China EPRI)

Day 1 – Sep 6th

Day 2 – Sep 7th

3. Taipei (TÜV SÜD Taiwan, ITRI, Metrologies)

Day 1 – Sep 10th

Day 2 – Sep 11th

[Details for Taipei seminar.](#)

This Training has been designed to provide all the knowledge required to Get into the Market with a 61850 product. Theoretical aspects of IEC 61850 with a focus on Edition 2 of the Standard as well as cost/benefit topics will be given during the first day. The second day will be focused on the real implementation (software/hardware development aspects) of the communication protocol. Finally the required steps to get a Device conformant and certified according to the UCA Testing Procedure, will be explained.

You will get all information needed to shorten project times by weeks and months, guaranteeing a **short "time to market"**.

Venues:

Korean Testing Laboratory 87, Digital 26-gil, Guro-gu, **Seoul**, KOREA (152-718)

Beijing Landmark Tower Convention center, Plum Blossom Room 8
North Dongsanhuan Road, Chaoyang District, 100004 **Beijing**, China

GIS NTU Convention Center. Conference room: Lock Hall Address: B1F.,
No.85, Sec. 4, Roosevelt Rd., Zhongzheng Dist., **Taipei City** 100,
Taiwan R.O.C.

[Download Program for IEC 61850 Asian Training Tour and further information \[800 KB, PDF\].](#)

[Details for Seoul seminar.](#)
[Details for Taipei seminar.](#)

Posted by [Karlheinz Schwarz](#) at [2:23 AM](#) [No comments:](#) 

Labels: [Edition 2](#), [education](#), [hands-on Training](#), [IEC 61850](#), [IEC 61850 edition 2](#), [seminar](#), [Training](#)

Tuesday, July 31, 2012

Power Outage in India for some 600,000,000 people

It is a national (better a global) tragedy what happened in India yesterday and today! Some 600.000.000 people are out of power within two days! ... and IEC 61850 would not have prevented such a power outage. ;-)

Guess there are many reasons: technical, political, personal, ...

One technical (and social) issue is the theft of electric power along the lines. It was reported today that "Losses in electricity transmission and distribution are also among the world's highest, 24 percent to 40 percent, because of inefficiencies and theft.". When you see the following pictures, you could understand why it is so easy to tap the wires:

How many wires tap these lines? If the electric network would be modeled with SCL (single line diagram) you could "see" it ... I am kidding.



On the next photo (taken near Agra) you can see that the wires can easily be taped (1.5 m above ground ...):



Some more (dump) meters would allow to figure out what amount of energy is put into the grid and what amount is being paid ...

I hope that more people in charge understand that the electrical system is very complex and that it requires improvements and maintenance all time! A badly maintained system will hit back !! with power outages. The bad side of this is that it costs a lot of money!!

Some people think that they could treat the electric power system like their car or bike – they run them until they break ... maintenance often does not make them more reliable. A broken car may block a lane at the highway – a broken transformer may cause a cascading outage ... leaving millions of people in the dark!

Electrical engineers should educate more people in order to help them to understand what to do. But who is listening to an engineer? Hm!

I wish that the people living in India get power back very soon! And people living all over that the electric power systems will be better understood and treated.

Posted by [Karlheinz Schwarz](#) at [5:26 AM](#) [No comments:](#) 

Labels: [engineer](#), [power outage](#), [power systems](#)

Sunday, July 29, 2012

Comparison of Message Exchange DLMS/COSEM, SML and IEC 61850

The paper "Comparison of the Communication Protocols DLMS/COSEM, SML and IEC 61850 for Smart Metering Applications" analyzes these protocols ... especially to figure out the message lengths. The application the authors have in mind is for metering application. Independent of the application it is interesting what they figured out.

The major result is summarized as "In this paper the most significant qualitative features of a smart metering application layer protocol have been identified. The comparison of DLMS/COSEM, SML, and IEC 61850 has shown that no single protocol is superior in all aspects. The analysis and comparison of the message size has shown that DLMS and the MMS IEC 61850 clearly outperform the rest. ..."

The message length of the protocols is one aspect. The more crucial impact on the needed resources is determined by the system behavior:

- Is TLS used? TLS adds a lot of bytes ... especially for the handshake for opening a secure connection. By the way, IEC 61850 has security measures: defined in IEC 62351-4. Encryption eats a lot of the computing resources!
- Is cyclic sending of the payload supported issued by the server (cyclic reports in IEC 61850 do not need a request message)?
- Frequency to exchange the metered values. How often are the metered values read? Will the TCP connection closed/resumed between two transmissions? In case of permanent TCP connections, there may be more bandwidth consumed for TCP keep-alive than for the payload.

[The paper can be downloaded \[PDF, 200 KB\].](#)

It is recommended to focus on the system – message encoding should have a lower priority when building future power automation systems!

Posted by [Karlheinz Schwarz](#) at [10:59 PM](#) [1 comment:](#) 

Labels: [DLMS/COSEM](#), [IEC 61850](#), [message encoding](#), [MMS](#), [SML](#)

Thursday, July 26, 2012

Security for IEC 61850 Chip from Beck IPC

Can you make your IEC 61850 IED with the Beck IEC 61850 chip secure? Yes! Here is the solution.



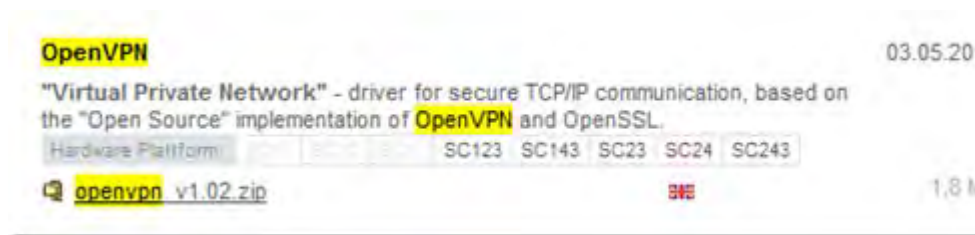
The Beck RTOS (Real-time operating system) supports:

- Secure Socket Layer - SSL
- Secure Shell – SSH
- IP Security Protokoll – IPsec/IKE
- OpenVPN

The free software "OpenVPN" as the solution for the installation of a virtual private network (VPN) has gained more and more popularity among its users. Easy installation and configuration of an OpenVPN-tunnel, in comparison to the complicated configuration of the IPsec eases access to this topic. The OpenVPN source code, registered under

GNU General Public License (GPL) has been ported by Beck for the IPC@CHIP® platform and is made available at our download centre for implementation.



[Software for SC143 ...](#)



OpenVPN 03.05.20

"Virtual Private Network" - driver for secure TCP/IP communication, based on the "Open Source" implementation of **OpenVPN** and OpenSSL.

Hardware Platform: SC123 SC143 SC23 SC24 SC243

 **openvpn** v1.02.zip  1,811

[Download driver for OpenVPN for SC143](#)

For other details contact Beck IPC.

[Useful information can also be found at the Beck IPC Forum.](#)

Posted by [Karlheinz Schwarz](#) at 6:25 AM No comments: 

Labels: [IEC 61850](#), [IEC 62351](#), [IpSec](#), [OpenVPN](#), [security](#)

Saturday, July 21, 2012

Download IEC 61850 Blog Content as single PDF Document

For those readers of the blog that want to get the complete content as a single pdf document, it is just a click away ... it contains the 656 posts from 2008 until 2012-07-21. Once you have downloaded the file you can easily browse the content ... search ...

Click [HERE](#) to download all posts in one pdf [14.5 MB, 470+ pages DIN A4]

Enjoy!

Posted by [Karlheinz Schwarz](#) at 3:29 AM No comments: 

Labels: [blog](#), [download](#), [IEC 61850](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Saturday, July 21, 2012

Abbreviations of the standard series IEC 61850

Some 550 updated Abbreviations of the standard series IEC 61850 (7-1, 7-2, 7-3, 7-4, 7-410, 7-420, ...) are listed in the following document:

GGIO	Generic process I/O	7-4 Ed2
GI	general interrogation	IEC 61850-7-2 Ed2
GLOG	Generic log	7-4 Ed2
GoCB	GOOSE control block	IEC 61850-7-2 Ed2
GOMSFE	Generic Object Models for Substation and Feeder Equipment (generisches Objektmodell für Einrichtungen in Stationen und Einspeiseanlagen nach IEEE-SA TR 1550-1999)	

The list contains all LN class names like MMXU and common data classes like WYE ...

[Download the list of Abbreviations of the standard series IEC 61850 \[pdf; 1.1 MB\]](#)

Posted by [Karlheinz Schwarz](#) at 3:05 AM [No comments:](#) 

Labels: [abbreviations](#), [IEC 61850](#), [IEC 61850 edition 2](#)

IEC 61850 for “Facility Smart Grid Information Model”

The Draft BSR/ASHRAE/NEMA Standard 201P “**Facility Smart Grid Information Model**” has been published for Public Review in July 2012.

The draft standard uses a good part from IEC 61850 models (IEC 61850-7-3, -7-3 and -7-420). The paper document has been derived from a UML document.

The purpose of this standard is to define an abstract, object-oriented information model to enable appliances and control systems in homes, buildings, and industrial facilities to manage electrical loads and generation sources in response to communication with a “smart” electrical grid and to communicate information about those electrical loads to utility and other electrical service providers.

The IEC 61850 community should have a look at this draft in order to make sure that the models used form IEC 61850 are referenced - the maintenance of the models in IEC TC 57 should automatically adopted by the standard 201P in the future. This would allow to get a consistent set of models.

[Download the Draft BSR/ASHRAE/NEMA Standard 201P “Facility Smart](#)

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[Abbreviations of the standard series IEC 61850](#)

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[Current Series IEC 61850 comprises 19 parts](#)

► June (17)

► May (14)

► April (10)

[Grid Information Model"\[pdf; 3 MB; 600+ pages\]](#)

Posted by [Karlheinz Schwarz](#) at [1:24 AM](#) [No comments:](#) 

Labels: [BACnet](#), [building automation](#), [IEC 61850](#), [IEC 61850-7-420](#), [Information Model](#)

Friday, July 20, 2012

List of all published Parts and Drafts of IEC 61850

The series IEC 61850 comprises 21 parts (8 tagged Edition 2 and 13 tagged Edition 1) and 20 draft parts (projects).

The list of the title and further information (like edition of each part) of all 41 parts (standards and work under progress) can be downloaded:

Part	Current Title	Edition	Statutory Date	
1	IEC/TR 61850-1	Part 1: Introduction and overview	1.0 (2003-04-26)	2012
2	IEC/TS 61850-2	Part 2: Glossary	1.0 (2003-05-07)	2012
3	IEC 61850-3	Part 3: General requirements	1.0 (2002-05-16)	2012
4	IEC 61850-4	Part 4: Systems and project management	1.0 (2002-01)	2006
		2.0 (2011-04-11)	2011	
5	IEC 61850-5	Part 5: Communication requirements for functions and device models	1.0 (2003-07-24)	2012
6	IEC 61850-6	Part 6: Configuration description language for communication in electrical substations related to IEDs	1.0 (2004-03)	2006
		2.0 (2009-12-11)	2012	

[Download table of all published parts of IEC 61850 and projects \(drafts\) \[pdf; 390 KB\]](#)

Posted by [Karlheinz Schwarz](#) at [9:31 AM](#) [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [IEC 61850](#)

List of almost all IEC 61850 Logical Nodes

A list of some 280 Logical Nodes from the following documents has been posted (see below):

- IEC 61850-7-4 Ed2
- IEC 61850-7-410 Ed1
- IEC 61850-7-420 Ed1
- IEC 61400-25-2 Ed1

Clause	Description	Name	Part	Remark
5.3.2	Physical device information	LPHD	7-4 Ed2	Ext1
5.3.3	Common Logical Node	Common LN	7-4 Ed2	Ext3
5.3.4	Logical node zero	LLN0	7-4 Ed2	Ext1
5.3.5	Physical Communication channel Supervision	LCCH	7-4 Ed2	New
5.3.6	GOOSE subscription	LGOS	7-4 Ed2	New
5.3.7	Sampled value subscription	LSVS	7-4 Ed2	New
5.3.8	Time synchronization	LTSN	7-4 Ed2	New

[Download the list of the 280 Logical Nodes \[pdf; 314 KB\]](#).

You can see if the LN is new, extended (few, several, many extensions)

- [March](#) (12)
- [February](#) (21)
- [January](#) (15)

- [2011](#) (159)
- [2010](#) (153)
- [2009](#) (162)
- [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

or more or less unchanged.

You will find a lot of new LNs in IEC 61850-7-4 like the LGOS (GOOSE Subscription). The LN LGOS is defined for the monitoring of GOOSE messages:

Logical Node GOOSE Subscription **LGOS**:

DataObject	Semantic
NdsCom	Subscription needs commissioning
St	Status of the subscription
SimSt	Status showing that really Sim(ulation) messages are received and accepted
LastStNum	Last state number received
ConfRevNum	Expected configuration revision number Settings
GoCBRef	Reference to the subscribed GOOSE control block

NettedAutomation offers a comprehensive training on the Migration from the various Edition 2 parts of IEC 61850 that have been published so far.

Posted by [Karlheinz Schwarz](#) at [8:56 AM](#) [No comments:](#) 

Labels: [Edition 1](#), [Edition 2](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61850-7-4 Ed2](#), [IEC 61850-7-410](#), [IEC 61850-7-420](#), [logical node](#)


Thursday, July 19, 2012

IEC 61850 conformance certificates

The UCAIUG (international UCA users group) manages the certification process for IEC 61850 conformance. With a **guest login** you can access the test requirement documents, authorized test labs and lists of conformance certificates.

The website shows 276 certificates for servers, 13 for clients, and 2 for merging units.

[Access list of certificates of IEC 61850 conformance tested devices and other testing related documents.](#)

Posted by [Karlheinz Schwarz](#) at [10:49 PM](#) [No comments:](#) 

Labels: [certificate](#), [conformance test](#), [IEC 61850](#), [UCA](#)

Tuesday, July 17, 2012

New IEC 61850 Test Lab - TÜV SÜD invites to opening ceremony on July 23

TÜV SÜD reported that the preparations and accreditations for their IEC 61850 testing laboratory are now almost finalized and relocation to their new premises in Barthstraße 16 (Munich) has been completed.

Given this, they invite you to a laboratory demonstration on **23 July 2012 from 4 pm** to give you the opportunity to look behind the scenes and get in contact with you.

For the details of the laboratory demonstration please see the invitation in English and German below:

Invitation for IEC 61850 Lab opening (English):



By car:
Donnersbergbrücke / Mittlerer Ring ring road heading south: exit Pasing, Laim, city centre, turn right into Landberger Strasse and then left into Barthstrasse.
Donnersbergbrücke / Mittlerer Ring ring road heading north: exit Pasing, Laim, city centre, turn left into Landberger Strasse and then left into Barthstrasse.

Underground / Train:
From the Hauptbahnhof central station take underground line U4/U5 in direction Laimstr. Platz, exit at either Heimeranplatz or Westendstrasse.
From the Hauptbahnhof central station take train 19 in direction Conndorfplatz, exit Barthstrasse, or train 19 in direction Pasinger Marienplatz, exit Barthstrasse.

TÜV SÜD AG
Embedded Systems (VMM)
Barthstrasse 16
80339 München / Munich
Tel.: +49 89 5100 3102
Fax: +49 89 5100 3437
sonja.hertlin@tuv-sued.de
www.tuv-sued.de



Invitation Embedded Systems Laboratory Demonstration

Munich, 23 July 2012

TÜV SÜD AG

Embedded Systems Laboratory Demonstration

After one year of meticulous preparation, Embedded Systems has applied for accreditation by UCA and DAKKS. With accreditations near completion, the first testing and certification projects have been launched.

Following relocation to our new premises in Barthstrasse, the Embedded Systems Team would like to thank its cooperation partners and supporters by staging a laboratory demonstration. In the new testing laboratory, our experts will put embedded systems intended for use in the smart grid through their paces. To measure and regulate the conditions in our power grids, the energy supply of the future depends on intelligent electronic devices (IEDs) that communicate with each other and automatically regulate the feed-in of, say, renewable energy. These devices will be tested and certified for their interoperability in accordance with IEC 61850 and their characteristics in accordance with VDE-AR-N 4105. The testing laboratory also offers IT security testing and certification of equipment and infrastructure.

We warmly invite you to come to our laboratory demonstration and take a look behind the scenes.

Dr. Kai Ströblbe
Head of Embedded Systems
TÜV SÜD AG

Embedded Systems Laboratory Demonstration

We would be
happy to welcome
you to our laboratory

On: 23 July 2012

At: Embedded Systems
Laboratory
Barthstrasse 16
80339 Munich

4 pm - 5 pm
Registration and
refreshments

4:10 pm - 4:30 pm
Laboratory
Demonstration

4:50 pm - 5:30 pm
Networking and
dinner

RSVP
by 13 July 2012
sonja.hertlin@tuv-sued.de

Einladung zur IEC 61850 Lab Eröffnung (Deutsch):

Labordemonstration Embedded Systems

Nach einem Jahr der optimalen Vorbereitung sind bei Embedded Systems nun die Akkreditierungen durch UCA und DAkkS beantragt und nahezu abgeschlossen. Gleichzeitig laufen die ersten Test- und Zertifizierungsprojekte an.

Nach dem Umzug in die neuen Geschäftsräume in der Berthstraße möchte sich das Embedded Systems Team nun bei seinen Kooperationspartnern und Unterstützern mit einer Labordemonstration bedanken. In dem neuen Testlabor werden zunächst Eingebettete Systeme für das Smart Grid geprüft. Die zukünftige Energieversorgung braucht zur Messung und Regelung des Zustands der Netze intelligente Geräte, die miteinander kommunizieren und selbständig die Einspeisung von z.B. Erneuerbaren Energien in das Stromnetz regulieren. Diese Geräte werden auf ihre Kommunikationsfähigkeit nach IEC 61850 und ihre Eigenschaften nach VDE-AR-N 4105 geprüft und zertifiziert. Zusätzlich werden Tests und Zertifizierungen zur IT Sicherheit der Geräte und Infrastruktur durchgeführt.

Wir laden Sie recht herzlich ein, bei der Labordemonstration einen Blick hinter die Kulissen zu werfen.



Dr. Kai Ströbe
Leiter Embedded Systems
TÜV SÜD AG

Labordemonstration Embedded Systems

Wir erlauben uns

Datum: 23. Juli 2012

Ort: Testlabor Embedded Systems, Berthstraße 1, 80635 München

15:00 Beginn der Demonstration

15:10 Labordemonstration

15:50 „Gemeinsam“

Bitte senden Sie Ihre Teilnahmeanmeldung bis zum 03. Juli an senja.hertling@tuv-sued.de

Karlheinz Schwarz (NettedAutomation) and Detlef Raddatz (SystemCorp) look forward to seeing you there.

Posted by [Karlheinz Schwarz](#) at [3:34 AM](#) [No comments:](#) 

Labels: [conformance test](#), [IEC 61850](#), [Smart Grid](#), [testing](#)

Saturday, July 14, 2012

IEC 61850 in Italy - SMA offers IEC 61850 Piggy-Back for PV Inverters

As you may have heard, IEC 61850 is a crucial standard for PV inverters in Italy. All requirements of the Italian CEI 0-21 standard (use of IEC 61850 is recommended – expected to be mandatory soon) will be required for new plants as of July 01, 2012.

Even for plants up to 6 kW it is required to provide an interface to the network operator!

SMA has reacted on the requirements for Italian customers ... including a "... Piggy-back that will be able to receive the IEC-61850 commands to implement remote shutdown and narrow the frequency limits of the inverter."

Read the SMA Customer information on these requirements including IEC 61850 in [English](#) / [German](#).

Posted by [Karlheinz Schwarz](#) at [12:55 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-90-7](#), [inverter](#), [Italy](#), [PV](#), [Wechselrichter](#)

Wednesday, July 11, 2012

SGIP will migrate to SGIP 2.0 in January 2013

The Smart Grid Interoperability Panel (SGIP) will transition from a public-private partnership to a self-financed, legal entity that retains a working partnership with government early 2013.

Since the formation of the SGIP in 2009, the activity of the SGIP by NIST personnel and member volunteers has been supported and enabled by the work of a Program Administrator that has been fully funded by NIST in the approximate amount of \$5 to 7 million per year; a significant portion of those funds came from the ARRA program.


The SGIP 2.0 has five principal responsibilities:

1. To provide the technical guidance and coordination necessary to **facilitate standards development** for Smart Grid interoperability
2. To identify and specify the necessary **testing and certification requirements**, including providing the underlying rationale, to assess the **achievement of interoperability using Smart Grid Standards**
3. To oversee the performance of these activities to maintain **momentum and achievement**
4. To proactively inform and **educate** smart grid industry stakeholders on the definition of and the benefits attributable to interoperability
5. To conduct an outreach to similar organizations in other countries to help establish global interoperability alignment

[Download the SGIP 2.0 Business Sustainment Plan - Roadmap to the Future of Smart Grid Interoperability](#)

Interoperability requires subsets (or profiles) of the various standards. It would be great if the SGIP 2.0 would support the development of profiles for specific applications, e.g., for PV inverter with an IEC 61850 interface. IEC 61850 provides many information models and services – just a few may be needed for very simple PV inverters. These profiles should have very few (or better no) optional definitions. If vendor A uses option 1 and B uses option 2 – then interoperability may be limited.

Somebody told me the other day: “If you accept a special feature of a vendor’s product, you may have to use this vendor’s products forever.” Don’t use any special function! If a profile has no options, then all products have to support the same information models and services ... and protocols.

Posted by [Karlheinz Schwarz](#) at 7:04 AM [No comments:](#) 

Labels: [IEC 61850](#), [NIST](#), [NIST Roadmap](#), [SGIP](#), [SGIP 2.0](#), [Smart Grid](#)

Video from ABB on IEC 61850 for Feeder Automation

[ABB has published a nice 3 minute video on IEC 61850 for Feeder Automation \(Relay series 670\)](#)

Posted by [Karlheinz Schwarz](#) at 4:20 AM [No comments:](#) 

Labels: [ABB](#), [distribution automation](#), [feeder automation](#), [GOOSE](#), [IEC 61850](#)





Monday, July 9, 2012

Current Series IEC 61850 comprises 19 parts

The complete series of IEC 61850 comprises 19 parts as per 2012-07-09:

Content and structure of IEC 61850

The Parts of IEC 61850-x-y (20

Reference	IEC 61850-SER.ed1.0		
Title	Communication networks and systems in substations - ALL PARTS		
Publication date	2012-05-09		
Format, price (Swiss francs) and language	<div><div> 4203.-</div><div></div><div>2521 pages</div></div> <div><div> 4203.-</div><div></div><div>43122 Kb</div></div>		

Abstract

This pack contains all parts to IEC 61850 and an informative pdf file containing most of IEC 61850-7-3 and IEC 61850-7-4. The reader can use these pages to easily read an content of the two standards, without going back and forth in the documents.


This pack contains the following:

- IEC/TR 61850-1 ed1.0
- IEC/TS 61850-2 ed1.0
- IEC 61850-3 ed1.0
- IEC 61850-4 ed2.0
- IEC 61850-5 ed1.0
- IEC 61850-6 ed2.0
- IEC 61850-7-1 ed2.0
- IEC 61850-7-2 ed2.0
- IEC 61850-7-3 ed2.0
- IEC 61850-7-4 ed2.0
- IEC 61850-7-410 ed1.0
- IEC 61850-7-420 ed1.0
- IEC/TR 61850-7-510 ed1.0
- IEC 61850-8-1 ed2.0
- IEC 61850-9-2 ed2.0
- IEC 61850-10 ed1.0
- IEC/TS 61850-80-1 ed1.0
- IEC/TR 61850-90-1 ed1.0
- IEC/TR 61850-90-5 ed1.0

Eight (8) of the 19 parts have been published as Edition 2; 11 parts are tagged as Edition 1. So, the series IEC 61850 (as of today) is composed of parts tagged Edition 1 AND Edition 2.

Note: **There is and will never be an Edition 2 of the standard series !!!**

[Access the IEC Website for the latest update on the Series IEC 61850.](#)

Posted by [Karlheinz Schwarz](#) at 5:52 AM No comments: 

Labels: [Edition 1](#), [Edition 2](#), [Edition 3](#), [IEC 61850](#), [IEC 61850 edition 2](#)

Saturday, June 30, 2012

Using ConfRev to report a change of value

The configuration revision is a very useful information for clients (Reporting) and subscribers (GOOSE and SV). It is highly recommended that a receiving IED marks the received values as **invalid** in case the receiver expects **ConfRev=X** but receives a message with a value **unequal X**.

The service Reporting (or GOOSE) could be used to inform receivers that there is a change in the ConfRev – long before it may receive a message with a different (incremented) value.

By the way, the functionality to “monitor” changes of control block attribute values is called “Service Tracking” and is defined in IEC 61850-7-2 Edition 2.

The Control Block Attribute ConfRev needs to become a member in a data set. This data set may have all ConfRev attributes of all control blocks as members. So, if any change is detected, a message is issued (Report or GOOSE message, or log entry posted).

It is not yet specified in IEC 61850 if the **change of a value** (of the ConfRev) **implemented by a re-configuration** of the IED (e.g., change of the data set) can be used as a trigger (dchg) to issue a report or GOOSE message or post a log entry. Because this new value may become online visible after the IED restart (to interpret the new SCL file).

It would require that the Control Block stores the last ConfRev value non-volatile; in order to figure out that the new value (from configuration tool) is larger than the old one. This is true for SV Control Blocks only, see §19.2.1.6: "A restart of the IED shall not reset the value."

[See IEC 61850 Tissue # 861.](#)

Posted by [Karlheinz Schwarz](#) at [6:29 AM](#) [2 comments:](#) 

Labels: [configuration](#), [configuration change](#), [ConfRev](#), [GOOSE](#), [IEC 61850](#), [IEC 61850-6](#), [IEC 61850-7-2](#), [Reporting](#), [tissues](#)

Mismatch of ConfRev values in IED and SCL file

The issue of how can the values of ConfRev (configuration revision) in an IED be consistent with the configuration file during the lifetime of IED has been discussed many times. The final standardized solution is now discussed in the IEC TC 57 WG 10 task force "System Management".

Here are some hints on the issue that help to understand what to do until we get a standardized solution.

Part IEC 61850-7-2 Edition 2 defines for GOOSE Control Blocks:

18.2.1.6 ConfRev – configuration revision

The attribute ConfRev shall represent a count of the number of times that the configuration of the DATA-SET referenced by DataSet has been changed. Changes that shall be counted are:

- any deletion of a member of the data-set;
- Any adding of a member to the data-set;
- the reordering of members of the data-set; and
- changing the value of the attribute DataSet.

The counter shall be incremented when the configuration changes. At configuration time, the configuration tool will be responsible for incrementing/maintaining the ConfRev value. When configuration changes occur due to SetGoCBValues, the IED shall be responsible for incrementing the value of ConfRev.

If the value of DataSet is set through a SetGoCBValues service to the same value, the ConfRev value shall still be incremented.

Part IEC 61850-6 Edition 2 defines for GOOSE and SV Control Blocks:

confRev

"The configuration revision number of this control block; mandatory. It is **recommended** to increment it by **10000** on any configuration change, to distinguish this from online configuration changes [by services] leading to an increment of 1 only"

Work-around

In the meantime you have to implement a work-around on your own, e.g., when you implement online changes (caused by services), then the build-in IED Tool ("online tool" in the IED) has to increment the ConfRev value by 1. If you implement a change in the SCL file that is used to configure the IED then you are recommended to READ first the current ConfRev value of the IED and increment by 10,000 and "overwrite" the current value in the SCL file before you re-configure the IED.

It should be specified in the PIXIT file how your IED works (as publisher and/or subscriber).

Please note the **tissue 840** (quite new) in which you can read:

"The question, how dynamic changes done online (through the IED front-panel or through communication services) relate to changes made through configuration files and if these changes shall be allowed for real use is a different topic. There is currently a task force active dealing with system management - they will need to address details on how precisely dynamic changes shall be handled compared to static (through configuration) changes."

<http://tissue.iec61850.com/tissue.msp?issueid=840>

In the following document you find also that the issue is well known:

http://www.fgh.rwth-aachen.de/verein/projekte/InterOP_TestReport.pdf

See §2.2.9

There is still some work to be done – you are invited to get involved in the ongoing work of the WG 10 (Project "System Management") to provide your input on the issue "Configuration Version Control".

A special group of the German Mirror committee of IEC TC 57 has published a requirement document for [IEC 61850 Engineering Systems](#):

"Anforderungen an IEC 61850 Engineeringwerkzeuge" [Deutsch]

Posted by [Karlheinz Schwarz](#) at [5:34 AM](#) [No comments:](#) 

Labels: [configuration](#), [ConfRev](#), [engineering](#), [engineering system](#), [IEC 61850](#), [IEC 61850-6](#), [revision control](#)

Thursday, June 28, 2012


Updated IEC 61850 analyzer for Wireshark (V2.6)

An updated analyzer for Wireshark (V2.6) is available. It supports IEC 61850 (8-1, SCL import for GOOSE, 9-2, and 90-5), MMS and ICCP-TASE.2. Older versions show some problems that do not really exist. Some people are using the Wireshark as THE reference implementation of IEC 61850! The reference is the standard – but the tool is very helpful!

[Download the exe file to install the new Wireshark version for IEC 61850.](#)

The skunkworks version 2.6 analyzes all of the data. An additional utility that must be run to extract the dataset definitions into ETR files. The directory that the ETR files are located in can be set in the protocol preferences tab.

Thanks to Herb Falk for continuously updating the analyzer!

Posted by [Karlheinz Schwarz](#) at [10:06 AM](#) [2 comments:](#) 

Labels: [GOOSE](#), [ICCP](#), [IEC 61850](#), [IEC 61850-8-1](#), [IEC 61850-9-2](#), [MMS](#), [network analyzer](#), [TASE.2 ICCP](#), [wireshark](#)

Sunday, June 24, 2012

Siemens Expects IEC 61850 as the Preferred Solution for Demand Response

According to a Siemens white paper there is a preferred solution for the information exchange in Demand Response applications: IEC 61850.

The paper states: " ... only **IEC 61850 should be used** for the communication between the control center and district controller [gateway between the energy automation and the building automation infrastructure] ... a larger variety of legacy building automation protocols can be expected. In the long term, communication should be based on BACnet, KNX, **or IEC 61850** protocol standards."

[Read the complete white paper for demand response supporting IEC 61850 \[pdf\]](#)

The paper give a good overview about the various applications in power distribution systems.

Posted by [Karlheinz Schwarz](#) at [12:35 PM](#) [No comments:](#) 

Labels: [BACnet](#), [Demand Response](#), [distribution](#), [distribution automation](#), [IEC 61850](#), [Siemens](#)

Thursday, June 21, 2012

International Standardized Profiles needed for IEC 61850-8-1 (MMS)

The mapping standard IEC 61850-8-1 (Mapping to MMS) requires in §6.2.2 to implement the MMS-specific **Implementation agreements** requiring "This A-Profile shall conform to the agreements specified in ISO/ISP 14226-1, ISO/ISP 14226-2, ISO/ISP 14226-3, ISO/IEC ISP 11188-1 and ISO/IEC ISP 11188-3."

The tree first ISPs can be downloaded from the NEMA website for free:

[ISO/ISP 14226-1:1996, Industrial automation systems – International Standardized Profile AMM11: MMS General Applications Base Profile – Part 1: Specification of ACSE, Presentation and Session protocols for use by MMS](#)

[ISO/ISP 14226-2:1996, Industrial automation systems – International Standardized Profile AMM11: MMS General Applications Base Profile – Part 2: Common MMS requirements](#)

[ISO/ISP 14226-3:1996, Industrial automation systems – International Standardized Profile AMM11: MMS General Applications Base Profile – Part 3: Specific MMS requirements](#)

Posted by [Karlheinz Schwarz](#) at [3:22 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [IEC 61850-8-1](#), [implementation](#), [MMS](#)

Monday, June 18, 2012

Workshop IEC 61850 mit dem Beck IEC61850@CHIP

IEC 61850/IEC 61400-25 für die Energie-Versorgungssysteme der Zukunft

Beck IPC GmbH und NettedAutomation bieten einen Workshop zum Thema IEC 61850 und IPC@CHIP® an.

Termin :

3. Juli 2012, 9:30 - 17:00 Uhr (in Deutsch)

Veranstaltungsort:

Beck IPC GmbH
35415 Pohlheim,
Grüninger Weg 24

Die Schulung vermittelt die wichtigsten Schritte zur schnellen und kostengünstigen Implementierung von IEC 61850 und IEC 61400-25 konformen Geräten und Systemen.

Die Veranstaltung richtet sich an alle, die sich mit der Einführung genormter Kommunikations- und Informationstechnik in der Energieversorgung und anderen Anwendungsgebieten wie der Automatisierungstechnik beschäftigen. Angesprochen werden Entscheider, Anwendungsprogrammierer, Systemverantwortliche und Service-Techniker. Für die derzeitigen Nutzer des IPC@CHIP® wird aufgezeigt, wie durch eine einfache Ergänzung der Plattform (Stack-API für IEC 61850 von SystemCorp) der Einsatzbereich der Lösungen drastisch erweitert werden kann.

[Weitere Details zum IEC 61850 Workshop finden Sie hier.](#)

[etz-Veröffentlichung über den Chip \[deutsch\].](#)

Posted by [Karlheinz Schwarz](#) at [1:20 AM](#) [No comments:](#) 

Labels: [Chip](#), [embedded system](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [seminar](#), [Training](#)

Friday, June 15, 2012

IEC 61850-90-13 – New Work on IEC 61850 for Steam and Gas Turbines

The new work item has been introduced in the work programme under the title:

IEC 61850-90-13 Ed.1 (57/1259/RVN):

Communication networks and systems for power utility automation – Part 90-13: Extension of IEC 61850 information models to also include **logical nodes and data models for steam and gas turbines**

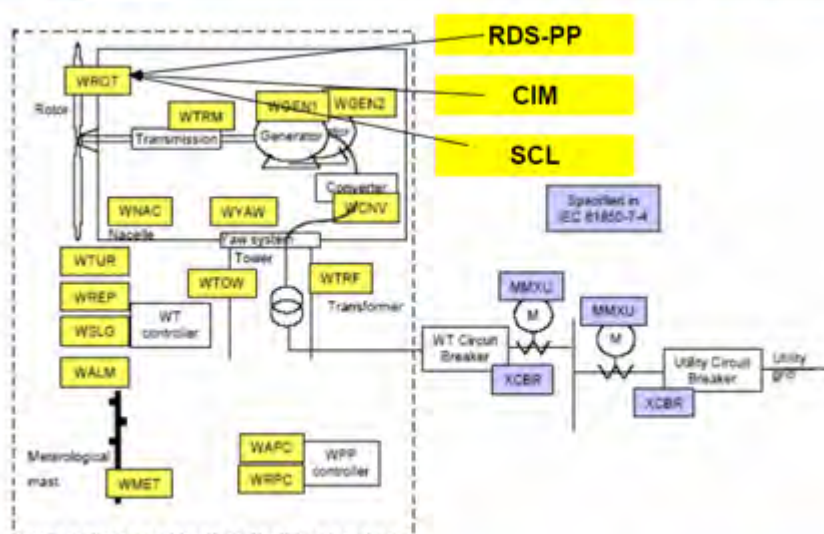
IEC 61850 defines very common concepts, information models, services and configuration language that can be used in many other application domains outside substations. MMS – as a basic communication service to which IEC 61850 models and services are mapped – was originally defined for the manufacturing floor (MMS – Manufacturing Message Specification). So it is no surprise that it can be used there and in many other application domains.

One key issue in power plants is the RDS PP (related to KKS):



Examples of RDS PP for Wind Power Plants and IEC 61400-25/61850:

IEC 61400-25-2 Wind Power Plant model



Binding of Information Models:

RDS PP and IEC 61400-25 for Wind Power Plants

Part IEC 61400-25-2

IEC Knoten	Beschreibung	RDS-PP Kennung
WTUR	Turbine	MD
WROT	Rotor	MDA
WTRM	Triebstrang	MDK
WCNV	Umrichter	MKY
WGDC	Netzanbindung	MS
WNAC	Gondel	MUD10
WYAW	Windnachführung	MDL
WTOW	Turm	UMD20
WALM	Alarm	MYA
WSLG	Status	MYA
WALG	Log	MYA
WREP	Report	MYA

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RDS PP for Wind Power Plants

Bezeichnung Komponente	RDS-PP Kennung	IEC 61400-25	Bezeichnung Messwert
Windnabinensystem	MD	W.ROT	
Rotorblätter	MDA10	RotSt	Status of rotor
Rotorblatt A	MDA11 MQ001	BISB11	Status of blade 1
Rotorblatt B	MDA12 MQ001	BISB12	Status of blade 2
Rotorblatt C	MDA13 MQ001	BISB13	Status of blade 3
Leitschrank Pitch	MDC10 KF001	PcSt	Status of pitch control
Drehzahlensor 1			
Hauptwelle	MDK10 BS001	RotSpd	Value of rotor speed at msoc side
Rotorpositions Sensor	nicht vorhanden	RotPos	Angular rotor position
Gondeltemperatur Sensor	nicht vorhanden	HubTnp	Temperature in the rotor hub
Hydrauliköl drucksensor Blatt1	aufgrund von elektrischer	PcHyPresB11	Pressure of hydraulic pitch system for blade 1
Hydrauliköl drucksensor Blatt2	Umsetzung des	PcHyPresB12	Pressure of hydraulic pitch system for blade 2
Hydrauliköl drucksensor Blatt3	Pitches nicht vorhanden	PcHyPresB13	Pressure of hydraulic pitch system for blade 3
Softwertgeber Pitchwinkel 1	MDC11 KF001	PcAngSpB11	Pitch angle set points for blade 1

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Examples from IEC 61850-7-510 (Hydroelectric power plants – Modelling concepts and guidelines):

EXAMPLE2: 3 Phase Measurement

Signal	RDS-PP	IEC61850 Possible Solution
Power	G1-M1-T1	G1_M1/MMXU01.TotW.mag.f
frequency	G1-M1-T3	G1_M1/MMXU01.Hz.mag.f

EXAMPLE 3: Speed Controller¶

Signal¶	RDS-PP¶	IEC61850 Possible Solution¶
Speedsetpoint internal¶	G1-M1-B0=C0¶	G1_M1_B0/FSPT02.SptVal.ctlVal¶
Speedsetpoint external¶	G1-M1-B0=C1¶	G1_M1_B0/FSPT03.SptVal.ctlVal¶
actual Speed¶	G1-M1-B0=P0¶	G1_M1_B0/HSPD.Spd.mag.f¶
Isolated network cmd on¶	G1-M1-B0=P1¶	G1_M1_B0/HGOV.ModAct.ctlVal¶
Isolated network is on¶	G1-M1-B0=P2¶	G1_M1_B0/HUNT.GridMod.stVal¶
Permanent Droop¶	G1-M1-B0=P3¶	G1_M1_B0/HGOV.Drp.ctlVal¶
Speedcontroller is on¶	G1-M1-B0=P4¶	G1_M1_B0/HGOV.ModAct.stVal¶
Speed controller output¶	G1-M1-B0=K0¶	G1_M1_B0/HGOV.Out.mag.f¶
Speed higher¶	G1-M1-B0=K1¶	G1_M1_B0/FSPT02.SptChg.ctlVal[2]¶
Speed lower¶	G1-M1-B0=K2¶	G1_M1_B0/FSPT02.SptChg.ctlVal[3]¶

Step by step we learn that IEC 61850 is in harmony with many other designation standards ... and it can be used for almost all online (runtime) information exchange and system and IED configuration.

Posted by [Karlheinz Schwarz](#) at 6:35 AM [No comments:](#) 

Labels: [IEC 61850-7-510](#), [IEC 61850-90-13](#), [IED](#), [IED configuration](#), [KKS](#), [power generation](#), [Power Plants](#), [RDS](#), [RDS PP](#)

IEC 61850-85-1 FDIS published for ballot

IEC 61850-85-1 Ed.1 (57/1258/FDIS):

Standard for N times 64 kbit per second optical fiber interfaces between teleprotection and multiplexer equipment (IEEE C37.94)

has been published for FDIS ballot ; ballot closes 2012-08-10.

This standard describes the interconnection details for N, where N = 1, 2...12, times 64 kilobit per second connections of teleprotection equipment to digital multiplexers using optical fiber. Requirements for both physical connection and the communications timing are also included.

Posted by [Karlheinz Schwarz](#) at 6:08 AM [No comments:](#) 

Labels: [IEC 61850-85-1](#), [ieee C37.94](#), [protection](#), [teleprotection](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Friday, June 15, 2012

More Open Positions that require Knowledge on IEC 61850 in the USA

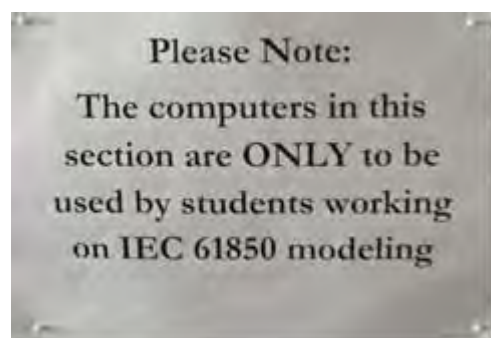
SimplyHired lists today some 80 open positions in the USA that require knowledge on IEC 61850 – one way or the other.

[Search for open positions on IEC 61850 in the U.S.](#)

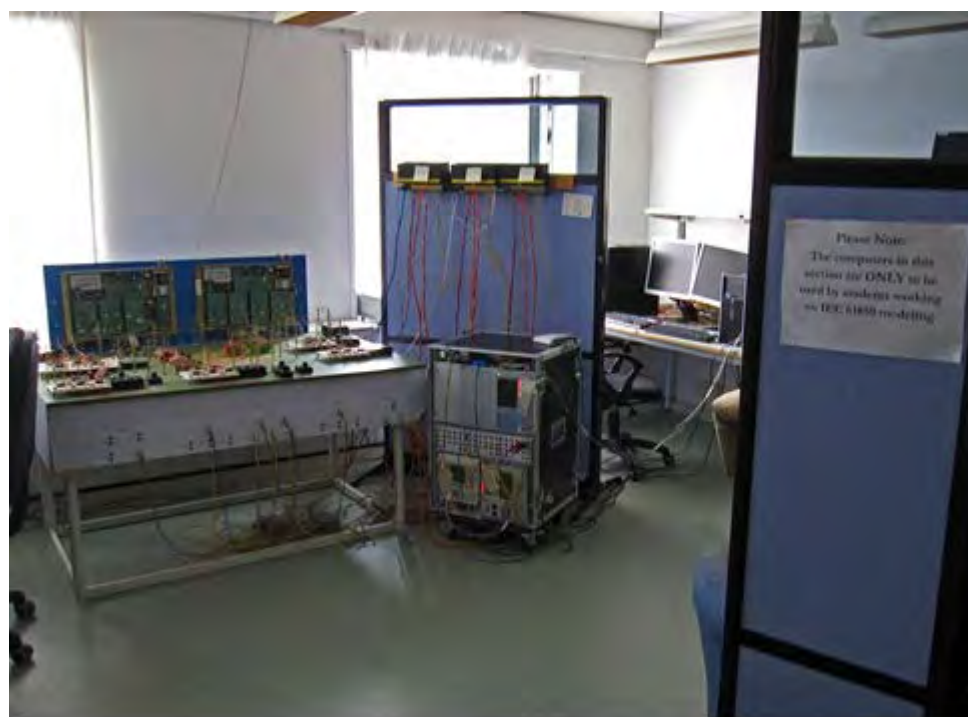
In one case it says: "Strong Communication protocols (61850, DNP, Modbus) knowledge" is required.

Good education in IEC 61850 pays off.

Education in IEC 61850 is a must in some universities ... this week I saw this hint a technical university in Europe (KTH Stockholm):



IEC 61850 IEDs and test equipment in an IEC 61850 lab:



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[International Standardized Profiles needed for IEC...](#)

[Workshop IEC 61850 mit dem Beck IEC61850@CHIP](#)

[IEC 61850-90-13 – New Work on IEC 61850 for Steam ...](#)

[IEC 61850-85-1 FDIS published for ballot](#)

[More Open Positions that require Knowledge on IEC ...](#)

[IEC 61850 – Soon Getting Intelligent Logical Nodes...](#)

[IEC 61850-90-14 FACTS](#)

Karlheinz Schwarz run a one day hands-on training on the Beck Development Kit 65 for PHD Students at the KTH.

Posted by [Karlheinz Schwarz](#) at 5:56 AM No comments: 

Labels: [Beck Chip](#), [development kit](#), [education](#), [hands-on Training](#), [IEC 61850](#), [SCL](#), [Smart Grid](#), [smart people](#), [Training](#)

Wednesday, June 13, 2012

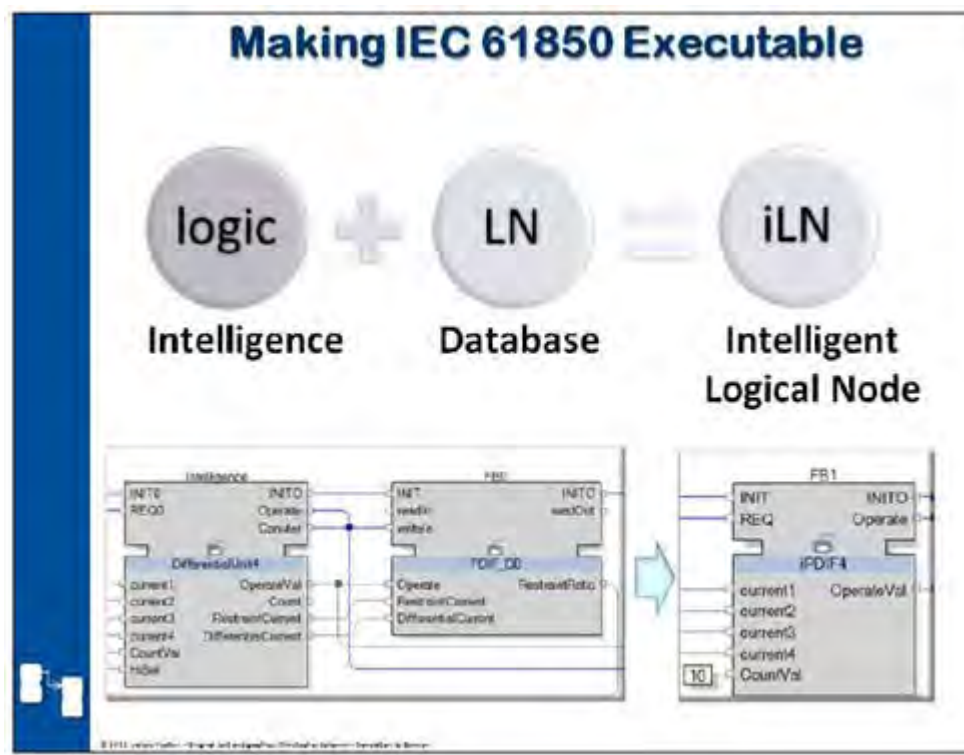
IEC 61850 – Soon Getting Intelligent Logical Nodes?

IEC 61850 is one of the crucial subjects in standardization, power systems (generation, transmission, distribution,), education, and research ... all over.

One research issue is to bring "dynamics" and "Intelligence" into the more static Logical Node classes - By applying another IEC standard: IEC 61499 (Function Blocks).

A discussion of IEC 61499 and IEC 61850 can be found in a presentation by Valeriy Vyatkin, University of Auckland, New Zealand and Christopher Schemm, infoteam; presented at Automation Day, October, 17th, 2011, Nuremberg, Germany.

Here is one of the slides showing the idea of iLN (intelligent Logical Node):



[Download the presentation on IEC 61499 and IEC 61850 including notes \[notes in German\] \[pdf\]](#)

Posted by [Karlheinz Schwarz](#) at 5:16 AM No comments: 

Labels: [IEC 61131-3](#), [IEC 61499](#), [IEC 61850](#)

[\(Flexible AC Transmission Sy...](#)

[IEC 61850 at the Remote Monitoring and Control Con...](#)

[Two MW Wind-to-Gas converter build for E.ON in Ger...](#)

[29 Different Ethernet Solutions for Real-time Comm...](#)

[IEC 61850-90-8 Object Models for E-Mobility](#)

[IEC 61850 Goes Power Distribution – Grid4EU Projec...](#)

[Smart Grid – A Compelling Force for Mega Merger Ea...](#)

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- April (10)
- March (12)
- February (21)
- January (15)

- 2011 (159)
- 2010 (153)
- 2009 (162)
- 2008 (82)

Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

IEC 61850-90-14 FACTS (Flexible AC Transmission Systems) data modeling

IEC TC 57 has published a proposal to work on

IEC TR 61850-90-14 (57/1250/DC):

Communication networks and systems for power utility automation –
Part 90-14: **Using IEC 61850 for FACTS** (Flexible AC Transmission Systems) data modeling

The applications comprise shunt compensation, series compensation, multi-function power flow control, voltage regulation, angle regulation, ...

Posted by [Karlheinz Schwarz](#) at [12:22 AM](#) [No comments:](#) 

Labels: [FACTS](#), [IEC 61850-90-14](#), [Information Model](#)

Thursday, June 7, 2012

IEC 61850 at the Remote Monitoring and Control Conference, Denver (CO), September 18-19

Looking for the latest on Remote Monitoring and Control? Check the program of the Remote Monitoring and Control Conference, Denver (CO), September 18-19, 2012

The Remote Monitoring and Control Conference has released its 2012 **show brochure**. Included in the brochure are presentation descriptions, the show's full schedule, conference workshop information (on DNP3, IEC 61850, IEC 62351 Security, ...), exhibitors, co-located event profiles, registration details and information on booking your room at the show hotel.

[Click Here to View the Brochure](#) [pdf, 4 MB]

If you are automating, remotely monitoring and controlling your oil & gas, water/wastewater, utility/T&D, telecom and transportation infrastructure equipment and systems, this is a must attend event.

Please note that NettedAutomation GmbH will have an exhibition booth in cooperation with SystemCorp (vendor of IEC 61850 Stack/API) and Beck IPC. The latest products for IEC 61850 (like IEDs, Gateways to/from DNP3, Modbus, IEC 60870-5-101/104, ...) will be presented.

Posted by [Karlheinz Schwarz](#) at [8:13 AM](#) [No comments:](#) 

Labels: [DNP3](#), [Fernwirktechnik](#), [Gateway](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Modbus](#), [RTU](#), [security](#)

Monday, June 4, 2012

Two MW Wind-to-Gas converter build for E.ON in Germany


Storage of energy is one of the basic building blocks for the future power delivery system. The option of converting **electric power** into **gas** is one of the most discussed and promising storage options these days. In February I have discussed this briefly:

[Wind and Solar Gas – A Challenging Storage Option](#)

A **2 MW utility scale converter project** at E.ON in North Eastern Germany has been announced by **Hydrogenics** the other day. Up to 30 MWh of energy can be converted from wind power into gas in 24 hours – the gas will be injected into the regional natural gas pipeline, making the natural gas pipeline network a storage system for surplus electrical power generated from renewable resources. Great idea.

[Read the complete news report "Hydrogenics wins order from E.ON for 'Power-to-Gas' energy storage project in Germany"](#)

Standards like IEC 61850 and IEC 61400-25 (Wind Turbines) are ready to support the monitoring and control of wind turbines, and many other applications.

Posted by [Karlheinz Schwarz](#) at 7:14 AM No comments: 

Labels: [Automation](#), [IEC 61400-25](#), [IEC 61850](#), [monitoring](#), [renewables](#), [storage](#), [wind gas](#), [wind power](#)

Sunday, June 3, 2012

29 Different Ethernet Solutions for Real-time Communication! – What about IEC 61850?


The industrial automation market intended in the mid 90s to get a single Ethernet based international standard for the factory floor. Until today the industry is struggling to keep the number of solutions smaller than 30 (!). 29 solutions are listed at the following site (as of September 2008): [Real-Time-Ethernet](#)

One of the most prominent experts in real-time communication (Dr. Karl Weber) came recently (after many tests and investigations) to the conclusion that IEC 61850 is a good candidate for htcp: (Hyper Control Transfer Protocol): [Read his presentation on IEC 61850 for htcp](#)

[A suggestion to use Ethernet as a fieldbus published in 1991 could be found in the paper "Bridging MAP to Ethernet" \[PDF, 720 KB\]](#)

The wait for MMS on Ethernet is over (as stated at the end of the paper) – **Native Ethernet** and MMS are well accepted standard (!) solutions in power systems (generations, transmission, distribution, ...): IEC 60870-6 TASE.2 (ICCP), IEC 61850, IEC 61400-25, IEC 61869-9, ...

IEC 61850 (not only Ethernet) could be used in almost all application domains that need to exchange information in real-time. Will IEC 61850 replace any of the 29 solutions? IEC 61850 will be used at least in applications that have a close relation to electric power – this is a lot! Think about motor control and protection systems or electric cars ... electricity is all over – so will IEC 61850 be in a few years.

Posted by [Karlheinz Schwarz](#) at 10:08 AM No comments: 

Labels: [Ethernet](#), [fieldbus](#), [ICCP](#), [IEC 61850](#), [MMS](#), [real-time](#), [standards](#), [wind power](#)

Saturday, June 2, 2012

IEC 61850-90-8 Object Models for E-Mobility

IEC TC 57 has published (as 57/1254/DC) on June 01, 2012 the

Draft IEC TR **61850-90-8** – Communication networks and systems for power utility automation – Part 90-8: **IEC 61850 object models for**

electric mobility

The Technical Report describes how current standardization for Electric Road Vehicles and the Vehicle-to-Grid Communication Interface can be linked to the IEC 61850-7-420 standard for Distributed Energy Resources (DER). The technical report provides necessary background information and proposes an object model for e-mobility in order to establish an Electric Vehicle plugged into the power grid as DER according to the principles of IEC 61850-7-420. The basic information modeling in IEC 61850 and IEC 61850-7-420 already covers a lot of needs for the e-Mobility domain. Missing parts can be modeled as new logical nodes and data objects, which this technical report defines.

New/extended information models are:

E-mobility supply equipment LN **DESE**

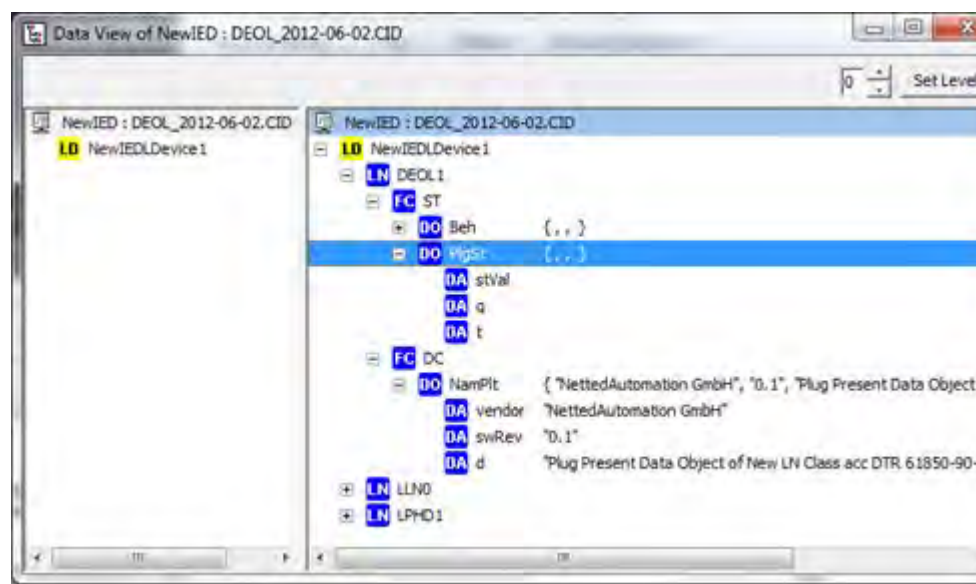
E-mobility outlet LN **DEOL**

E-mobility Electric Vehicle LN **DEEV**

Power cable LN **ZCAB**

Schedule LN **DSCH**

It is easy to add the definition of the **LN DEOL** to an ICD File. Here is an example of the "Plug Present" Data Object of the New LN Class according to DTR 61850-90-8:



This LN Class can easily be added to the model template for the SystemCorp ICD Designer <<61850DTT.xml>>:

```

2095 <!-- section xxxx LN: E-Mobility Plug Present / 2012-06-02 Name: DEOL-->
2096 <LNNodeType id="DEOL" lnClass="DEOL">
2097   <DO name="Mod" type="ENC" pre="O" />
2098   <DO name="Beh" type="ENS" pre="M" />
2099   <DO name="Health" type="ENS" pre="O" />
2100   <DO name="NamPlt" type="LPL" pre="O" />
2101   <DO name="PlgSt" type="ENS-DEOL" pre="O" />
2102 </LNNodeType>

3206 <!-- section 7.3.5 Enumerated status (ENS-DEOL)-->
3207 <DOType id="ENS-DEOL" edc="ENS" desc="Enumerated status">
3208   <DA name="stVal" fc="ST" bType="Enum" type="PlugStatus" dchg="true" pre="M" />
3209   <DA name="q" fc="ST" bType="Quality" qchg="true" pre="M" />
3210   <DA name="t" fc="ST" bType="Timestamp" pre="M" />

```

Almost any new Logical Node published by IEC or any other extended or new LN can easily be modeled with the ICD Designer ... and can easily be applied for building clients and servers using the SystemCorp IEC61850 Stack/API, e.g., using the free evaluation version of the

SystemCorp Windows DLL or using the Beck IPC embedded controller.

There is no need to purchase an expensive package to use IEC 61850 for any model. Just use the SystemCorp IEC61850 Stack/API – and you are ahead of the market.

Many people are now using the Beck IPC Development Kit DK61 or DK55 to implement a gateway between “their data” and the various models according to IEC 61850. It just takes hours to get their (or your) data speaking IEC 61850 ...

It’s really so easy!

Posted by [Karlheinz Schwarz](#) at [2:30 AM](#) [No comments:](#) 

Labels: [E-Mobility](#), [Gateway](#), [ICD](#), [IEC 61850](#), [IEC 61850-90-8](#), [implementation](#), [Object model](#)

Friday, June 1, 2012

IEC 61850 Goes Power Distribution – Grid4EU Project

The electrical power distribution is faced a lot of challenges all over in the years to come: renewable power, virtual power plants, energy storage, aging infrastructure, aging workforce, security, ...

How to get prepared for the future power transmission and distribution system? There are many answers. **One is to work in teams.** The European Commission funds projects for major smart grid demonstrations integrating production from renewable energy and management mechanisms active demand management (Smart Grid). The project **Grid4EU** received a favorable agreement of the European Commission. 27 companies and organizations started the project on 1st of November 2011.

The budget for the project is 54 Million Euro, it will run until end of 2015:

- 6 DSOs (cover more than 50% of the metered electricity customers in Europe)
- 27 partners (Utilities, Energy Suppliers, Manufacturers, Research Institutes)

[Website of the Grid4EU project.](#)

[Statement from the project leader ERDF.](#)

According to several information I received, IEC 61850 is playing a crucial role when it comes to information models and information exchange in medium and low voltage applications. There is a need for the project partners to be trained in order to get a reasonable level of knowledge on how to implement and use IEC 61850. It is highly recommended to have the training at the beginning – and not when people figure out after years that they have missed to use the standards in the way they were intended.

More to come ... stay tuned.

Posted by [Karlheinz Schwarz](#) at [11:09 PM](#) [No comments:](#) 

Labels: [education](#), [IEC 61850](#), [low voltage](#), [medium voltage](#), [Smart Grid](#)

Smart Grid – A Compelling Force for Mega Merger

Eaton and Cooper

Eaton takes over Cooper Industries for 11.8 Billion US\$. Why? ...
Expansion into power distribution, grid automation, and smart grid, ...
;-)

Cooper Power Systems supports IEC 61850: Their substation automation products comply with the IEC 61850 Standard for grid integration and automation ... Eaton has also a range of protection relays and other IEDs supporting IEC 61850 ... It could be expected that IEC 61850 will be a crucial component in the future of both companies.

[More information from Eaton can be found here.](#)

Posted by [Karlheinz Schwarz](#) at [1:03 PM](#) [No comments:](#) 

Labels: [Cooper](#), [distribution](#), [distribution automation](#), [Eaton](#), [IEC 61850](#)

Thursday, May 24, 2012

IEC 61850-3 Ed2 CDV is out for ballot

The CDV for IEC 61850-3 Ed.2 is out for comments and ballot:

Communication networks and systems for power utility
automation – Part 3: General requirements

The ballot closes 2012-10-19


This part of IEC 61850 defines general requirements, mainly regarding construction, design and environmental conditions for utility communication and automation IED's and systems in power plant and substation environments. These general requirements are in line with requirements for IED's used in similar environments, for example measuring relays and protection equipment.

IEC 61850 is used in many applications in the power distribution. The applicability of the requirements (defined in the above CDV) for distribution networks or DER seems to be defined in a more details. Currently clause 6.7.1 defines "In addition to the mentioned electrical plants, Electricity Utilities can install apparatus in control centers, radio repeaters, or low voltage distribution points in industrial, commercial or residential areas. **These locations are covered by other generic standards or product standards.**"

Does this mean that all or most or some requirements defined in IEC 61850-3 Ed2 are not applicable for these locations? etc.

It is highly recommended that experts from all over have a close look at this CDV to make sure that IEDs applied in DER and distribution networks are not burdened with requirements not needed.

[Contact your IEC TC 57 national committee for a copy of the IEC 61850-3 Ed2 CDV.](#)

Posted by [Karlheinz Schwarz](#) at [10:24 PM](#) [No comments:](#) 


Labels: [Edition 2](#), [EMC](#), [IEC 61850](#), [IEC 61850-3](#)

IEC 61850 Extensions for FACTS

IEC TC 57 is about to develop the information model for FACTS
(Flexible AC Transmission Systems)

IEC TR 61850-90-14: Communication networks and systems for power utility automation – Part 90-14: Using IEC 61850 for FACTS (Flexible AC Transmission Systems) data modeling

If you are interested in this work contact your IEC TC 57 national committee.

Posted by [Karlheinz Schwarz](#) at 9:58 PM No comments: 

Labels: [FACTS](#), [IEC 61850](#), [IEC 61850-90-14](#)

Wednesday, May 23, 2012

Work on IEC 61850-90-11 started -- Logics

It was agreed internationally to develop IEC TR 61850-90-11: Communication networks and systems for power utility automation – Part 90-11: Methodologies for modelling of logics for IEC 61850 based applications.

The scope could be quite narrow, taking into account simple logics for input and output signal ... but it could cover also the way how to program complex distributed applications. The standards like IEC 61131-3 or IEC 61499 may be taken into account.

[Some discussion on the use of IEC 61499 ...](#)

Posted by [Karlheinz Schwarz](#) at 11:22 PM No comments: 

Labels: [application programming](#), [applications](#), [IEC 61131-3](#), [IEC 61499](#), [IEC 61850](#), [logic](#)

New Work on Security for SCL, CIM, DNP3 XML-Files


XML files are used for IEC 61970 (CIM), IEC 61850, and IEEE 1815 (DNP3) and IEEE C37.111 (COMTRADE). How can one trust that the content of an XML file for these applications has not been modified? etc.

A new work proposal has been published:
Power systems management and associated information exchange –
Data and communications security –
Part 11: Security for XML Files (future IEC 62351-11)

The ballot closes 2012-07-27

This work is one of the crucial aspects of the future power systems – the various files may contain very sensitive information that has to be protected ... like the protection relays and protection engineers protect the power system!!

I hope that the management takes this work very serious!

Posted by [Karlheinz Schwarz](#) at 10:12 PM No comments: 

Labels: [CIM](#), [COMFEDE](#), [COMTRADE](#), [DNP3](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC 62351](#), [IEEE 1815](#), [SCL](#), [security](#), [XML](#)

Denver (CO): Workshop on International Standards

for Smart Grids and SCADA Application Domains

A **two day Workshop on International Standards for Smart Grids and SCADA Application Domains** will be conducted by two gurus of standards for power systems on

September 18 – 19, 2012 – Hyatt Regency Denver (CO) Tech Center

Topics are among others: NIST SGIP standards catalog, IEC 61850, IEC 62351 (security), DNP3, ... security measures, solutions, and needs, as well as the global market penetration of standards in power systems, ...

[Details and registration information for the Smart Grid Standards Workshop can be found here.](#)

[If you want to have a specific topic presented and discussed during the workshop, please let me know.](#)

Posted by [Karlheinz Schwarz](#) at 1:27 AM [No comments:](#) 

Labels: [DNP3](#), [IEC 61850](#), [NIST](#), [NIST Roadmap](#), [Power Automation](#), [power distribution](#), [power generation](#), [power systems](#), [security](#), [seminar](#), [SGIP](#), [standards](#), [Training](#)

Stockholm: Course on IEC 61850 and Interoperability in SmartGrids including CIM

The School of Electrical Engineering KTH, Royal Institute of Technology, Stockholm is conducting a course on interoperability issues in electrical power delivery systems 11-13 June 2012.

This course will provide fundamental knowledge to the interoperability issues in the Smartgrid, introduction to state of the art systems and technologies, and hands-on practice with relevant industry standard tools.

Aims and Objectives of the course are among others:


- Introduction and understanding of Interoperability issues in the Smartgrid
- Introduction to the state of the art systems, methodologies and frameworks for interoperability in the Smartgrid: IEC 61850 and related standards like IEC 62351 (Security), CIM, ...
- To perform hands-on practice and exercises on interoperability solutions in IEC 61850 based industry standard automation and control systems
- Hands on IEC 61850 substation automation systems with introduction to software tools and IEDs
- Interoperability in 61850 based environments with multi-vendor IEDs
- Interoperability in 61850 based advanced Smartgrid use cases
- KTH LAB hands-on/demo
- Overview and introduction to leading research projects in the field

[Program of the Course on IEC 61850 and Interoperability in SmartGrids \[pdf\]](#)

[General course information and updates.](#)

I look forward to meeting you there.

If you know someone who may be interested in this event please forward the information.

Posted by [Karlheinz Schwarz](#) at [1:09 AM](#) [No comments:](#) 


Labels: [CIM](#), [education](#), [IEC 61850](#), [security](#), [seminar](#), [Smart Grid](#), [smart solution](#), [Training](#)

Tuesday, May 22, 2012

Solvimus bietet IEC 61850 für den Niederspannungsbereich

Die solvimus GmbH (Ilmenau) bietet mit Ihren Steuerungen der auvis-Reihe und dem Gerät MUC.easy für Smart Metering verschiedene Produkte, welche diese Norm unterstützen. IEC 61850 wird somit auch in der Niederspannungsebene verfügbar.

[Pressemitteilung zu IEC 61850 in solvimus-Produkten.](#)

Posted by [Karlheinz Schwarz](#) at [10:05 PM](#) [No comments:](#) 

Labels: [distribution](#), [distribution automation](#), [embedded system](#), [IEC 61850](#), [smart metering](#), [smart solution](#)

Friday, May 18, 2012

USA: IEC 61850-90-5 – Synchrophasor Communication appreciated

The North American Electric Reliability Corporation (NERC) and the North American SynchroPhasor Initiative (NASPI) applauded the publication of IEC 61850-90-5 as an improved synchrophasor data communication solution.

[Access the FERC and NASPI press release on IEC 61850-90-5.](#)

[More details on IEC 61850-90-5 see below.](#)

Posted by [Karlheinz Schwarz](#) at [11:04 PM](#) [No comments:](#) 

Labels: [GOOSE](#), [IEC 61850](#), [sampled value](#), [Synchrophasor](#), [wide area network](#)

Thursday, May 10, 2012

IEC TR 61850-7-510 ed1.0 has been published

The new part IEC 61850-7-510 has been officially published:

Communication networks and systems for power utility automation -
Part 7-510:

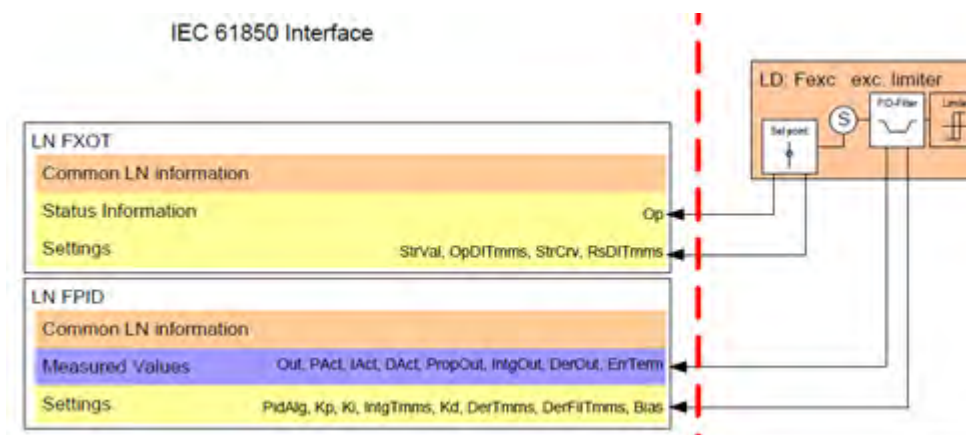
Basic communication structure - **Hydroelectric power plants -
Modelling concepts and guidelines**

[Download the Preview of IEC 61850-7-510](#)

IEC/TR 61850-7-510:2012 provides explanations on how to use the Logical Nodes defined in IEC 61850-7-410 as well as other documents in the IEC 61850 series to model complex control functions in power plants, including variable speed pumped storage power plants. This publication is to be used in conjunction with IEC 61850-7-410 which introduced the general modelling concepts of IEC 61850 to hydroelectric power plants.

This document lays a ground for control devices like PLCs to implement the information interface. One simple implementation could be to integrate an IEC 61850 gateway into a PLC. The gateway could, for example, be implemented with an powerful embedded controller.

The controller would implement the information model and the services like GOOSE for operational status, Setting limits or Reporting of status or measured values:



A gateway could be easily build with available embedded controllers that provide an easy API for IEC 61850 clients, servers, publishers and subscribers.

Posted by [Karlheinz Schwarz](#) at 10:27 PM No comments:

Labels: [API](#), [application programming](#), [applications](#), [embedded system](#), [hydro power](#), [IEC 61850](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Thursday, May 10, 2012

IEC TR 61850-90-5 ed1.0 published

The new part IEC 61850-90-5 has been officially published:

Communication networks and systems for power utility automation - Part 90-5:

Use of IEC 61850 to transmit synchrophasor information according to IEEE C37.118

[Download the Preview of IEC 61850-90-5](#)

IEC/TR 61850-90-5:2012 provides a way of exchanging synchrophasor data between PMUs, PDCs WAMPAC (Wide Area Monitoring, Protection, and Control), and between control center applications. The data, to the extent covered in IEEE C37.118-2005, are transported in a way that is compliant to the concepts of IEC 61850. However, given the primary scope and use cases, this document also **provides routable profiles for IEC 61850-8-1 GOOSE and IEC 61850-9-2 SV packets**. These routable packets can be utilized to transport general IEC 61850 data as well as synchrophasor data.

Posted by [Karlheinz Schwarz](#) at [10:10 PM](#) [No comments:](#) 

Labels: [GOOSE](#), [IEC 61850](#), [sampled value](#), [Synchrophasor](#), [wide area network](#)

Wednesday, May 9, 2012

IEC 61850 Approved for NIST SGIP Catalog of Standards

The SGIP (Smart Grid Interoperability Panel) membership voted to include the IEC 61850 Standard Series into the Catalog of Standards (CoS) with approval of some 100 per cent.

The IEC 61850 series of standards define object models, abstract services, and mappings to communications protocols for field devices and systems. The scope of IEC 61850 includes information exchanges **within substations, for protective relaying, between substations, between substations and control centers, within hydro power plants, for distribution automation, for managing distributed energy resources (generation and storage), and for managing charging of electric vehicles.**

[See the complete list of approved standards for the NIST SGIP Catalog of Standards, including IEC 61850](#)

This is a major step towards the application of IEC 61850 in North America and other regions. The use of IEC TC 57 information and information exchange standards is rapidly growing all over!

The interest in small boxes like the various [COM.TOM's \(as gateways](#)

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[IEC 61850 Extensions for FACTS](#)

[Work on IEC 61850-90-11 started -- Logics](#)

[New Work on Security for SCL, CIM, DNP3 XML-Files](#)

[Denver \(CO\): Workshop on International Standards f...](#)

[Stockholm: Course on IEC 61850 and Interoperabilit...](#)

[Solvimus bietet IEC 61850 für den Niederspannungs...](#)

[USA: IEC 61850-90-5 – Synchrophasor Communication ...](#)

[IEC TR 61850-7-510 ed1.0 has been published](#)

[IEC TR 61850-90-5 ed1.0 published](#)

[IEC 61850 Approved for NIST SGIP Catalog of](#)

between IEC 60870-5-101/104, DNP3, Modbus ... and also between [these and IEC 61850, and for collecting measurements of the electrical system and equipment](#)) is picking up all over. One big utility is about to install 40.000 of these boxes to monitor transformers in distribution substations! More to come.

Posted by [Karlheinz Schwarz](#) at [2:44 PM](#) [No comments:](#) 

Labels: [Beck](#), [Beck Chip](#), [distribution](#), [distribution automation](#), [DNP3](#), [Gateway](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [NIST](#), [NIST Roadmap](#), [SGIP](#)

Monday, May 7, 2012

Report on the big South-Western US Blackout on September 08, 2011

Some 6 months after the big blackout in the Pacific Southwest, leading to cascading outages and leaving approximately 2.7 million customers without power in parts of Arizona, Southern California, and Baja California, and Mexico, a comprehensive report has been published.

The Key Findings, Causes, and Recommendations are as follows:


"The September 8, 2011, event showed that the system was not being operated in a secure N-1 state. This failure stemmed primarily from **weaknesses** in two broad areas—**operations planning** and **real-time situational awareness**—which, if done properly, would have allowed system operators to proactively operate the system in a secure N-1 state during normal system conditions and to restore the system to a secure N-1 state as soon as possible, but no longer than 30 minutes. **Without adequate planning and situational awareness**, entities responsible for operating and overseeing the transmission system could not ensure reliable operations within System Operating Limits (SOLs) or prevent cascading outages in the event of a single contingency. As demonstrated in Appendix C, **inadequate situational awareness** and planning were also identified as causes of the 2003 blackout that affected an estimated 50 million people in the United States and Canada."

One of the crucial needs for real-time operations is the **availability of real-time INFORMATION – to become aware of the situation at the level of the electrical process, primary equipment, secondary functions, and distributed power resources**! This requires real-time information exchange which seems to have not been properly installed, available or used. One challenge is to handle the many vendor and user specific communication protocols. It is very surprising that even at the power transmission level the awareness seems to be showing gaps. The situational awareness (supported by real-time information exchange) at the high voltage levels is one of the most crucial issues in power systems!

So, what is the situation in the implementation of real-time information exchange systems in the lower voltage levels? Hm ... IEC 61850 installed all over would definitely help to get a good awareness of the situation of the system – allowing to proactively operate the system.

More standard based communication (IEC 61850, DNP3, ...) to come.

[Read complete power outage report.](#)

Posted by [Karlheinz Schwarz](#) at [12:54 AM](#) [No comments:](#) 

Labels: [communication](#), [control](#), [DNP3](#), [IEC 61850](#), [power outage](#), [real-time](#)

[Standa...](#)

[Report on the big South-Western US Blackout on Sep...](#)

[Draft IEC 61850-90-7 – Object models for photovolt...](#)

[Draft IEC 61850-90-4 – Network engineering guideli...](#)

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Contributors

 [Karlheinz Schwarz](#)

 [Michael Schwarz](#)

Draft IEC 61850-90-7 – Object models for photovoltaic, storage, and other DER inverters

IEC has published the following very crucial draft for ballot (57/1239/DTR):

IEC 61850-90-7 Ed. 1:

Communication networks and systems for power utility automation –
Part 90-7: IEC 61850 object models for photovoltaic, storage, and other DER
inverters

The ballot closes on 2012-06-29.


This 114 page Technical Report describes the functions for inverter-based Distributed Energy Resources (DER) systems, including photovoltaic systems (PV), battery storage systems, electric vehicle (EV) charging systems, and any other DER systems with a controllable inverter. It defines the IEC 61850 information models to be used in the exchange of information between these inverter based DER systems and the utilities, Energy Service Providers (ESPs), or other entities which are tasked with managing the volt, var, and watt capabilities of these inverter-based systems.

These inverter-based DER systems can range from very small grid-connected systems at residential customer sites, to medium-sized systems configured as microgrids on campuses or communities, to very large systems in utility-operated power plants, and to many other configurations and ownership models. They may or may not combine different types of DER systems behind the inverter, such as an inverter-based DER system and a battery that are connected at the DC level.

The crucial object models for IEC 61850-90-7 have already been implemented on the Beck IPC Development Kit 61.

[Please contact your national committee to get a copy of this crucial document.](#)

[A list of crucial models defined in IEC 61850-90-7 can be found here.](#)

Posted by [Karlheinz Schwarz](#) at 12:22 AM No comments: 

Labels: [IEC 61850](#), [IEC 61850-90-7](#), [inverters](#), [PV](#), [Smart Grid](#)

Draft IEC 61850-90-4 – Network engineering guidelines

IEC has published the following draft for ballot (57/1238/DTR):

IEC 61850-90-4 TR Ed.1:

Communication networks and systems for power utility automation –
Part 90-4: Network engineering guidelines for substations


The ballot closes on 2012-06-22.

[Please contact your national committee to get a copy of this crucial document.](#)

This 192 page Technical Report provides definitions, guidelines, and specifications for the network engineering of IEC 61850 based (substation and other) automation.

It addresses issues such as Ethernet technology, network topology, redundancy, traffic latency and quality of service, traffic management by multicast and VLAN, network-based clock synchronization and testing of

the network.

Posted by [Karlheinz Schwarz](#) at [12:08 AM](#) [No comments:](#) 

Labels: [Ethernet](#), [Ethernet switches](#), [IEC 61850](#), [redundancy](#), [traffic engineering](#)


Sunday, April 29, 2012

Siemens SIPROTEC 5 – Documents online

<http://www.energy.siemens.com/br/en/automation/power-transmission-distribution/protection/siprotec5/>

Click on "Download Software & Documents" on right side of page.

The SIP 5.01 booklet is listed as "System Catalog V1.0"

Posted by [Karlheinz Schwarz](#) at [11:28 AM](#) [No comments:](#) 

Labels: [IEC 61850](#), [Siemens](#), [SIPROTEC 5](#)

Friday, April 27, 2012

IEC Standards for the Integration of Wind Energy and Photovoltaic

Dr. Kai Strübbe, Head of Embedded Systems, TÜV SÜD AG, presented some crucial aspects of the Integration of renewable power into the Smart Grids at the Hanover Fair 2012:

The Integration of Wind Energy and Photovoltaic into a Smart Grid

Hannover Messe, 24 April 2012

According to the figures shown in the presentation there are more than 1,000,000 low voltage substations in Germany – most of them are not yet controllable! It's a huge market.

He said that **"IEC 61850 Will Be the Esperanto of the Smart Grid"** – Right. IEC 61850 (IEC 61400-25) is a language that is already spoken in the medium and high voltage networks – the huge low voltage domain is next!


There is a huge interest in **learning this language and easy to use IEC 61850 hardware and software** shown during the fair in Hanover. The crucial questions were on how to implement the standards in a short time to market. SystemCorp and TQ had the right answer.

[Download the presentation from Dr Stübbe \[pdf, en, 1 MB\]](#)

By the way, there are still seats available for the next 3 day public IEC 61850 training in Frankfurt (Germany) from 09–11 May 2012.

3 day General Seminar/Hands-on Training with Real IEDs (embedded controller with Linux, RTOS, ...), Starter Kit (Windows DLL), and several Demo Software (Client/Server and GOOSE messaging)	<input type="checkbox"/> 09-11 May 2012	Frankfurt (Germany)
	<input type="checkbox"/> 17-19 October 2012	Frankfurt (Germany)
Fee for Seminar/Training: € 1.950,-	Special offer for Hanover Fair 2012: 1. Receive an IEC 61850 Development Kit (Beck IPC DK61) included in the regular fee, or 2. Get a discounted fee of € 1.150 (without DK61)	

[If you are interested in the training and FREE IEC 61850 development kit DK61 contact us please.](#)

Posted by [Karlheinz Schwarz](#) at 12:00 AM No comments: 

Labels: [embedded system](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Smart Grid](#), [smart people](#), [Training](#)

Wednesday, April 25, 2012

Famous Visitors at the TQ/SystemCorp Booth at Hanover Fair 2012

Reinhard Bütikofer (Member of the EU Parliament) and Ludwig Karg (E-Energy) visited the TQ/SystemCorp booth C45 in Hall 13 on Wednesday (2012-04-25). They discussed the future of Smart Grids (under the headline of IEC 61850 and IEC 61850 embedded controllers from TQ):



Detlef Raddatz and Pritam Munot (both from SystemCorp, Perth Western Australia) have explained the benefits of IEC 61850 stack and API integrated on TQ embedded controllers (ARM 9 and ARM 11) – these products help to “Get Smart Quick”:



Posted by [Karlheinz Schwarz](#) at 11:48 PM No comments: 

Labels: [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [Smart Grid](#), [smart metering](#), [smart people](#), [smart solution](#), [SystemCorp](#), [TQ](#)

Hanover Fair – NettedAutomation Brochure for Download

There is an overwhelming interest in IEC 61850 we are facing at the Hanover Fair 2012. The 47 page brochure from NettedAutomation on IEC 61850 and IEC 61400-25 distributed run already out at the third day!



The brochure is now available for download:

[Download the 47 page brochure on IEC 61850 distributed at the Hanover Fair 2012 \[pdf, 5.8 MB\].](#)

Posted by [Karlheinz Schwarz](#) at 11:20 PM No comments: 

Labels: [embedded system](#), [hanover fair](#), [IEC 61400-25](#), [IEC 61850](#), [NettedAutomation](#), [Smart Grid](#), [smart people](#), [SystemCorp](#), [TQ](#)

TQ IEC 61850 Embedded Controllers at the Hanover Fair

The following embedded controller are on display at the Hanover Fair; the interest in getting a package of a hardware piece with an integrated IEC 61850 API for servers and clients is huge:

TQMa28

Functional talent for universal applications

The TQMa28 Minimodule, based on the i.MX28 processor, offers a balanced ratio between computing and graphic performance. The basis for this is an ARM926 core with up to 450 MHz. The realised memory on the module provides best system support. The module is best suited for smart metering and for easy visualization and control applications.

A large number of interfaces and module functions are implemented in the CPU due to the high level of interface and function integration. This allows the basic board to be developed easily and at low-cost.

All the processor's functional pins are on the module plug-in connector.

The highlights:

- Smallest ARM9 module
- Low-cost due to highest level
- Extended temperature range
- 2x IEEE1588 Ethernet (L2 Switch)
- Low power consumption (typ.)
- Long-term availability
- Power management
- Battery charge functionality
- IEC 61850 stack



[Download technical specification for TQMa28 with IEC 61850.](#)

TQMa35

Allroundtalent for many applications

The TQMa35 Minimodule, based on the Freescale i.MX35 processor, offers a balanced ratio between computing and graphic performance. The basis for this is an ARM11 core with up to 532 MHz. A large number of interfaces and module functions is implemented due to the high level of interface and function integration in the CPU. This allows the basic board to be developed easily and at low-cost.

All the processor's functional pins are on the module plug-in connector.

- All CPU interfaces are available
- Extended boot options (Boot from eMMC Flash)
- Extended temperature range
- eMMC Flash
- Low power consumption
- Long-term availability
- IEC 61850 stack



[Download technical specification for TQMa35 with IEC 61850.](#)

Posted by [Karlheinz Schwarz](#) at 11:19 PM No comments: 

Labels: [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [stack](#), [SystemCorp](#), [TQ](#)


IEC 61850 at the Hanover Fair

TQ, SystemCorp and NettedAutomation present IEC 61850 on embedded ARM platforms at the Hanover Fair, from Monday to Friday (23.-27. April 2012) - (Hall 13 Stand C45):





The interest in IEC 61850/IEC 61400-25 on powerful embedded controllers is huge! Visitors from all over visited the booth for information or asked for offerings for small and large quantities during the first two days.

Posted by [Karlheinz Schwarz](#) at [12:15 AM](#) [No comments:](#) 

Labels: [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [Smart Grid](#), [smart people](#), [smart solution](#), [stack](#), [starter kit](#)

Friday, April 20, 2012

IEC 62351-10 – Security architecture guidelines

A new key draft document on Security has been published by IEC:

IEC 62351-10 TR Ed.1:

Power systems management and associated information exchange –
Data and communications security – Part 10: Security architecture
guidelines

Ballot closes on 2012-06-22; ask your [IEC National Committee for a copy](#).

Cyber security becomes more and more a basic requirement in power control systems as standard IT and other forms of modern communication technology are being increasingly used for control and supervision of these systems. The application of IT communication technology requires the consideration of already existing vulnerabilities, which can be exploited by potential attackers, as recent intentional and unintentional cyber incidents on SCADA and other industrial control systems have shown. The increasing number of control system cyber incidents world-wide with medium to high impact underlines the requirement for appropriate security measures. The draft document targets the description of security architecture guidelines for power systems based on essential security controls, i.e., on security-related components and functions and their interaction. Furthermore, the relation and mapping of these security controls to the general system architecture of power systems is provided as guideline to support system integrators to securely deploy power generation, transmission, and distribution systems applying available standards.

The main clause is:

4. MAPPING SECURITY CONTROLS TO THE TC57 ARCHITECTURE

4.1 SECURITY DOMAINS WITHIN A GENERIC POWER SYSTEM ARCHITECTURE

4.2 APPLICATION OF SECURITY CONTROLS TO A GENERIC POWER SYSTEM ARCHITECTURE

4.3 APPLICATION OF SECURITY CONTROLS TO SPECIFIC POWER SYSTEM SCENARIOS

4.3.1 Substation Automation

4.3.2 Control Center – Substation Communication

4.3.3 Advanced Metering

4.4 IDENTIFIED GAPS

See the list of all parts of the series IEC 61351:

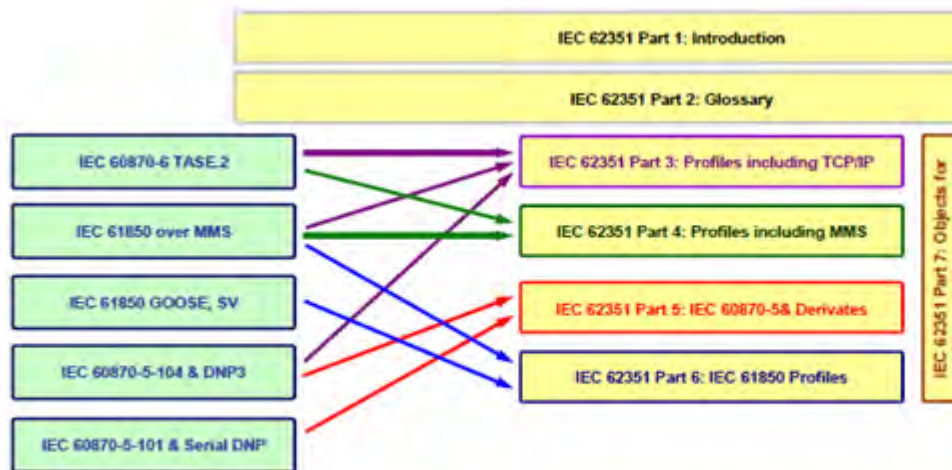


Figure 7: Mapping of IEC 62351 Parts to applicable protocols

It is HIGHLY recommended to ALL stakeholders in the energy industry to keep an close eye on the security issues!!

Posted by [Karlheinz Schwarz](#) at 10:16 PM No comments:

Labels: [IEC 61850](#), [IEC 62351](#), [security](#)

Friday, April 6, 2012

IEC 61850 ready for VHP-Ready (Virtual Heat and Power Ready)

Vattenfall Europe New Energy GmbH and Vattenfall Europe Wärme AG seem to be ahead of many other utilities in implementing "virtual Power Plants". They have set a standard on how to use renewable energy in a virtual power plant. The information exchange is realized with two IEC TC 57 standards: IEC 60870-5-104 (Fernwirktechnik) and IEC 61850-7-420 (DER).

Vattenfall is one of the leaders of the implementation of virtual power plants. The concept is called: **VHP READY – Virtual Heat & Power Ready**.

Their objective is by end of 2012 to provide their services to 150.000 housing units (with some 500 CHP or heat pumps) communicating with a Vattenfall control center. By 2013 they expect some 1,000 CHP or heat pumps providing heat and electric power to some 200.000 housing with an electric capacity of 200 MW.

The requirements document lists a total number of signals of 40:

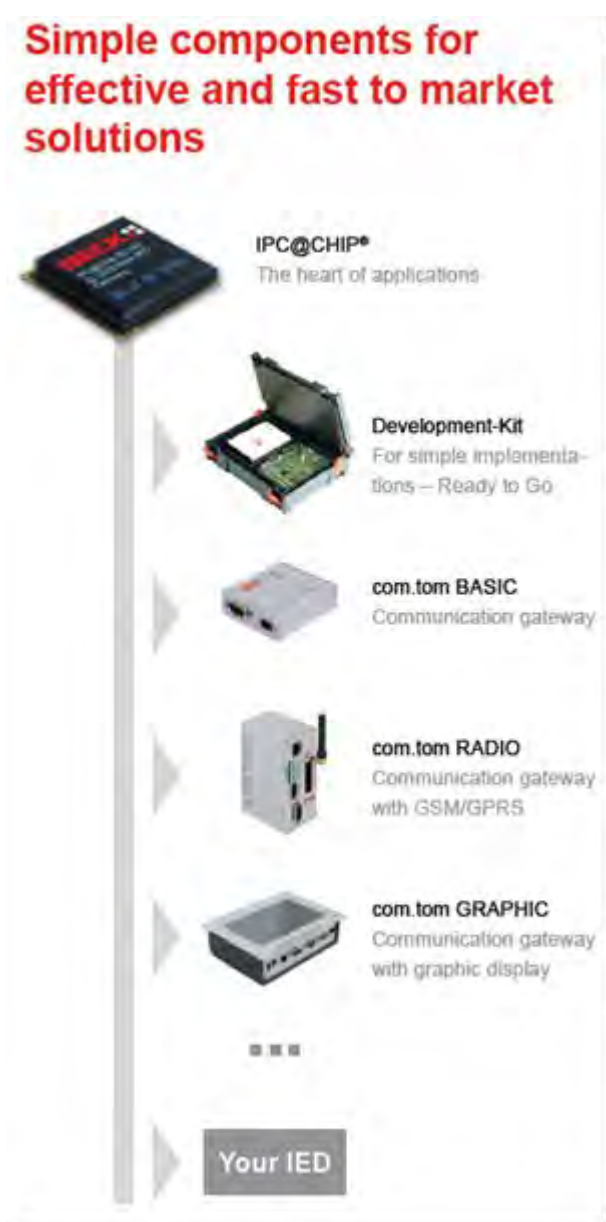
- 8 binary status signals,
- 17 measurements and calculated values,
- 5 metered values, and
- 10 control points.

[Requirements document referring to IEC 60870-5-104 and IEC 61850 can be downloaded](#) [German, pdf, 23 pages, 360 KB]

VHP READY – Virtual Heat & Power Ready

Vattenfall virtuelles Kraftwerk

Several other projects are under way in Germany to implement a similar approach. In one project there is already a plan to define (and possibly standardize) a specific profile (subset) of IEC 61850-7-420. Such a profile would represent the above some 40 signals – a very simple set of models that could easily be implemented in an IEC 61850 IED like the **Beck IPC IEC 61850 com.tom**:




IEC 61850 Software implementation

- MMS over TCP/IP
- GOOSE Publisher/Subscriber
- Sampled Values
- Data sets
- Buffered reporting
- Unbuffered reporting
- Control
- Data Logging
- Time synchronization via SNTP
- File Transfer via MMS and FTP

[More information on Beck IPC IEC 61850 com.tom.](#)

[Basic component for IEC 61850: the IPC@CIP](#)

[Download the discussion about benefits using Beck's ready-to-go solutions with IEC 61850](#) [pdf, 2.3 MB, 18 pages]

Posted by [Karlheinz Schwarz](#) at [11:07 PM](#) [No comments:](#) 

Labels: [Beck Chip](#), [CHP](#), [control](#), [control center](#), [Heat Pump](#), [IEC 60870-5-104](#), [IEC 61850](#), [IED](#), [monitoring](#), [Vattenfall](#), [virtual power plant](#), [VPP](#)

SystemCorp, TQ and NettedAutomation at Hanover Fair 2012

IEC 61850 software, hardware and peopleware are crucial topics at the Hanover Fair 2012. SystemCorp, TQ and NettedAutomation provide all three:

- SystemCorp has the right software to get started in hours or days
- TQ has powerful embedded controller that run the IEC 61850 API and
- NettedAutomation provides the education to get Smart People for smart grids

[IEC 61850 - Get there first with SystemCorp, TQ and NettedAutomation as competent partners!](#)

[IEC 61850 - Mit SystemCorp, TQ und NettedAutomation als kompetente Partner zuerst am Ziel!](#)

Posted by [Karlheinz Schwarz](#) at [2:22 AM](#) [No comments:](#) 


Labels: [education](#), [embedded system](#), [IEC 61850](#), [NettedAutomation](#), [SystemCorp](#), [TQ](#)

Monday, April 2, 2012

CDV of IEC 61850-10 Ed.2.0 approved

The CDV of IEC 61850-10 "Communication networks and systems for power utility automation - Part 10: Conformance testing" has been approved by the 25 P-members of IEC TC 57 end of March 2012.

The next step will be the FDIS publication for final ballot.

Posted by [Karlheinz Schwarz](#) at [11:26 AM](#) [No comments:](#) 

Labels: [conformance test](#), [IEC 61850](#), [iec 61850-10](#)

Friday, March 30, 2012

IEC 61850 für Smart Grids in Deutschland

BDEW und ZVEI empfehlen acht "reife" und notwendige Technologien für den unmittelbaren Einsatz für Smart Grids:

Smart Grids in Deutschland – Handlungsfelder für Verteilnetzbetreiber auf dem Weg zu intelligenten Netzen (27. März 2012)


"Um die Verteilnetze effizient zu gestalten, erhöht sich der Bedarf an **Messung, Regelung und Automatisierung**. Aus Sicht eines Verteilnetzbetreibers kommt es jetzt darauf an, die wichtigsten Technologien und deren Wirksamkeit zu identifizieren. Es stellt sich die Frage, **welche Technologien bereits heute zur Verfügung stehen und welches Potenzial diese zur Lösung der verteilnetzspezifischen Probleme mitbringen.**"

Von 25 Smart-Grid-Komponenten gelten acht als „erfolgversprechend“:

- Sensorik im Netz,
- Netzleittechnik,
- Kommunikations- und Dateninfrastruktur,
- regelbare Windkraft,
- regelbare Photovoltaik,
- kleinere KWK-Anlagen,
- Pumpspeicherkraftwerke sowie
- Komponenten zur Blindleistungskompensation.

"Als etablierte Kommunikationsstandards in der Energieverteilung liegt die Verwendung der IEC 61850 nahe. Die IEC 61850 erlaubt einen sicheren und effektiven Datenaustausch zwischen den Smart IEDs und das übergreifende Nutzen von Sensoren und Aktoren. ... **Die konsequente Umsetzung des gemeinsamen Systemstandards IEC 61850 über alle Spannungsebenen hinweg, bietet die Voraussetzung für einheitliche Kommunikations- und Datenstrukturen. Dies ist eine Voraussetzung für den wirtschaftlichen Ausbau der Verteilnetz-Automatisierung.**

[IEC 61850 und ... in "Smart Grids in Deutschland – Handlungsfelder für Verteilnetzbetreiber auf dem Weg zu intelligenten Netzen"](#) [PDF, 32 Seiten, 10,9 MB]

Posted by [Karlheinz Schwarz](#) at 5:27 AM No comments: 

Labels: [control](#), [de](#), [Deutschland](#), [IEC 61850](#), [PV](#), [Sensors](#), [Smart Grid](#), [smart people](#), [smart solution](#), [Verteilnetz](#), [wind power](#)

Tuesday, March 27, 2012

Edition 1, Edition 2, and soon Edition 3 of IEC 61850?

Some people are already looking for Edition 3 of IEC 61850! If you are looking for IEC 61850 Edition 2 or IEC 61850 Edition – you will never find them!! Really.

Editions are specific to parts – NOT to the series IEC 61850 per se with its 20+ parts!!

[Check out more information about Editions of the parts of IEC 61850.](#)

Posted by [Karlheinz Schwarz](#) at 10:10 PM No comments:



Labels: [Edition 1](#), [Edition 2](#), [Edition 3](#), [IEC 61850](#), [IEC 61850 edition 2](#)

Get Free IEC 61850 Development Kit (HW and SW)

The application of IEC 61850 is very successful all over. More and more people are looking for hardware and software that can be used right away – for an easy implementation of applications and Gateways between IEC 61850 and DNP3, Modbus, IEC 60870-5-101/104 and for short time to market developments.

NettedAutomation has scheduled the next public training course to be held in **Frankfurt from May 09-11, 2012**. As a **special gift we offer you a free IEC 61850 Development Kit (Beck IPC DK61)** with an ready to go API and example application source code in C/C++ and IEC 61131/CoDeSys. The DK61 will be used during the course ... after the event you can take the kit home and continue developing applications for IEC 61850 and IEC 61400-25.

[Download a description of the Development Kit \[pdf, 1.4 MB\]](#).

The gift is included in the regular training fee.

This offer is valid until April 27, 2012. Register soon.

[The program and further information on the training course can be downloaded.](#)

[If you are interested in the training and FREE IEC 61850 development kit DK61 contact us please.](#)

The retail price of the DK61 is 1,299 Euro. The regular course fee will be discounted by 800 Euro if you don't want to get the kit but attend the training course only. Students get a further discount ... please ask for it.

Download the [discussion about benefits using ready-to-go solutions with IEC 61850, DK61, Beck Chip, ... and PV Inverter models](#) [pdf, 2.3 MB, 18 pages]

Posted by [Karlheinz Schwarz](#) at [11:14 AM](#) [No comments:](#)

Labels: [application programming](#), [CoDeSys](#), [development kit](#), [DNP3](#), [Evaluation](#), [IEC 60870-5-104](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Training](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Tuesday, March 27, 2012

HAW Hamburg: IEC-Normen für Smart Grids und die Energiewende

Das HAW Hamburg (Hochschule für Angewandte Wissenschaften) lädt Studierende und Wissenschaftler sowie Experten aus der Industrie, den Betreibergesellschaften und Verbänden zu einem Impuls-Vortrag ein:

IEC-Normen für Smart Grids und die Energiewende

Mittwoch, 4. April 2012

16:00 - 17:30 Uhr, mit anschließender Diskussion

Veranstaltungsort:

HAW Hamburg, Berliner Tor 5, Hörsaal 01.10 (1. Stock)


Die Veranstaltung ist kostenlos.

Flexible und intelligente Stromnetze sind in aller Munde - die dafür nötigen Kommunikationssysteme und Normen werden allerdings gerade erst entwickelt. Experte Karlheinz Schwarz wird die globalen Entwicklungen von nationalen und internationalen Roadmaps und Normen vorstellen.

Im Rahmen der nachhaltigen Weiterentwicklung der Versorgungssysteme muss mit den verfügbaren Ressourcen (Energiequellen, technischen Einrichtungen und Menschen mit Erfahrung) sowie den physikalischen Gesetzmäßigkeiten verantwortungsvoll und "smart" umgegangen werden. Smart Grids helfen, die Physik zum Wohl der Menschen sicher und zuverlässig nutzbar zu machen - gestern, heute und morgen.

Es werden globale Entwicklungen von nationalen und internationalen Roadmaps (DIN, CEN/CENELEC/ETSI, NIST, Chinese State Grid, IEC usw.) und Normen (IEC 61850, IEC 61968/70 CIM usw.) vorgestellt, die helfen werden, die Energieversorgungsnetze auch unter geänderten Randbedingungen sicher und zuverlässig zu erhalten.

[Weitere Informationen zur Veranstaltung finden Sie hier.](#)

Posted by [Karlheinz Schwarz](#) at [10:36 AM](#) [No comments:](#) 

Labels: [CIM](#), [Energiewende](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [Smart Grid](#), [smart people](#)

Monday, March 26, 2012

Smart Grids – A 19th century invention

Intelligent, safe electrical power distribution networks were invented at the start of electrification and have been further developed up to the present day. Electrical fuses, protective devices and monitoring devices have been phenomenal in the protection of life and technical

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[Fix in IEC 61850-7-4 Edition 2 - Mode and Behaviou...](#)

[IEC 61850 Gateway And Programmable IED](#)

[Wireless Temperature](#)

installations for **more than 100 years**. Without these "smart" devices a fault-free, fail-safe electrical energy supply system would be inconceivable and the supply of electrical energy much too dangerous.

Since the 19th century engineers have developed, tested, used on a large-scale and continuously improved suitable solutions for the safe and reliable operation of the rapidly growing supply of ever more applications with electrical energy. During the sustained further development of the supply systems, it is necessary to handle the available resources (energy sources, technical installations and individuals with experience) as well as the laws of physics both responsibly and in a "smart" manner. Smart grids help to make it possible to use physics safely and reliably for the benefit of man – in the past, today and in the future.

A new paper discusses some aspects of the development of Smart Grids.

[Download the Smart Grid paper in English single sided](#) or [double sided](#).

[Laden Sie das Smart Grid paper in Deutsch im Einseiten-Format herunter](#) oder [im Doppelseiten-Format](#).

The papers will be published by Bender (Gruenberg/Germany) in the Bender magazine MONITOR 01/2012.

[Bender creates new technologies for safe handling of electrical power](#); to ensure the protection of people and the safe operation of machines, systems and manufacturing plants.

IEC standards are quite important for Bender! Mr Wolfgang Hofheinz (CTO of Bender) is President of the DKE (German national committee of the IEC international standardization organization) since 2010.

[Check which IEC product standards and guidelines Bender applies](#)

Posted by [Karlheinz Schwarz](#) at [9:18 AM](#) [No comments:](#) 


Labels: [future](#), [history](#), [IEC Standards](#), [protection](#), [reliable power delivery](#), [Smart Grid](#), [smart people](#)

Thursday, March 15, 2012

ABB to deliver 17 IEC 61850 based substations to Rio Tinto (Western Australia)

ABB has won orders worth approximately \$100 million for 17 substations to support Rio Tinto's iron ore expansion in the Pilbara ... the protection and communication equipment will be compliant with IEC 61850.

[News report on 17 new IEC 61850 based substations for Rio Tinto.](#)

Posted by [Karlheinz Schwarz](#) at [10:44 PM](#) [No comments:](#) 

Labels: [ABB](#), [Australia](#), [IEC 61850](#), [Substation](#), [Substation Automation](#)

Tuesday, March 13, 2012

Powerful Arm and Freescale Platforms with IEC 61850 Stack and API at Hanover Fair 2012

SystemCorp and TQ offer the easy to use and powerful IEC 61850 stack and API running on two Mini modules:

[Sensors for Switchgears and I...](#)

[IETF Energy Management WG \(EMAN\) inspired by IEC 6...](#)

[Australia: The Dutch Disease and IEC 61850!?](#)

► [February](#) (21)

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► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

 [Michael Schwarz](#)

 [Karlheinz Schwarz](#)

1. TQMa28 is based on the i.MX28 processor (ARM926 core with up to 450 MHz)
2. TQMa35 is based on the Freescale i.MX35 processor (ARM 11 core with up to 532 MHz)

The platforms will be presented during the Hanover Fair:

Hall 13, Stand C45


Co-exhibitor with: [TQ-Systems](#)

23-27 April 2012 - daily, 9 a.m. to 6 p.m.

Karlheinz Schwarz will also be present at the booth – offering training services and answering questions related to IEC 61850, IEC 61400-25, IEC 60870-5/6, IEC 61968/70 CIM, DNP3, ...

[Check for more details on the ARM 9 and ARM 11 platforms offering IEC 61850.](#)

[Read the experience and CV of Karlheinz Schwarz.](#)

Posted by [Karlheinz Schwarz](#) at [4:32 AM](#) [No comments:](#) 

Labels: [API](#), [CIM](#), [ICCP](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [SystemCorp](#)

Friday, March 9, 2012

Fix in IEC 61850-7-4 Edition 2 - Mode and Behaviour

Please note that Table A.2 – Definition of mode and behaviour in IEC 61850-7-4 Edition 2 has an error that has been corrected, see Tissue 671:

Table A.2 – Def

MODE/BEHAVIOUR	on
Incoming data with q=test	Processed as valid
Inco with p	Processed :
	Processed

NOTE A precondition of the use of different modes (Mod/Beh) is the pro

Tissue 671: ... as invalid

For incoming data with q.test = True and Mode on, the data shall be processed as **invalid!**

Access [IEC 61850-7-4 Tissue 671](#).

Posted by [Karlheinz Schwarz](#) at 10:30 AM No comments: 

Labels: [IEc 61850-7-4 Ed2](#), [tissues](#)

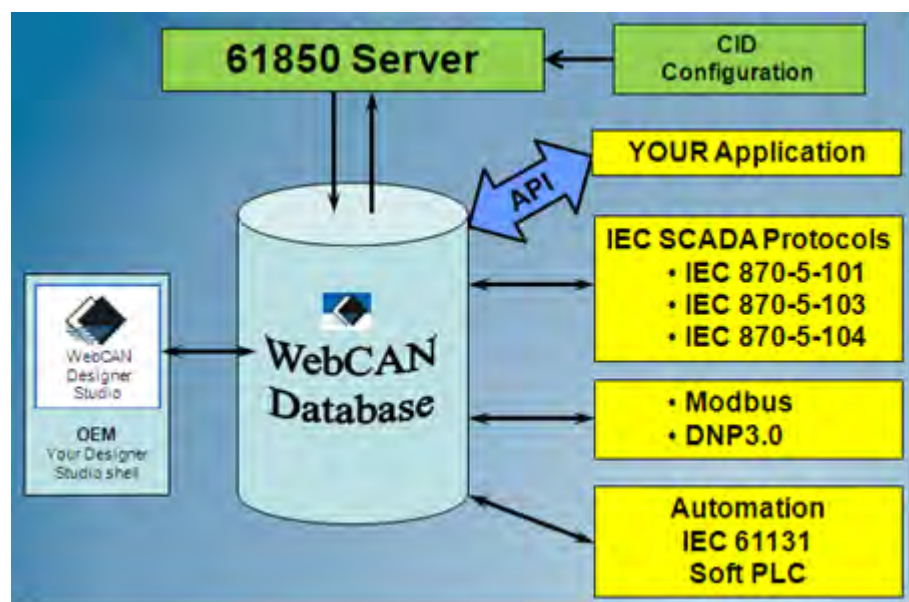
Thursday, March 8, 2012

IEC 61850 Gateway And Programmable IED

These days many vendors that have to develop devices for the electric power delivery are interested in applying a third-party Gateway that map the commonly used protocols like DNP3, Modbus, IEC 60870-5-10x, or CAN bus to an IEC 61850 Server. There are ready-to-go gateway available.

Usually the gateways map between one other protocol and an IEC 61850 Server – if you want to have two or three protocols to be mapped to IEC 61850 you likely have to pay a license for each protocol. The gateways usually are just gateways and **do not allow** any other application running on the same platform providing application data through IEC 61850 models and services.

The Gateway provided by SystemCorp is quite different as the following figure depicts:



In addition to the Gateway functionality any other application programmed on the very same platform can provide data exchange with the IEC 61850 server through the simple API of the IEC 61850 stack. Various embedded controllers like the Beck IPC Chip provide these possibilities.

This allows with one IEC 61850 license to implement gateway functionalities AND let any other application functionality "speak" IEC 61850.

Access the description of the [IEC 61850 Protocol Stack Online API Manual](#).

Posted by [Karlheinz Schwarz](#) at 1:53 AM No comments:

Labels: [API](#), [applications](#), [Beck Chip](#), [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61131-3](#), [IEC 61850](#), [Modbus](#), [stack](#), [SystemCorp](#)

Wednesday, March 7, 2012

Wireless Temperature Sensors for Switchgears and IEC 61850

Monitoring the temperature of likely failure points within electric power switchgear provides invaluable data on the health of that piece of equipment. Wireless solutions for temperature monitoring of medium-voltage and high-voltage switchgear are appropriate means to get critical information about the health of switchgears – especially for aging switchgears that have an ever more crucial impact on the reliability of the electric power system.

Ruggedized passive wireless radio-based temperature sensor and monitoring systems are a great answer for medium-voltage and high-voltage electric power switchgear. The access to these measured temperature values through IEC 61850 is now available by Intellisaw.

Access the [Intellisaw website to read the benefits of their Wireless sensors](#).

Check the [temperature measurement model STMP of IEC 61850](#).

Posted by [Karlheinz Schwarz](#) at 9:18 PM No comments:

Labels: [IEC 61850-3](#), [IEC 61850-7-4 Ed2](#), [Smart Grid](#), [switch gear monitoring](#), [temperature monitoring](#)

IETF Energy Management WG (EMAN) inspired by IEC 61850 and CIM

IETF EMAN, Energy Management, is an active WG that is modeling (in the MIB) a lot of power related real world objects "connected" one way or the other to a network. SNMP is used to access this information. The objective of Energy Management (EMAN) is to provide an energy management framework for networked devices.

Networked devices could be Ethernet switches, routers, battery controller, other storages, gateways, ... more or less anything that is connected to a network!

<http://tools.ietf.org/wg/eman/>

The WG sees IEC 61850 as the most applicable standard to EMAN. Concepts from IEC 61850 and CIM have been reused (somehow) by the EMAN WG. A closer cooperation of the models would be appreciated by the next generation of engineers and programmers ...

There is ONE real world – many models could be thought of to describe that single real world. I hope that for energy applications we will prevent to get too many models. IEC 61850 models should be used as default solution in all devices closely connected to the physical level of energy systems ... different notations and protocols may be used BUT the content/semantic should be identical!

A MMXU should model the 3-phase electrical system – all over and in all models.

Posted by [Karlheinz Schwarz](#) at [12:15 AM](#) [No comments:](#) 

Labels: [CIM](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [ietf](#), [Information Model](#), [MIB](#), [SNMP](#)

Thursday, March 1, 2012

Australia: The Dutch Disease and IEC 61850!?


Dustin Tessier suggests in his paper the increased application of IEC 61850 in Australia as a means against the Dutch Disease – a very interesting paper. He states:

"With a bit of sponsorship from the government, this cost saving technology [IEC 61850] established in 2004 - could immediately translate into production efficiencies throughout the utility, LNG, and industrial sectors. This is but one example of low lying fruit that have yet to be picked in the Australian productivity domain."

The Dutch Disease is a serious threat against nations that have a high dependency on their exportable resource commodities; which explains the apparent relationship between the increase in exploitation of natural resources and a decline in the manufacturing sector. Nations that are victim to low productivity rates, are more vulnerable than others, and it is these nations that must first seek the "low lying fruit" when trying to stimulate efficiencies within their economy. **The answer? IEC 61850!** This is an attractive technology, as it applies across most industries, be it utilities, LNG, metals and mining, desalination plants, etc. With a bit of sponsorship from the government, this cost – saving technology established in 2004 – could immediately translate into production efficiencies throughout the utility, LNG, and industrial sectors. This is but one example of low lying fruit that have yet to be picked in the Australian productivity domain. This is likely true for Canada, Brazil, ...

According to Wikipedia "the **Dutch disease** is a concept that explains the apparent relationship between the increase in exploitation of natural resources and a decline in the manufacturing sector. The mechanism is that an increase in revenues from natural resources (or inflows of foreign aid) will make a given nation's currency stronger compared to that of other nations (manifest in an exchange rate), resulting in the nation's other exports becoming more expensive for other countries to buy, making the manufacturing sector less competitive."

Download the [Document Death To The Dutch Disease: The Century of the Surplus](#) [pdf, 1.2 MB]

Posted by [Karlheinz Schwarz](#) at [1:54 AM](#) [No comments:](#) 

Labels: [Australia](#), [economy](#), [IEC 61850](#), [Power Automation](#), [Power Plants](#), [power systems](#)

Wednesday, February 29, 2012

New Release of NIST Framework and Roadmap for Smart Grid Interoperability Standards

DoE (U.S. Department of Commerce) and NIST (National Institute of Standards and Technology) have published an updated roadmap for the Smart Grids (Release 2.0) the other day.

The general direction and objectives of the framework and roadmap described in the first release have been approved by release 2. Several topics of Release 1.0 have been improved and extended. IEC 61850 (and other IEC TC 57 standards like 60870-6 TASE.2/ICCP, IEC 61968/70 CIM, and IEC 62351 Security) are still understood as key standards for Smart Grids.


New aspects covered:

- Developments related to ensuring **cybersecurity** for the Smart Grid, including a **Risk Management Framework** to provide guidance on security practices;
- A new framework for **testing the conformity of devices and systems** to be connected to the Smart Grid—the Interoperability Process Reference Manual; and
- An overview of future areas of work, e.g., **electromagnetic disturbance and interference**.

You can read between the lines that the people in charge for smart(er) grids have understood that the implementation of new devices and systems is more a **marathon than a sprint**. Take a look at the process of standardization of IEC 61850 which started in 1995, released first complete set mainly in 2004-2005, and extended the standard since then. It took many years before the market saw a bunch of vendors and users that implemented the standard (2007 - 2010). But: The pace in implementing and using the standard has increased steadily all over since 2010 – 15 years after IEC 61850 standardization work started, some 20 years after UCA 2.0 was initiated, and 25 years after the MAP project started.

Don't worry if you see a lot of legacy stuff still running and commissioned. Keep in mind: **Haste makes waste**. Take your time.

Download the [NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 2.0](#) [pdf, 7.5 MB]

Posted by [Karlheinz Schwarz](#) at [11:04 PM](#) [No comments:](#) 

Labels: [CIM](#), [IEC 61400-25](#), [IEC 61850](#), [NIST Roadmap](#), [security](#), [Smart Grid](#), [smart people](#)

Saturday, February 25, 2012

Easy, Affordable and Fast Integration of IEC 61850 in Small Devices

High financial and time expenditures for the implementation of IEC 61850 in control systems and other devices prevented so far a broad market penetration of the standard in the lower voltage levels and in distributed power generation. A reasonable and cost effective solution is now available with the Beck IPC@CHIP. The development of IEC 61850 conformant interfaces in power delivery systems – particularly renewable and decentralized power producers and consumers – can now be realized within very short time to market.

The stack and API used on many platforms has been developed by SystemCorp (Bentley, Western Australia), e.g., on the Beck IPC Chip.

A new paper has been written about the benefits of using ready-to-go solutions. The paper discusses embedded controller with IEC 61850 stack and API, DLL and other libraries with IEC 61850 stack and API, ... You will find also a brief discussion of the information models for PV inverters (IEC 61850-90-7).

Download the [discussion about benefits using ready-to-go solutions with IEC 61850 and PV Inverter models](#) [pdf, 2.3 MB, 18 pages]

Posted by [Karlheinz Schwarz](#) at 12:29 PM No comments: 

Labels: [API](#), [applications](#), [Beck](#), [Beck Chip](#), [embedded system](#), [Evaluation](#), [IEC 61400-25](#), [IEC 61850](#), [SystemCorp](#)

Video on the Use of IEC 61850-6 SCL to configure a server and a client

This presentation explains the use of two IED specific SCL files to configure IEDs. One is used to **configure a server** and the second **(with the same model - but different bindings between the model and the real data)** is used to **configure a client**. The API "Write call " at the client and the "Write callback" at the server are briefly explained. The API is provided by SystemCorp (Bentley, Western Australia). The API is available at the Beck IPC Chip and other embedded controllers, or for Windows (DLL) and Linux.

Click [HERE](#) for an evaluation kit running on a PC (with DLL and applications). The evaluation package runs for six months. It uses two SCL files for configuring the server and the client (as shown in the video).

I hope you will enjoy this video!
Your feedback to [Karlheinz Schwarz](#) would be appreciated.

Posted by [Karlheinz Schwarz](#) at 5:46 AM No comments: 

Labels: [configuration](#), [IEC 61850-6](#), [IED configuration](#), [SCL](#), [system configuration](#), [Training](#), [video](#)

Friday, February 24, 2012

Video with brief Introduction to IEC 61850 and IEC 61400-25

IEC 61850 and IEC 61400-25 comprise some 25 documents. Part IEC 61850-7-1 contains some basic modeling concepts that may help to get a few ideas what IEC 61850 is about. I guess that just a few people have read that part. In my training courses with almost 3.000 attendees I have gained a lot of experience on how to explain the basic concepts. In 2011 I have conducted more than 30 training sessions (from one to 12 days). Today I am starting a new service to the industry: providing videos that explain basics with animated up-to-date slides.

The first video is a brief presentation of the key concepts of IEC 61850 (one slide): modeling methods, models, configuration language, communication, and mappings. The demonstration shows how these concepts are used to compose a system. Of course, this slide is just showing the basics of a "small system". This slide is part of the introduction of my commercial training courses.

Please click on the start button to see the video – in order to see it in the full screen, click again on the video and select the full screen button.

I hope you will enjoy this video!
Your feedback to [Karlheinz Schwarz](#) would be appreciated.

Posted by [Karlheinz Schwarz](#) at 5:44 AM No comments: 

Labels: [Ethernet](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [MMS](#), [models](#), [SCADA](#), [SCL](#), [SMV](#), [TCP/IP](#), [video](#)

Thursday, February 23, 2012

Siemens Industry offers PRP Ethernet Redundancy Products

Ethernet is obviously to become the number ONE solution for almost all automation domains – just a few experts expected this success some 20 years ago. Even one of the serious supporters of Fieldbusses (Siemens) is supporting this trend by offering new Ethernet products.


High Availability Seamless Redundancy (HSR) and Parallel Redundancy Protocol (PRP) are the latest additions to the IEC 62439 Standard for High Availability Industrial Ethernet Networks. Designed for mission critical and time sensitive applications such as those found in Electric Utility protection and control applications (referenced by IEC 61850-8-1). Below is an excerpt of the TCP/IP Profile (PRP1 and HSR are also contained in the GOOSE and SV profiles):

OSI Model Layer	Specification			m/o
	Name	Service specification	Protocol specification	
Communication	Requirement for internet host	RFC 1122		m
Transport	ISO Transport on top of TCP	RFC 1006		m
	Internet Control Message Protocol (ICMP)	RFC 792		m
	Transmission Control Protocol (TCP)	RFC 793		m
Network	Internet Protocol	RFC 791		m
	An Ethernet Address Resolution Protocol (ARP)	RFC 826		m
Link Redundancy	Parallel Redundancy Protocol and High Availability Seamless Ring	IEC 62439-3 – PRP1 or HSR		o
	Rapid Spanning Tree Protocol (RSTP)	IEEE 802.1D		o

Siemens offers IEC 62439-3 PRP compliant Ethernet products (SCALANCE X204RNA).

Click [HERE](#) for information on SCALANCE X204RNA in English
Click [HERE](#) for information on SCALANCE X204RNA in German
Click [HERE](#) for Manuals and further information

Click [HERE](#) for further information on the concepts [ppt presentation]
Click [HERE](#) for other IEC 62439 products [Hirschmann]

Posted by [Karlheinz Schwarz](#) at 4:56 AM No comments: 

Labels: [Ethernet](#), [Ethernet switches](#), [IEC 61850](#), [IEC 61850-8-1](#), [redundancy](#)

Thursday, February 16, 2012

Excerpt of IEC 61850 etz Report online

A excerpt of the etz Report 34 (in German only) is available online:




2004 / 184 Seiten

Themen: IEC 61850 - Datenmodelle und Kommunikation für die Schutztechnik, Stationsleittechnik, Netzleittechnik, Leitsysteme, Schaltanlage, Energieversorgung, u.v.a.m.

Click [HERE](#) for an excerpt of the book.

Click [HERE](#) for order information.

Posted by [Karlheinz Schwarz](#) at [5:00 AM](#) [No comments:](#) 

Labels: [etz Report](#), [IEC 61850](#), [Stationslettechnik](#)

Tuesday, February 14, 2012

Update on: How to define New Data Objects in IEC 61850?

The post dated January 15, 2012, on "How to define New Data Objects in IEC 61850?" has been updated and enhanced to help you to understand the model extensions. It contains also to older links ...

Click [HERE](#) for the updated post.

Posted by [Karlheinz Schwarz](#) at [1:58 AM](#) [No comments:](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [model extensions](#)


Monday, February 13, 2012

Download IEC 61850 Blog Content as PDF Document

For those readers of the blog that want to get the complete content as a single pdf document, it is one click away ... it contains the 585 posts from 2008 until 2012-02-13.

Click [HERE](#) to download all posts in one pdf [12.5 MB, 420+ pages DIN A4]

Enjoy!

Posted by [Karlheinz Schwarz](#) at [9:37 AM](#) [No comments:](#) 



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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Monday, February 13, 2012

Smart Grid Last Mile Infrastructure

20 experts from 15 companies have drafted an architecture for "A Standardized and Flexible IPv6 Architecture for Field Area Networks".

The "paper is intended to provide a synthetic and holistic view of open standards Internet Protocol version 6 (IPv6) based architecture for Smart Grid Last Mile Infrastructures in support of a number of advanced Smart Grid applications (meter readout, demand-response, telemetry, and grid monitoring and automation) and its benefit as a true Multi-Services platform. ... provide an efficient, flexible, secure, and multi-service network based on open standards."

IEC TC 57 standards like CIM, IEC 61850, and IEC 610870, as well as DNP3, IEEE 1888, and Modbus are understood as crucial application standards.

Click [HERE](#) for the above architecture.

What is **IEEE 1888**? A new IEEE project ...

Standard for Ubiquitous Green Community Control Network Protocol

Click [HERE](#) for some background information

Click [HERE](#) for the PAR

Click [HERE](#) to visit the project website.

I hope that the experts involved in the project IEEE 1888 will rely on standards like CIM, IEC 61850, and IEC 610870, ... Hope that the energy automation market is smarter than the industrial automation market: keeping the number of protocol solutions very low!! The industrial automation domain has a lot of headaches with the proliferation of the many many protocols (100+)!!

Posted by [Karlheinz Schwarz](#) at 7:31 AM 0 comments

Labels: [CIM](#), [Cisco](#), [communication](#), [fieldbus](#), [IEC 60870-6](#), [IEC 61850](#), [Smart Grid](#), [smart metering](#), [utilities](#)

Saturday, February 11, 2012

IEC 61850 on every Pole?

Pole mounted power distribution equipment and communication could be found all over in big cities like the one shown in the following picture I took in Seoul:

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[Power Quality Information modeled in IEC 61850](#)

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► [2009](#) (162)

► [2008](#) (82)

Contributors

[Michael Schwarz](#)


[Karlheinz Schwarz](#)

In the future you may see many pole mounted boxes that function as routers supporting the hybrid grids (power, gas, heat, ...), traffic control, ... and may other applications.

Several companies are offering the needed communication infrastructure that connects many of the millions of devices.

One of these comprehensive solutions is the "**Cisco Connected Grid** – Deliver More Value from Your Operations Over a Single, Intelligent, Secure Platform". A key element in this platform is IEC 61850.

Click [HERE](#) for a presentation on "Cisco Connected Grid" [pdf, 25 pages]

Posted by [Karlheinz Schwarz](#) at [12:15 AM](#) [1 comments](#) 

Labels: [CIM](#), [Cisco](#), [IEC 61850](#), [power distribution](#), [power systems](#), [routers](#)

Friday, February 10, 2012

Ethernet for Real-Time Applications – IEEE Symposium in Munich

On January 17, 2012 TÜV SÜD (Munich, Germany) held a symposium on real-time Ethernet. Ethernet is not fit for real-time – that is what has been said from the very beginning. But: time and technology has changed. "Deterministic Ethernet & Unified Networking - **Never bet against Ethernet** ...", this is the opening statement of one of the 11 presentations of the symposium. Ethernet seems to be THE backbone of all automation systems in the near future.

The 11 presentations can be downloaded:

1. [Opening by TÜV SÜD](#)
2. [IEEE 802.1 AVB standards status](#) (audio video bridging, Broadcom)
3. [Real-time networks and preemption](#) (Cisco)
4. [Latency Scenarios of Bridged Networks](#) (Deggendorf University)
5. [Real-time Ethernet Requirements](#) for Automation Applications (iniT)
6. [Ultra Low Latency Traffic Class](#) @ Industry (Siemens)
7. [Adaptive Scheduling](#) of Streams in RT (Czech TU Prague)
8. [AVB and Fault Tolerant Networking](#) (Belden/Hirschmann) – **Ethernet everywhere!**
9. [Robustness Requirement in Industry and Energy](#) (ZHAW, CH)

10. [Deterministic Ethernet & Unified Networking](#) (TTTech)
11. [IEEE 1588v2 Time Synchronization in Energy Automation Applications](#) – Case Studies from China (RuggedCom) – **Huge substation with more than 160 Ethernet Switches!**

When I was about to do my diploma thesis at Siemens in Karlsruhe in 1981, my topic was to do some practical analysis of Ethernet. Due to the high cost of two (2) Ethernet MAUs (40.000 DM / 20.000 Euro) it was decided not to purchase the hardware – people did not believe that Ethernet would be an option at all ... and forever. Many experts believed in Token Passing.

I did not agree (I was still a student). So, I decided to look for an answer of making shared Ethernet deterministic ... [it ended up in a patent Siemens got](#).

More to come ... in China and all over. Ethernet and IEC 61850 (based on Ethernet) are providing real standard solutions.

Posted by [Karlheinz Schwarz](#) at [11:09 PM](#) [0 comments](#) 

Labels: [Ethernet](#), [Ethernet switches](#), [IEC 61850](#), [IEEE 1588](#), [IEEE 802](#), [real-time](#)

Thursday, February 9, 2012

IEC 60870-6 TASE.2 (ICCP) - New Editions

IEC TC 57 has published three Committee Drafts (CD) that are intended to provide new editions of the popular standards for control center to control center communication.

IEC 60870 defines a mechanism for exchanging time-critical data between control centres. It defines a standardized method of using the ISO 9506 Manufacturing Message Specification (MMS) services to implement the exchange of data.

Closing date for comments: 2012-05-04

57/1213/CD

IEC 60870-6-503 Ed.3: Telecontrol equipment and systems - Part 6-503: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - **TASE.2 Services and protocol**


57/1214/CD

IEC 60870-6-702 Ed.2: Telecontrol equipment and systems - Part 6-702: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - **Functional profile for providing the TASE.2 application service in end systems**

57/1215/CD

IEC 60870-6-802 Ed.3: Telecontrol equipment and systems - Part 6-802: Telecontrol protocols compatible with ISO standards and ITU-T recommendations - **TASE.2 Object models**

[Contact your National Committee](#) for a copy.

Posted by [Karlheinz Schwarz](#) at [11:50 PM](#) [0 comments](#) 

Labels: [IEC 60870-6](#), [iso 9506](#), [MMS](#), [TASE.2](#), [TASE.2 ICCP](#)

Load-Shedding by Police and SMS

The German TV channel ZDF showed yesterday how businesses in Nice

(France) shed loads: by policeman coming by ... and by SMS messages.

Click [HERE](#) for a video [in German only, at ZDF.de]

Posted by [Karlheinz Schwarz](#) at [11:30 PM](#) [0 comments](#) 

Labels: [load shedding](#), [power outage](#), [power systems](#)

Tuesday, February 7, 2012

Italian Norm about to Require IEC 61850 for almost all PV Inverters

The CEI (Comitato Elettrotecnico Italiano) has published in December 2011 a norm that strongly proposes to use IEC 61850 to connect PV inverters (>1kV and >6 kW) to external systems (grid operator, ...):

CEI 0-21 "Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti BT delle imprese distributrici di energia elettrica".

"Reference technical rules for the connection of active and passive users to the LV electrical Utilities"

Click [HERE](#) for the press release and link to the norm provided by CEI [pdf, Italian].

Click [HERE](#) for a up-to-date presentation presenting the background and needs for ... and for standard communications in low voltage (LV) power systems.

The document IEC 61850-90-7 "IEC 61850 object models for inverters in distributed energy resources (DER) systems" is about to published in a few months. This document is a perfect fit for the needs of PV inverters.

IEC TC 57 WG 17 has met in San Diego (CA) last week. The final draft paper is expected to be available in a few weeks.

Posted by [Karlheinz Schwarz](#) at [11:11 AM](#) [0 comments](#) 

Labels: [DER](#), [distribution automation](#), [IEC 61850](#), [IEC 61850-90-7](#), [inverters](#), [photo voltaic](#), [PV](#)

IEC 61850 Training Courses in Frankfurt and Denver (CO)

Are you looking to tap the experience of training almost 3.000 experts all over? Here are a few public events in Germany and U.S. that provide a wide range of experience and knowledge presented by Karlheinz Schwarz.


Understanding the basics of standard series IEC 61850 and IEC 61400-25 will help you to get smoothly to systems that are based on interoperable devices.

[Frankfurt \(Germany\), 09.-11. May 2012](#)
[Frankfurt \(Germany\), 17.-19. October 2012](#)

3 day IEC 61850/61400-25 Seminar/Hands-on Training (NettedAutomation) with with several embedded Controller Development Kits (Linux, RTOS, ...), Starter Kit (Windows DDL), and several other demo software

[Denver, CO, \(USA\), Remote Conference, 18.-19. September 2012](#)

2 day Seminar (NettedAutomation) on Power System Communication covering IEC 61850, IEC 61400-25, DNP3, NIST Interoperability Roadmap, Smart Grids, ...

Posted by [Karlheinz Schwarz](#) at [10:51 AM](#) [0 comments](#) 

Labels: [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [stack](#), [starter kit](#), [Training](#)

Monday, February 6, 2012

Modeling Circuit Breakers for Single and Three Phases

Models for switchgear are defined in IEC 61850-7-4 Edition 2. The model defines several aspects like controlling and monitoring of real circuit breaker switchgear:

XCBR excerpt of model:

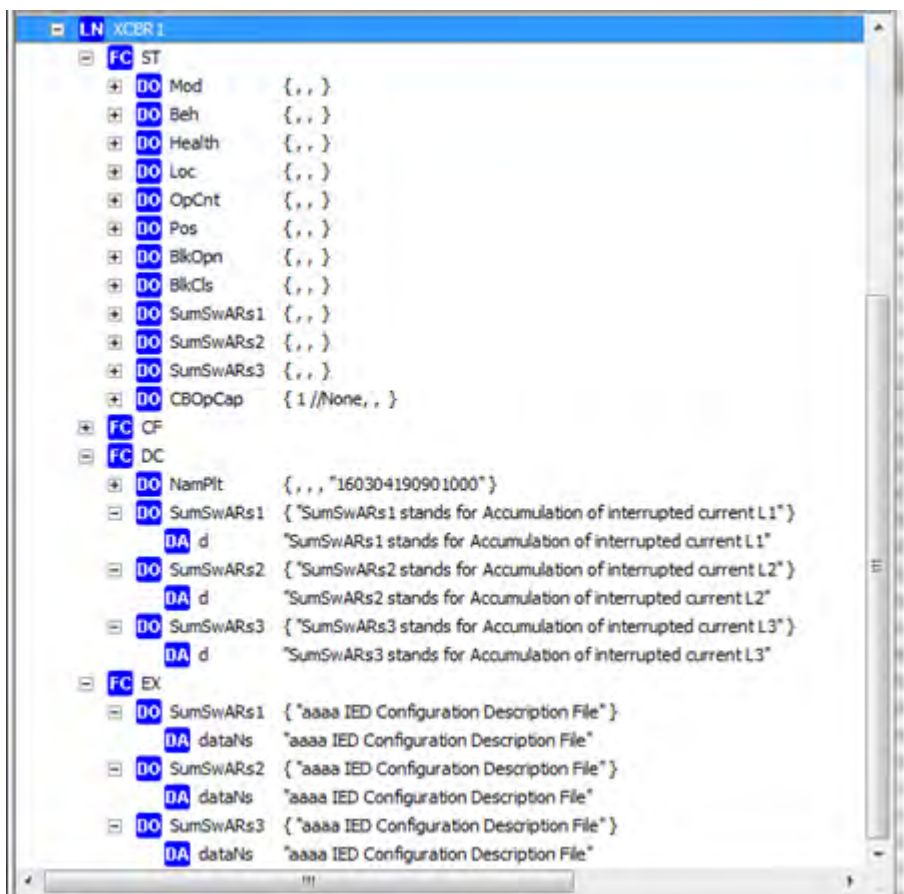
Status information		
EEHealth	ENS	External equipment health
LocKey	SPS	Local or remote key (local means without substation automation communication, hardwired direct control)
Loc	SPS	Local control behaviour
OpCnt	INS	Operation counter
CBOPCap	ENS	Circuit breaker operating capability
POWCap	ENS	Point on wave switching capability
MaxOpCap	INS	Circuit breaker operating capability when fully charged
Dsc	SPS	Discrepancy
Measured and metered values		
SumSwARs	BCR	Sum of switched amperes, resettable
Controls		
LocSta	SPC	Switching authority at station level
Pos	DPC	Switch position
BlkOpn	SPC	Block opening
BlkCls	SPC	Block closing
ChaMotEna	SPC	Charger motor enabled
Settings		
CBTms	ING	Closing time of breaker

XCBR represents usually one (1 phase) circuit breaker. In some special cases it may represent all three (3 phase) circuit breaker. If you want to trip all three CBs of a 3-phase system, you have to define an instance 1 for that purpose: e.g., All_XCBR1.

In case you want to model the case to trip a single phase CB, you have to model 3 instances of XCBR, e.g., A_XCBR1, B_XCBR2, C-XCBR3.

The data object XCBR.SumSwARs represents the "Sum of switched amperes, resettable". What to do when you want to model the SumSwARs of all three phases?

I saw this model the other day: extended data objects:SumSwARs1, SumSwARs2, SumSwARs3 ... for Phase A, B, and C in a single XCBR instance:



From a general modeling point of view this could be done (it is not wrong!) – **But it is highly recommended not to do!** Since a XCBR is usually representing a single CB then we need 1 instance per phase. A_XCBR1 would represent the sum of switched amperes of Phase A. The All-XCBR1 (see above) could represent the sum of switched amperes of all 3 CBs.

Posted by [Karlheinz Schwarz](#) at 3:01 AM 2 comments

Labels: [circuit breaker XCBR](#), [IEC 61850](#), [model extensions](#), [models](#)

Long-Term Solutions for The Transition of Energy System Needed

Energy supply systems have a long lifetime (30 ... 40 ... 50+ years). Electric energy is flowing through generators, wires, transformer, switchgears, motors, and other loads; gas and heat is flowing through tubes ... The energy is usually flowing top-down today. In the future we will have to manage energy flow top-down, bottom-up, back and forth, converted between ...

The transition of the energy system as planned today, will take decades to happen. According to Eberhard Umbach, the president of the KIT (Karlsruher Institut für Technologie) it would be a great success, if we could get started within the next 10 years ([Read in the News \[German\]](#)).

“Der Präsident des Karlsruher Instituts für Technologie (KIT) hat Zweifel am Gelingen der Energiewende und dem Ausbau der Windenergie im Südwesten. “Das größte Problem ist, dass wir künftig dezentrale Netze brauchen, die separat geregelt werden und miteinander verknüpft sind”, sagte Eberhard Umbach der “Frankfurter Allgemeinen Zeitung” (Montag).

*Ein Aspekt werde von den Politikern derzeit weitgehend ignoriert, sagte Umbach: "Zur Steuerung der dezentralen Netze fehlt uns heute die entsprechende Informationstechnologie einschließlich entsprechender Sicherheitsmaßnahmen, da reicht es nicht, ein paar neue Programme zu schreiben." **Wenn innerhalb der nächsten zehn Jahre erste Schritte gelängen, so Umbach, dann "wären wir sehr gut".***


That means for the information and information exchange infrastructure that it has to stay (standardized one way or the other) for some 30 ... 50 years. It is unlikely to replace a comprehensive infrastructure, that is required for the future hybrid energy system, every 10 years or so. In the manufacturing domain (car production, ...) it is likely that a factory will be upgraded to a new "standard" every 7 to 10 years.

So, we have some years left to do large scale deployments of the basic information and information exchange infrastructure for the hybrid energy system of the future.

The basic definitions that can be used today, in 10 or even in 30 years are the IEC 61968/70 (CIM) and IEC 61850. The crucial parts of these standard series are independent of implementation technologies: models of a generators, measurements of the electrical 3-phase system or power quality information are semantic models that could be used forever. A "phase A current" is a "phase A current" today and in 40 years.

There is one issue here: How could I figure out which models exist? Good question!

Click [HERE](#) for the list of 280+ Logical nodes (2010).

Posted by [Karlheinz Schwarz](#) at [12:14 AM](#) [0 comments](#) 

Labels: [CIM](#), [energy supply](#), [IEC 61850](#), [long-term solution](#)

Friday, February 3, 2012

Wind and Solar Gas – A Challenging Storage Option

As you know, there is a crucial challenge with renewable power generation – wind and solar power are often generated during times when it could not be transported to the load centers! Usually generation has to stop – even the wind is blowing and the sun is shining. So, how to work around?

In November 2011 there was a big conference in Berlin to discuss a new way of storing energy: the existing **natural gas network** may become a cornerstone for a renewable energy system that provides huge storage, transport and distribution capacities that are hundred times larger than the electric power grid.

Electrons and gas? Yes!

The **"SolarFuel" power-to-gas method could convert renewable electricity into CO2 neutral, renewable natural gas.**

What does it all mean:

- More renewable electricity could be generated.
- Renewable natural gas stores the energy for days, weeks and months due to huge capacities in the tubes used for transportation and distribution
- Energy is accessible everywhere and at any time.

I remember that our gas utility here in Karlsruhe buried huge tubes

(some 100 cm in diameter) in the 90s – this allows to transport and store more gas (volume increases to the second of the diameter). Copper wires can transport more electric power with bigger cables – but the wires do not store more electric power ;-)

The gas storage in Germany could (if full) be tapped for some 6 month!!

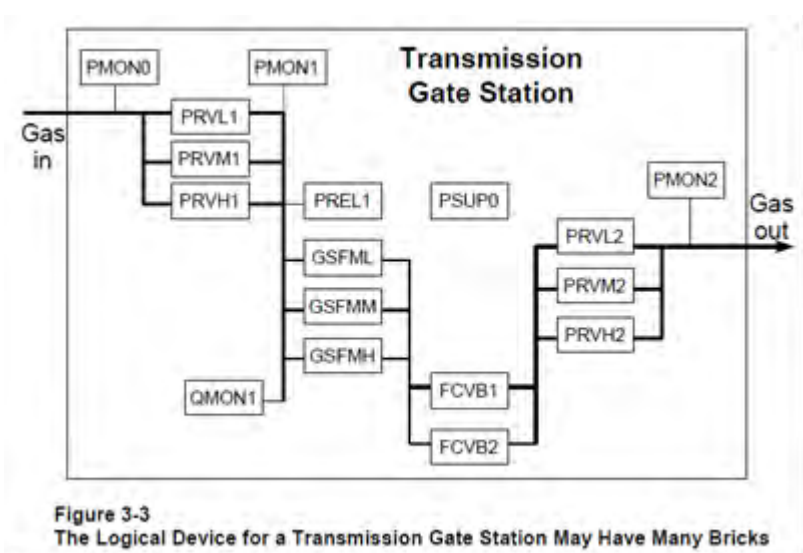
The new discussion is about **Hybrid Grids: Electric Power, Gas and Heat**. More to come soon.

One thing is for sure: **We will be challenged by a steep growing demand of Information Models to be added to IEC 61850 for the many aspects of hybrid grids**. UCA (the forerunner of IEC 61850) was adapted by the GRI (Gas research institute, USA) for use by gas utilities. This effort culminated in an evaluation of UCA in a gas utility environment at Pacific Gas and Electric Company, San Francisco, in the 90s.

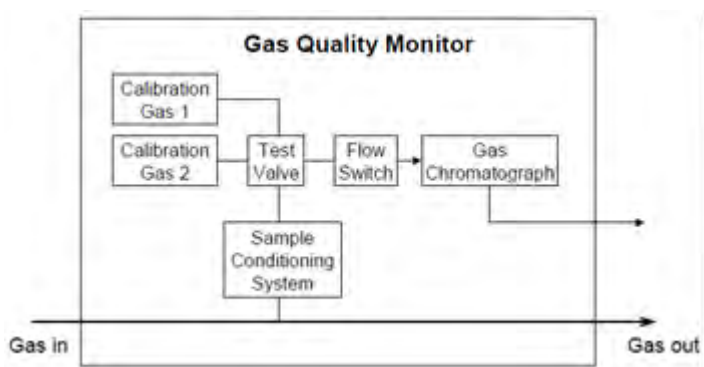
Excerpt of logical nodes (called Bricks in UCA) from the document: Integrated UCA(TM) for Gas Industry / Volume 2: Gas Industry Device Object Models.

Integrated UCA™ For Gas Industry

Volume 2: Gas Industry Device Object Models




- Pressure monitors for inlet, intermediate and outlet gas (PMON0, 1, 2 respectively)
- First stage pressure regulating valves (PRVL0, PRVM0 and PRVH0 for low, mid and high range valves respectively)
- Gate station flow monitors for low, medium and high flow rates (GSFL0, GSFM0, and GSFH0 respectively)
- **Gas quality monitor (QMON0):**



Click [HERE](#) for the list of 6 **reports from GTI** (former GRI) [2000]
Click [HERE](#) to get some more information on **wind and solar gas**.
Click [HERE](#) for a comparison of IEC 61850 and UCA [2004].

IEC 61850 logical nodes for the gas and heat application domain could easily be defined and (if needed) standardized.

Posted by [Karlheinz Schwarz](#) at [9:13 AM](#) [0 comments](#) 

Labels: [energy storage](#), [gas](#), [IEC 61850](#), [solar gas](#), [storage](#), [UCA](#), [wind gas](#)

Thursday, February 2, 2012

IEEE Standards for free download

Did you know that many IEEE 802 and other standards are available for free of charge download? IEEE provides these documents for free six months after their publication.

Click [HERE](#) for the list of free standards.

Posted by [Karlheinz Schwarz](#) at [7:57 AM](#) [0 comments](#) 

Labels: [download](#), [Ethernet](#), [IEEE](#), [IEEE 802](#), [standards](#)

Wednesday, February 1, 2012

U.S. System Integrator opened Test Facility for IEC 61850

Burns & McDonnell (Kansas City, MO) has invested in a new lab for technologies like IEC 61850 to offer a "work bench" for their employees and their clients. The lab supports GOOSE, MMS, and Sampled Values messaging.

The lab helps "tying IEC-61850 to the power line carrier and integrating advanced protection and control systems with legacy equipment using RS-232 and DNP interfaces."

This way they will gain crucial experience with the new standard series IEC 61850 –this is what you see in the factory automation domain where a lot of "fieldbus X" **competence centers** are offering services for specific fieldbus technologies.

Click [HERE](#) for the press release (2012-01-27).

Burns & McDonnell is involved in an upgrade project with 19 substations using IEC 61850 technology, 2010 – 2016:

*"Burns & McDonnell is responsible for detailed design including Northeast Utilities' new **Next Generation Substation Protection & Controls**. The new P&C system integrates **relays, SCADA equipment and yard equipment using IEC 61850 protocol, significantly reducing costly wiring.**"*

Click [HERE](#) for the project description.

Posted by [Karlheinz Schwarz](#) at [10:55 PM](#) [0 comments](#) 

Labels: [DNP3](#), [IEC 61850](#), [interoperability](#), [protection](#), [SCADA](#), [testing](#)

Power Quality Information modeled in IEC 61850

IEC 61850 is a powerful standard – also for describing the exchange of Power Quality Information.


IEC 61850 has been extended to support many advanced power quality applications like those defined in IEC 61000-4-30 and EN 50160. IEC 61850-7-4 Edition 2 defines logical nodes, that support modeling and configuring event sequencing with additional quality reporting and waveform recording.

Excerpt of logical nodes for power quality:

- Harmonics (MHAI)
- Flicker (MFLK)
- Imbalanced power calculations (MADV)
- Frequency variation (QFVR)
- Current transient (QITR)
- Current unbalance variation (QUIB)
- Voltage transient (QVTR)
- Voltage unbalance variation (QVUB) and
- Voltage variation (QVVR).

Click [HERE](#) for a nice summary published by Schneider Electric.

Click [HERE](#) for a draft list of Logical Nodes for Power Quality (this content was used as input to the development of IEC 61850-5 Edition 2 and IEC 61850-7-4 Edition 2).

Posted by [Karlheinz Schwarz](#) at [3:50 AM](#) [0 comments](#) 

Labels: [EN 50160](#), [IEC 61000-4-30](#), [IEC 61850](#), [IEC 61850-7-4 Ed2](#), [power quality](#), [power systems](#), [Schneider Electric](#)

Tuesday, January 31, 2012

FINSENY – European Consortium of 35 Organizations supports IEC 61850 and IEC 61400-25

Have you heard about **FINSENY** before? I didn't know about these activities. What is it? Another European project – yes, but one that seems to build on existing standards like IEC 61850, IEC 61968/70, IEC 61400-25, IEC 62351, ... IEC 60870-5.

FINSENY – Future Internet for Smart Energy (2011 – 2015)

FINSENY project: **35 organizations** from the ICT and energy sectors team-up to identify the ICT requirements of Smart Energy Systems. This will lead to the **definition of new solutions and standards, verified in a large scale pan-European Smart Energy trial** ... As part of the FI-PPP programme, FINSENY will analyse energy-specific requirements, **develop solutions** to address these requirements, and prepare for a **Smart Energy trial** in phase two of the programme.

Click [HERE](#) for the list of the 35 organizations.

Fortunately the work done so far refers to IEC TC 57 and TC 88 standards!

*“ ... **existing standards** which are worldwide considered and recognized like the IEC TC57 standards for **Communication networks and systems for power utility automation (IEC 61850)** and System interfaces for distribution management (IEC 61968) will be taken into account when defining the architecture, data models and communication relationships as well as existing telecommunication standards supporting the Future ... ”*

Click [HERE](#) for a statement on standards.

A first list of consolidated ICT Requirements recommends: *"To ensure interoperability the communication should rely on well-known and frequently used standards like IEC 61850, IEC 61968/61970 (CIM), or IEC 60870-5-101/104 (Telecontrol) and others. Also to be respected are specialized communication standards like - IEC 61400-25-4 for wind turbines ..."*

Click [HERE](#) for the requirements document [pdf, 262 pages]

A very detailed description of typical use-cases in **power distribution** has been written: "Distribution Network Building Block": *" ... Advanced ICT solutions that could provide Future Internet and the economies of scale that could be reached are essential for the development of the Smart Distribution Network. This deliverable presents a **Reference Model for the Distributed Network Scenario** and selects and describes a set of building blocks (UC) that should be representative enough for a further analysis of ICT requirements of smart DN solutions."*

Click [HERE](#) for the Distribution Network Building Block [pdf, 98 pages]

I was a bit surprised when I read in that document about the **communication with SCADA** systems:

*"SCADA System **updates real time information** from the RTU by means of **continuous polling**. The RTU is **monitoring continuously** Power Equipment through its Analog and Digital Inputs. When a change occurs in some of the inputs, the RTU takes note of it in order to send it in the next request from the SCADA System **SCADA System requests every 2 seconds** for any change of state or measurements detected in the RTU. When a request of state or measurement change is received, **RTU sends all these changes** to the SCADA System ..."*

Hm, this seems a bit ... ok, smart people will develop smart(er) devices – the IEDs (Intelligent Electronic Devices) – that will help to reduce the sheer unlimited amount of data to be exchanged continuously every 2 seconds. The project expects millions of devices to communicate with. Suppose 100 signals to be exchanged every 2 seconds from 100.000 devices: 5.000.000 signals per second ... IEDs (RTUs, Data Managers, Data Aggregators, Gateways, ...) with IEC 61850 will send information only if it is needed!! – on an event like a state change or limit violation.

Exchanging millions of signals per second means we need a high bandwidth – good for vendors that sell "bandwidth"! That is the question, how can more active power flow through the copper cable? Same may accomplish it the smart way with the reactive power compensation that can be done smart by inverters – smart electricians may solve this by just putting a bigger cable into the ground.

Click [HERE](#) for some discussion of polling versus spontaneous reporting.

The document lists also **Monitoring and Control of Inverter Functions** (Connect / Disconnect to/from grid, Adjust Maximum Generation Level, Adjust Power Factor, ... Scheduled Actions based on time, temperature, power pricing ... VAr modes for VAr support from PV/Storage inverters (Modes PV1...PV5) ... Advanced functions (Watt/Frequency or Watt/Voltage mode, advanced schedules, low voltage fault ride through (FRT), separate Watt and VAr management, harmonic cancellation) ...

The FINSENY papers are worth to read and study.

Posted by [Karlheinz Schwarz](#) at [10:32 PM](#) [0 comments](#) 

Labels: [CIM](#), [distribution](#), [distribution automation](#), [FINSENY](#), [IEC 61400-25](#), [IEC 61850](#), [PV](#), [RTU](#), [Smart Grid](#), [smart people](#), [smart solution](#)

Siemens Industry to take over RuggedCom

The Siemens division Industry (not Energy!) announced yesterday (2012-01-30) that they agreed with RuggedCom to acquire Canadian network supplier RuggedCom Inc. The other day it was reported that Belden was trying to take over RuggedCom.

Click [HERE](#) for the Siemens press release from 2012-01-30.

It is quite interesting to see how long it took to make Ethernet an enjoyable solution:

Excerpt from the press release: "Siemens' portfolio of **industrial Ethernet networking components is enjoying above-average growth rates compared to the competition**. Until now, the main emphasis of Siemens' installed base in this segment has been in Europe. "RuggedCom's portfolio would be an ideal addition to our range of industrial Ethernet communication products, improving our industrial-quality router and switch offering. In addition, the acquisition would improve our footprint in the North America and the Asia-Pacific region," said Anton S. Huber, CEO of the Siemens Industry Automation Division. Huber also indicated that all of **RuggedCom's and Siemens' product lines would be developed further in the next few years.**"

What is meant by "**competition**" in the statement "industrial Ethernet networking components is enjoying above-average growth rates compared to the **competition**"? Is Ethernet competing with the "Profi"- and many other Fieldbusses ... Profibus and ProfiNet ... FF fieldbus ...?

For me this deal indicates that the **native Ethernet** solution as provided by RuggedCom and used in **IEC 61850** is the most "enjoyable" and successful network solution in the next 20 years or so! RuggedCom is (as Belden/Hirschmann) quite active in the IEC 61850 standardization.

When I worked for Siemens Industry in the early 90s, I recommended to use native Ethernet instead of fieldbusses ... now we write 2012 – 20 years later.

Click [HERE](#) for the paper "Bridging MAP to Ethernet" [PDF, 720 KB, 1991]

Click [HERE](#) for the paper "Fieldbus standardization: Another way to go" [PDF, 720 KB, 1991].

Posted by [Karlheinz Schwarz](#) at [12:25 AM](#) [0 comments](#) 

Labels: [Ethernet](#), [Ethernet switches](#), [fieldbus](#), [IEC 61850](#), [Power Automation](#), [power systems](#), [RuggedCom](#), [Siemens](#), [Substation](#), [Substation Automation](#)

Saturday, January 28, 2012

IEC President Wucherer talks about the Electric Future

The new IEC President, Dr Klaus Wucherer talked to the IEC Council recently.

According to the IEC e-tech website (2012-01-28): "*Wucherer underlined that as an engineer and industrialist he has been in contact*

*with the IEC in one way or another throughout most of his working life. He contributed to IEC work through his company and the National Committee and was an industry customer for IEC products and services. ... **Wherever there is electricity, the IEC needs to be involved.**"* I my opinion: IEC is already deeply involved – many experts have to learn this.

Dr Wucherer was my boss at Siemens Automation and Drives when I started my consultancy business 20 years ago – he was in Nuremberg and I was in Karlsruhe. The reason I became a consultant was this: Dr Wucherer asked me three times to move from Karlsruhe to Nuremberg – I decided to stay in Karlsruhe and work in the standardization as a consultant. Dr Wucherer, colleagues of mine and I were deeply involved in the national, European and international standardization of Fieldbuses and MAP. Dr Wucherer supported the standardization work in the 80s and 90s. We agreed that the future would require true international standards for information exchange.

As a Siemens employee under Dr Wucherer I wrote two remarkable papers on the standardization: one about the future of Fieldbuses and one about MAP in 1991:

Click [HERE](#) for the paper "Bridging MAP to Ethernet" [PDF, 720 KB]

Click [HERE](#) for the paper "Fieldbus standardization: Another way to go" [PDF, 720 KB].

I would extend his statement "**Wherever there is electricity, the IEC needs to be involved**" to

Wherever there is electricity, the IEC 61850 needs to be involved!

Click [HERE](#) for some crucial information models for the electricity defined in IEC 61850-7-4 that demonstrate the importance of the above extended statement.

The "electricity world" is likely to prevent the proliferation found in the industrial automation domain's fieldbuses. If the many fieldbus consortia define their fieldbus specific profiles for the electric world then we will get as many information models as fieldbuses! Or?

Click [HERE](#) to see bunch of 60+ fieldbuses in ONE IEC standard in 2008: The IEC 61158.

Posted by [Karlheinz Schwarz](#) at 1:56 AM 1 comments 

Labels: [Automation](#), [Ethernet](#), [fieldbus](#), [IEC](#), [IEC 61158](#), [IEC 61850](#), [MAP](#), [Power Automation](#), [power systems](#), [Siemens](#)

Download IEC 61850 Blog Content as PDF Document

For those readers of the blog that want to get the complete content as a pdf document, you can just get it with one click ... it contains the posts from 2008 until 2012-01-27.

Click [HERE](#) to download all posts in one pdf [12 MB, 410+ pages DIN A4]

Enjoy!

Posted by [Karlheinz Schwarz](#) at 1:05 AM 0 comments 

Labels: [download](#), [IEC 61850](#)

News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Friday, January 27, 2012

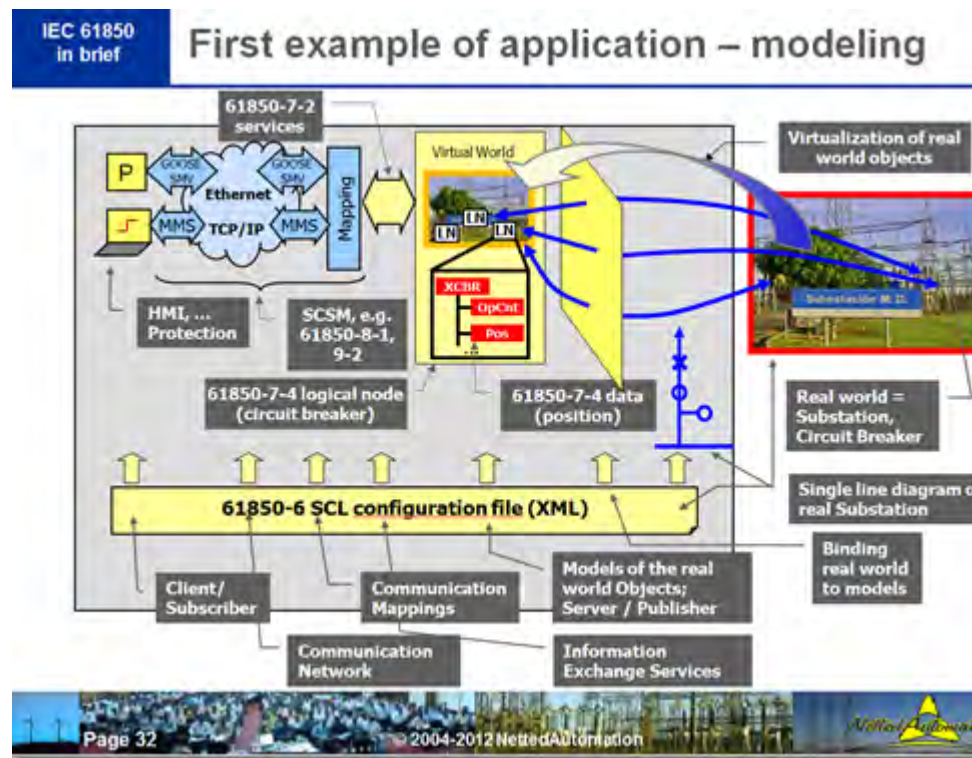
IEC 61850 in the U.S. – A Personal View of IEC 61850

Scott Olson (POWER Engineers) investigated recently to figure out the situation of the application of IEC 61850 in the U.S.: He found IEC 61850 on the radar screen!

In his report (A personal view of IEC 61850) he wrote early January 2012 that IEC 61850 is **"More Than a Protocol"**. Yes – it is much more than a protocol. It is not something like "DNP4" or "IEC 60870-5-105". The standard series IEC 61850 provides a bunch of definitions applicable in many different subsets – there will never be an implementation that implements the whole standard series! **Never ever.**

Some explanation on basic concepts of the standard series IEC 61850 follow (before we have a closer look into Scott Olson's report):

IEC 61850 provides **models of real world information** (status, measurements, and control points, settings, ...) for many different application domains. The following slide shows an example of a model: XCBB – circuit breaker of a real substation.



Another area is the **system configuration language (SCL)** that describes many aspects of devices and the whole system. Third, there is the **communication** shown in the top left corner. The communication defines services. These services are realized by **protocols**. The protocols are comprising TCP/IP based client-server communication and Ethernet based real-time communication (GOOSE and sampled

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[ABB review – Special Report IEC 61850](#)

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► 2011 (159)

systems and devices, how to document requirements and systems, ...

A remaining question is: What is most important to look at or to implement or to apply? It depends. From a device point of view it is absolute important to have the communication services and protocol – and application program interface (API) – implemented. This is required in TWO devices – the server, that provides the models, and the client that reads values or receives spontaneous reports:

IEC 61850
in brief

What is important in using IEC 61850?

In order to exchange first bit

- Information models
- Configuration language
- Abstract Services
- **Communication protocols**
 - TCP/IP based SCADA
[Polling, spontaneous messages
(events, reporting), logging,
control, ...]
 - Real-time (GOOSE)
 - Real-time (SMV)
 - Selfdescription

If focus is on application

- Information models
- Configuration language
- Abstract Services
- Communication protocols
 - TCP/IP based SCADA
[Polling, spontaneous messages
(events, reporting), logging,
control, ...]
 - Real-time (GOOSE)
 - Real-time (SMV)
 - Selfdescription

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From a application point of view it is crucial to look at the models!! ;-)

The models should be discussed independent of ANY protocol!!! Many people have understood that the models, services and protocols of IEC 61850 are all independent of each other – that is one of the crucial benefits! That is the reason why IEC 61400-25-4 (Wind Power application of IEC 61850) defines the mapping of process values (the signal lists) and simple services to DNP3 and IEC 60870-5-101/104. Because the models, services and configuration language are independent of the protocols.

And also note that the use of IEC 61850 is first of all intended for the substation automation and power generation ... finally it may be used (in the long term) in the communication with control centers.

Back to the crucial lessons Mr Olson and others have learnt:

He writes: "We received a great email from one of our readers, who reminded us that there was a difference between a standard and a protocol—the latter being a component of the former—and that it was possible to implement IEC 61850 protocols without going all out to implement the standard.

"For example," our reader offered, "61850 GOOSE messaging may be used between IEDs to eliminate physical wiring and increase speed of interaction between IEDs while continuing to use DNP to communicate upwards to SCADA and higher-level systems where slower communications updates are acceptable.

It was such a great point to make: **The migration to the IEC 61850 standard does not force the absolute replacement of protocols that are already in place.** Solutions can be implemented that allow

parts of 61850 to be added to the network while the legacy protocols continue to be used over the same network. For example, station bus protocol (IEC 61850-8-1) could be used to simplify the interface between IEDs, human-machine interfaces (HMIs), etc. within the substation network while continuing to use DNP interface to SCADA. As process bus (IEC 61850-9-2) devices become readily available, the opportunity to eliminate copper wiring between current transformers (CTs) and IEDs could provide tremendous ..."

The lesson that everybody should learn soon (or should have learnt): IEC 61850 could be implemented in many different subsets for even more simple to complex applications. I hope that at the end of 2012 the universe has understood that the **standard series IEC 61850 is more than just a protocol – it goes far beyond DNP3, IEC 60870-5-101/104, even beyond OPC and OPC UA! It's a system-supporting solution.**

By the way, this blog is visited by many experts from North America. It is likely that Mr Olson's lesson will be read by many U.S. people.

Click [HERE](#) for the full "personal view".

Posted by [Karlheinz Schwarz](#) at [12:13 PM](#) [0 comments](#) 

Labels: [ACSI](#), [control center](#), [DNP3](#), [IEC 61400-25](#), [IEC 61850](#), [Migration](#), [OPC UA](#), [protocol](#), [SCADA](#), [Substation](#), [Substation Automation](#), [USA](#)

How to secure Millions of devices in a Smart(er) Grid?

There are many R&D projects underway to find appropriate ways how to secure millions of devices that need to communicate – all over.

A nice paper discusses this issues in the light of the question: what is a workable solution for a some hundred devices may not scale for millions of devices.

The report concludes: "The cryptographic infrastructure underlying the smart grid the community envisions will likely require PKI, for scalability – **but this is the beginning, not the end, of the solution.**"

The good message we hear more often these days is: The path to **smart(er) Hybrid Grids (power, gas, heat, ...)** will be long and steep. A challenge for a people involved – one way or the other.

Click [HERE](#) for the 3 page paper.

There is some progress in making power system automation more secure. Siemens writes in the *SIPROTEC 5 - System Overview, Protection, Automation and Monitoring · Siemens SIP 5.01 · V1.0 (not yet available for download)*:

- Long-lasting, rugged hardware with outstanding EMC immunity and resistance to weather and mechanical loads
- Sophisticated self-monitoring routines identify and report device malfunctions immediately and reliably
- Conformance with the stringent Cyber Security requirements defined in the BDEW Whitepaper and NERC CIP
- Encryption along the entire communication segment between DIGS I 5 and the device
- Automatic recording of access attempts and security critical operations on the devices and systems

Click [HERE](#) for the DBEW Whitepaper "Requirements for Secure Control

and Telecommunication Systems” [Dual Language: EN/DE]

Click [HERE](#) for further information in German (only).

[Garderos \(Munich, Germany\)](#) offers industrial-grade (ruggedized) routers which are self-managing and **cyber-secure** ... secure against cyber-attacks ... applicable for power grid applications.

Posted by [Karlheinz Schwarz](#) at [8:42 AM](#) [0 comments](#) 

Labels: [CIP](#), [encryption](#), [ruggedized](#), [security](#), [Siemens](#), [SIPROTEC 5](#)

Sunday, January 15, 2012

How to define New Data Objects in IEC 61850?

The need to define new data objects is likely to have various reasons. One reason is that experts do not know which logical nodes and data objects are already defined. Let's assume there is really a need for a new data object – there is not any data object that may fit.

Example (I found on the Web):

The LN SIML (Insulation Medium Supervision) provides the data object **H2ppm** (Measurement of Hydrogen (H2 in parts Per Million)).

How to model related semantic, e.g., “Hydrogen ppm Rate of Change” or “Hydrogen ppm Rate of Change Goodness of Fit”

These two semantic models are **not defined in the standard**. What is the best way to model these two?

1. Defining values in GGIO? – maybe not,
2. Defining new data objects in SIML? – may be the best solution (could be standardized later), or
3. Defining something like H2ppm1 (measured value), H2ppm2 (rate of change”, and H2ppm3 (roc Godness of Fit)? – **That is definitely wrong!**

Why are the following data objects in conflict with the standard modeling method?

I found this definition for LN: SIML Name: Insulation Medium Supervision (Product Specification):

H2ppm1	MV	Yes	Measurement of Hydrogen (H2 in parts Per Million)
H2ppm2	MV	Yes	Hydrogen ppm Rate of Change
H2ppm3	MV	Yes	Hydrogen ppm Rate of Change Goodness of Fit

The standard IEC 61850-7-4 Edition 2 defines the LN as follows:

LN: SIML Name: Insulation Medium Supervision (Standard IEC 61850-7-4 Edition 2):

These data objects are not allowed to instantiate multiple times!

Excerpt of IEC 61850-7-1 Edition 2 that defines the extension rule for data objects:

14.6 Specialisation of data by use of number extensions

Standardised data names in logical nodes provide a unique identification. If the same data (i.e. data with the same semantics) are needed several times as defined, additional data with number extensions shall be used. The rules for number extensions shall follow the naming conventions defined in IEC 61850-7-2 and be as follows:

- *the number extension usage shall only be defined by the **owner of the data namespace**. This shall be done by adding the number extension 1 to a data object name (e.g. data1),*
- ***data with no number extension shall not be extended by third parties,***
- *data with the number extension 1 can be extended. Number extensions may be ordered or not (1,2,3,4, or, 1,2,19,25),*
- *if only one instance of an extendable data is present in an LN, it shall have the number extension "1".*

14.8 Example for new Data

New Data "Colour of Transformer Oil"

Data name	Attribute type (CDC)	Value of ColrTOil.datNs
ColrTOil	INS	myVendor1Extension:2010A

The above figure shows also that a data Namespace Attribute "datNs" has to be specified for each new data object.

For the above semantic it would work with the following (standard conformant) definition:

H2ppm1 (measured value) -> H2ppm
H2ppm2 (rate of change) -> H2ppmRoc datNs=Vendor so and so
H2ppm3 (roc Godness of Fit) -> H2ppmRocGdns datNs=Vendor so and so

Hope that helps ...

Posted by [Karlheinz Schwarz](#) at [1:08 PM](#) [0 comments](#) 

Labels: [data object](#), [Edition 2](#), [extended objects](#), [Extensions](#), [IEC 61850](#), [logical node](#), [namespace](#)

Friday, January 13, 2012

Siemens SIPROTEC 5 – More flexible IEC 61850 System Engineering and IED Configuration

According to the "SIPROTEC 5 - System Overview, Protection, Automation and Monitoring ·Siemens SIP 5.01 · V1.0" the new SIPROTEC 5 line supports several more flexible ways to configure IEC 61850 IEDs and Models.

See page 58: "The name of the logical device (ldName) is freely editable. For example, the standard-conforming name CTRL can be changed to CONTROL. Structural changes can also be made by changing the logical device (LD), so that the interface structure can be flexibly adapted to the user's own requirements. **Rigid manufacturer specifications are a thing of the past.** Prefix and instance of the logical node (LN) can also be edited. ... **Flexible engineering** is the key to bringing the **system view into harmony with the IEC 61850 structure of the device.**"

IEC 61850 seems to have totally influenced the new series. They put a headline over the communication description: "IEC 61850 - Simply Usable ... The internal structure of SIPROTEC 5 devices conforms to IEC 61850."

Compared to the products offered in the past (since 2004 when the first systems with IEC 61850 communication where commissioned) this **increase in flexibility provided by SIPROTEC 5 will be appreciated by system integrators and users.**

Posted by [Karlheinz Schwarz](#) at [10:37 PM](#) [2 comments](#) 

Labels: [Edition 2](#), [IEC 61850](#), [Siemens](#)

Wednesday, January 11, 2012

New Parts in IEC 61850 Tissue Database

The following new parts have been added to the tissue database:

Click [HERE](#) for Part 4 (2011; Edition 2)
Click [HERE](#) for Part 7-1 (2011; Edition 2)
Click [HERE](#) for Part 9-2 (2011; Edition 2)

Posted by [Karlheinz Schwarz](#) at [11:36 PM](#) [0 comments](#) 

Labels: [Edition 2](#), [IEC 61850](#), [IEC 61850-9-2](#), [maintenance](#), [technical issue](#), [tissues](#)

Description of IEC 61850 Application Examples

A couple of application examples using IEC 61850 for substation protection and automation can be found in a 48 page brochure from Siemens (English and German).

The following topics are covered:

- Switchgear Interlocking with IEC 61850-GOOSE
- Reverse Interlocking Using the GOOSE of IEC 61850
- Beneficial Engineering of IEC 61850 Substation Automation Systems
- Innovative Solutions for Substation Control with IEC 61850
- Seamless Migration
- Ethernet Topologies with IEC 61850
- IEC Interoperability, Conformance and Engineering Experiences

IEC Browser – A Powerful Test Tool for IEC 61850

The description is to a large extent vendor-neutral.

Click [HERE](#) for the English version [pdf, 1.4 MB]

Click [HERE](#) for the German version [pdf, 1.4 MB]

Posted by [Karlheinz Schwarz](#) at [11:11 PM](#) [7 comments](#) 

Labels: [example](#), [GOOSE](#), [IEC 61850](#), [Migration](#), [protection](#), [Siemens](#), [Substation Automation](#)

Saturday, January 7, 2012

Path to future Power System – Sprint or Marathon?

Many people have assumed that the conversion of today's power system into a smarter system could be done in a few years – comparable with a **Sprint**.

After eight years of extensive training on IEC 61850 and other power related topics I conducted for more than 2,750 experts, from more than 700 companies and more than 70 countries I have learned that the conversion is more like a **Marathon**!

Many people believe that smart meters would convert the system in a few years to become a Smart Grid. The German Network Regulator has stated that a **roll-out of huge number of smart meters is not required** for the stable network operation. The report states also that the development of a Smart(er) Grid is more like an evolution – not a revolution.

Click [HERE](#) for the Report (pdf, German only)

At the Hanover Fair in April 2010 I took the following photo of a hybrid PEV vehicle and a charging station. The battery was charged with a **regular extension cord** connected to a **conventional outlet** – in the morning before visitors walked around!!



Photo: Karlheinz Schwarz

The car is already a **Sprinter** – but the Plug into the future could be expected after a “**Marathon**” – **it just takes some more time!**

The International Energy Agency (IEA) states in their “Technology Roadmap on Smart Grids” that “The “smartening” of the electricity system is an evolutionary **process, not a one-time event.**”

Click [HERE](#) for the IEA roadmap [pdf, 50 pages].

Click [HERE](#) for a discussion of the results of the stimulus funding of the U.S. government by end of 2011. According to that report “18 million [installed] smart meters only covers 13 percent of the 142 million customers in the U.S., for example, and automating 671 substations leaves another 11,795 more to go, or 95 percent of those remaining in the United States. As befits its title, this **stimulus funding was meant to stimulate a new wave of smart grid investment across U.S.** utilities, not merely to serve as a **one-time jobs-and-spending jolt.**

My students are told all the time: Do not hurray! Take your time. To win in a Marathon you need sustainable training. Only **Smart (i.e., well trained) People** will be able to implement the needed systems to measure, monitor, control, protect, optimize, ... the electrical power system.

Posted by [Karlheinz Schwarz](#) at [8:09 AM](#) [0 comments](#) 

Labels: [education](#), [electric vehicles](#), [electro mobility](#), [IEC 61850](#), [power systems](#), [Smart Grid](#), [smart metering](#), [smart people](#), [smart solution](#), [Training](#)

Friday, January 6, 2012

Belden seeks to acquire networking specialist RuggedCom

Ruggedized network infrastructure compliant to IEC 61850-3 is crucial for the implementation of Smart(er) Grids. RuggedCom – one of the well known brands in the substation domain – is one of the companies that offers network components to build the needed communication infrastructure.

One of RuggedCom competitors, Belden (Hirschmann is a brand of Belden), wants to take RuggedCom over.

Click [HERE](#) for the press news.

This shows that the Power Industry is following the **native Ethernet** solutions. IEC 61850 is based on the native Ethernet solution in contrast to the industrial automation domain where a lot of even standardized solutions like EtherCat, ProfiNet, PowerLink, ... compete with each other Ethernet-based and traditional Fieldbuses, e.g., Profibus, CAN, Interbus, ...

The Electric Power System has a highly standardized process: the 3 phase A.C. system (50 or 60 Hz). This single process requires a single communication solution: IEC 61850 based on native Ethernet.

Posted by [Karlheinz Schwarz](#) at [11:34 PM](#) [0 comments](#) 

Labels: [Belden](#), [Ethernet](#), [Ethernet switches](#), [hirschmann](#), [IEC 61850-3](#), [RuggedCom](#)

Thursday, January 5, 2012

Status of the parts of the IEC 61850 series, January 2012

The standard series comprises 18 officially published parts; another 12 are in preparation. Most published parts are Standards; some are Technical Reports (TR) and Technical Specifications (TS):

1	IEC/TR 61850-1	Part 1: Introduction and overview
2	IEC/TS 61850-2	Part 2: Glossary
3	IEC 61850-3	Part 3: General requirements
4	IEC 61850-4	Part 4: System and project management
5	IEC 61850-5	Part 5: Communication requirements for functions and device models
6	IEC 61850-6	Part 6: Configuration description language for communication in electrical substations related to IEDs
7	IEC 61850-7-1	Part 7-1: Basic communication structure - Principles and models
8	IEC 61850-7-2	Part 7-2: Basic information and communication structure - Abstract communication service interface (ACSI)
9	IEC 61850-7-3	Part 7-3: Basic communication structure - Common data classes
10	IEC 61850-7-4	Part 7-4: Basic communication structure - Compatible logical node classes and data object classes
11	IEC 61850-7-410	Part 7-410: Hydroelectric power plants - Communication for monitoring and control
12	IEC 61850-7-420	Part 7-420: Basic communication structure - Distributed energy resources logical nodes
13	IEC 61850-8-1	Part 8-1: Specific communication service mapping (SCSM) - Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3
14	IEC 61850-9-1	Part 9-1: Specific Communication Service Mapping (SCSM) - Sampled values over serial unidirectional multidrop point to point link
15	IEC 61850-9-2	Part 9-2: Specific communication service mapping (SCSM) - Sampled values over ISO/IEC 8802-3
16	IEC 61850-10	Part 10: Conformance testing
17	IEC/TS 61850-80-1	Part 80-1: Guideline to exchanging information from a CDC-based data model using IEC 60870-5-101 or IEC 60870-5-104
18	IEC/TR 61850-90-1	Part 90-1: Use of IEC 61850 for the communication between substations

Another 12 Parts are under development. Some of these are almost ready for publication in 2012.

Several of the above listed documents have the tag "Edition 2", some have still the tag "Edition 1" and are in the maintenance process.

A complete list comprises all 30 parts: Title, publication, stability date, ... see excerpt in the table below (the complete table can be downloaded – see below):

Published Documents: Communication networks and systems for power

Part	Current Title	Edition	Stability Date	2002	2
1	IEC/TR 61850-1	Part 1: Introduction and overview	1.0 (2003-04-28)	2012	
2	IEC/TS 61850-2	Part 2: Glossary	1.0 (2003-08-07)	2012	
3	IEC 61850-3	Part 3: General requirements	1.0 (2002-01-16)	2012	
4	IEC 61850-4	Part 4: System and project management	1.0 (2002-01)	2004	
			2.0 (2011-04-11)	2015	
5	IEC 61850-5	Part 5: Communication requirements for functions and device models	1.0 (2003-07-24)	2012	
6	IEC 61850-6	Part 6: Configuration description language for communication in electrical substations related to IEDs	1.0 (2004-03)	2006	
			2.0 (2009-12-17)	2013	
7	IEC 61850-7-1	Part 7-1: Basic communication structure - Principles and models	1.0 (2003-07)	2005	
			2.0 (2011-07-15)	2013	

The table indicates as well how many tissues have been posted at the [tissue database](#) for most parts tagged edition 1 and tagged edition 2.

Please note that there is NO "IEC 61850 Edition 2" !! There are only Editions of the PARTS!!

If you want to know the current status of the standard series IEC 61850 (January 2012) you have to check the status of ALL documents at early January 2012 (red vertical line in the figure below):



Some of the documents are still Edition 1 (yellow) others are Edition 2 (green). 10 of the 18 parts are still EDITION 1 !! 8 parts are EDITION 2. The other 12 parts under development will be published as EDITION 1.

The 6 parts that are usually understood as "IEC 61850 Edition 2" are:

- 6 Ed2
- 7-1 Ed2
- 7-2 Ed2

-7-3 Ed2
-7-4 Ed2
-8-1 Ed2

This is NOT an official name!

Most parts published by January 2013 are still marked EDITION 1 !!

Click [HERE](#) to download the complete table [pdf, 2 pages]

Posted by [Karlheinz Schwarz](#) at [1:13 PM](#) [0 comments](#) 

Labels: [draft](#), [Edition 1](#), [Edition 2](#), [IEC 61850](#), [IEC 61850 edition 2](#), [status](#), [technical issue](#)

Wednesday, January 4, 2012

ABB review – Special Report IEC 61850

ABB has published already in August 2010 a very comprehensive and nice report on various aspects of IEC 61850. The report comprises 64 pages! Most visitors of this blog may not know the report.

The report starts with a very true statement: “**Communication is more than exchanging data**; it means **globally understandable information** based on syntax and semantic. This is behind IEC 61850, the topic of this issue of ABB Review Special Report.” It continues: “**Electric energy is the backbone of our global society**. Its reliable supply from conventional and renewable sources via complex networks requires seamless control that is only possible with the help of a standard providing a high-level and comprehensive description of the information exchanged.”

Most people are like to say that the **Internet is the backbone of our global society** – What would the Internet be without electric energy? How would your home look like without electric power? You would not be able to read this post without electric power. Many people see electric power like sunshine and rain – it is just here.

Click [HERE](#) for the report [pdf, edition August 2010]

Posted by [Karlheinz Schwarz](#) at [6:48 AM](#) [0 comments](#) 

Labels: [ABB](#), [IEC 61850](#), [IEC 61850 edition 2](#), [Smart Grid](#)

Register of tested IEC 61850 devices

KEMA has recently published an updated Test Register (version 2011-11-28) for

- IEC 61850 Client Systems [8 clients successfully test]
- IEC 61850 Server Devices [total: **212** – 2011:**42** / 2010:21 / 2009:34 /before:115]
- IEC 61850 Ethernet Switches [23]
- IEC 61850 Sampled Value Publishers (Merging Units) [2]

Click [HERE](#) for the complete list [pdf]

Click [HERE](#) for the IEC 61850 certificates; if you don't have an UCAIUG login account you can apply for a free guest account.

Posted by [Karlheinz Schwarz](#) at [5:48 AM](#) [0 comments](#) 

Labels: [certificate](#), [client](#), [conformance test](#), [IEC 61850](#), [server](#), [UCA](#)

Thursday, December 29, 2011

How can you feed back your experience with IEC 61850?

The many parts of the standards series IEC 61850 published require some kind of maintenance. In order to collect, discuss, solve, and document the feedback from the market, IEC TC 57 WG 10 has set-up a database: The Technical Issues database or just: the Tissues database.

More and more experts from utilities feed their experience back to the standardization groups. An example is the latest post of today:

Click [HERE](#) for the Tissue #810 on the Logical node RFLO.

In case you find any tissue in the published standards search the Tissue database first and post a new tissue if your tissue has not yet been posted.

Posted by [Karlheinz Schwarz](#) at 2:22 AM 0 comments 

Labels: [IEC 61850](#), [maintenance](#), [technical issue](#), [tissues](#)

TÜV-SÜD announces IEC 61850 Test Lab and Smart Grid Forum

TÜV-SÜD in Munich accelerates the support of the standard series IEC 61850 in 2012:

- Test Services
- Smart Grid Forum (20.-21. März 2012)

TÜV-SÜD will provide a wide range of services to reach a high level of interoperability of IEDs:



Click [HERE](#) for more details of the services [English, PDF]

Click [HERE](#) for more details of the services [German, PDF]

The Smart Grid Forum (Munich, 20.-21. März 2012) will be conducted in German). Topics are:

- Normen und Standards für Smart Grids
- IEC 61850 in der Anwendung
- Smarte Daten: Normen und Richtlinien für den sicheren Datenaustausch

- Verteilnetzautomatisierung durch intelligente Netzkomponenten: aktuelle Projektbeispiele von Netzbetreibern und Industriekunden
- IT-Sicherheit und Datenschutz im intelligenten Netzsystem

Click [HERE](#) for more information.

Posted by [Karlheinz Schwarz](#) at 2:08 AM 0 comments 

Labels: [conformance test](#), [forum](#), [IEC 61850](#), [interoperability tests](#), [testing](#), [TÜV SÜD](#)

Wednesday, December 28, 2011

MMS (ISO 9506) Introduction – Why to focus on the API?

Jan Tore Sørensen and Martin Gilje Jaatun (SINTEF ICT, Trondheim, Norway) have published a nice introduction to the basic architecture and definitions of MMS in a 46 page document – easy to read and understand.

This documents demonstrates that MMS is not complex. IEC 61850-8-1 (and IEC 61850-9-2) use MMS for specifying the message exchange between IEC 61850 servers (publishers) and clients (subscribers).

Implementing IEC 61850 compliant systems comprising SCL tools, servers, clients, publishers, and subscribers means to implement:

1. Upper layers on top of TCP/IP (or on Ethernet for publisher/subscriber)
2. Protocol machine (MMS, GOOSE and SV)
3. Encoding/Decoding ASN.1 BER messages
4. **ACSI services (LD, LN, Control Blocks (reporting, Logging, service tracking, GOOSE, and SV), DataSets, Control, LOG -> mapped to protocols, mainly MMS)**
5. **Object model (dictionary in IED and behavior according to IEC 61850-7-4)**
6. **API (application program interface) for server, client, publisher, and subscriber**
7. **IED configuration using SCL file**
8. **SCL tool for system engineering and IED configuration**

A ballpark estimate of the efforts needed to implement a reasonable subset of IEC 61850 (if one develops the software from scratch) is in the range of some 10 man-years. Only a small part of efforts (likely less than 10 per cent) deals with MMS and the underlying protocols required by MMS.

A different solution for the client-server messaging, e.g., by using a webservice, would have a minor impact on the total efforts. From a application point of view an efficient API should be in the focus when implementing of using IEC 61850!

Click [HERE](#) for the complete paper on MMS [pdf, 446 KB]

Note that IEC 61850 is much more than a protocol – and much more than MMS. MMS is just an international standard like Ethernet or TCP/IP.

Posted by [Karlheinz Schwarz](#) at 6:37 AM 0 comments 

Labels: [API](#), [applications](#), [IEC 61850](#), [IEC 61850-8-1](#), [MMS](#), [webservice](#)

Tuesday, December 20, 2011


Siemens and IEC 61850: More than 200,000 IEC 61850 IEDs installed

According to Siemens they are "the world market leader in digital protection technology ... from the experience out of an installed base of more than 1 million devices and **200,000 with IEC 61850**".

Often people ask, why are the many fieldbus users groups (for CAN, PROFINET, POWERLINK, EtherNet/IP, EtherCAT, SERCOS III, Foundation Fieldbus, ControlNet, DeviceNet, ...) more active than the UCA International Usersgroup (representing IEC 61850)? One reason seems to be this: most of the 50+ fieldbus solutions are competing with each other. It is no surprise that each users group tries to promote the benefits and the success of their solution.

IEC 61850 does not seem to have (serious) competitors – so it is not required to do a lot of marketing by a users group.

Click [HERE](#) for a brochure from Siemens on their relays (Relay Selection Guide, pdf).

Posted by [Karlheinz Schwarz](#) at [8:32 AM](#) [0 comments](#) 

Labels: [Edition 1](#), [Edition 2](#), [IEC 61850](#), [protection](#), [Siemens](#)

Example of a new part of IEC 61850 – Edition 1 or Edition 2?

The Technical Report IEC/TR 61850-90-1 (Substation to Substation Communication) has been published in March 2010 – quite new part of IEC 61850:



Is this document part of IEC 61850 Edition 1 or IEC 61850 Edition 2?
Neither nor!

It just is IEC/TR 61850-90-1 Edition1 – Edition 1 of part 90-1; NOT a part of **IEC 61850 Edition 1**. There was never an official Edition 1 of the SERIES IEC 61850 nor will there be an Edition 2 of the whole SERIES.

Vendors are often making statements like "Full compatibility between IEC 61850 Editions 1 and 2" or "Efficient operating concepts by flexible engineering of IEC 61850 Edition 2" ... What does that mean? Hm, it seems to be a marketing expression, or?

Posted by [Karlheinz Schwarz](#) at [8:11 AM](#) [0 comments](#) 

Labels: [Edition 1](#), [Edition 2](#), [IEC 61850](#)

Tuesday, November 29, 2011

NEW: Embedded Linux Gateway supporting IEC 61850 and IEC 61400-25

[SSV Embedded Systems](#) (Hannover, Germany) offers the embedded Linux gateway module DIL/NetPC DNP/9265 now with a preinstalled IEC 61850 (IEC 61400-25) protocol stack. An easy to configure and use IEC 61850 API (application program interface) allows for a **very short time-to-market development** – within days and weeks. Program your application, model the IEC 61850 logical nodes and data object that expose your application data, bind them together, configure the communication services like data sets and control blocks (reporting and GOOSE) – and you can connect with other IEC 61850 devices. The model, the binding, and the communication services are described in a standard SCL file (System Configuration Language, IEC 61850-6) and uploaded to the module. Restart the module and you are done. **It's that easy.**

The ARM9-based DNP/9265 is equipped with 32MB of SDRAM, as well as 32MB of NOR flash for holding the boot-loader and Linux O/S, says the company. I/O is passed through a 40-pin DIL socket, and includes three UARTs for COM functions, as well as 20-bit GPIO.

The module supplies one interface each for USB 2.0 Host, SD card, I2C, SPI, and CAN (ISO/11898A 2.0B), says the company. A 10/100Mbps Ethernet port is also supported. Additional features include a watchdog timer, power supervisor for VCC control, and in-system programming features.

Measuring 2.17 x 0.91 inches (55 x 23mm), the module runs on a 3.3 Volt power supply, with supply current at typically 300mA, with a maximum of 500mA. The module is said to support temperatures ranging from 32 to 158 deg. F (0 to 70 deg. C).


SSV also offers other DIL/NetPC-based gateway box products for smart grid and virtual power plant applications. These gateways allow to connect distributed generation installations (such as CHPs, wind-turbines, small hydro, back-up gensets etc.) **directly via IEC 61850** with any other application like power grid monitoring or control centers.

In addition to Linux and the integrated IEC 61850 the SSV gateway solutions comes with drivers and protocol stacks for SSL- or IPsec-based VPNs (*virtual private networks*). This allows secure data communication with powerful encryption technologies over the public telecommunication infrastructure, such as the Internet.

Click [HERE](#) for the news [in German]

Click [HERE](#) for a description of the product [in English]

Click [HERE](#) to check the IEC 61850 (IEC 61400-25) API online [in English]

Posted by [Karlheinz Schwarz](#) at [11:24 PM](#) [0 comments](#) 

Labels: [API](#), [distribution automation](#), [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [Linux](#), [power generation](#), [security](#), [Substation](#), [Substation Automation](#), [wind power](#)

Saturday, November 26, 2011

Reminder – Introduction to IEC 61850 and IEC 61400-25 on ARM and LINUX on December 14

The introduction to the standard series and the new Embedded Modules developed by TQ with IEC 61850 und IEC 61400-25 (using ARM

Architectures, Linux and the very simple and powerful SystemCorp IEC61850 API) is less than three weeks ahead (in **Wessling/Munich, 2011-12-14**).

Click [HERE](#) for the event and information on the embedded controllers (in German).

Posted by [Karlheinz Schwarz](#) at [3:33 AM](#) [0 comments](#) 

Labels: [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [smart metering](#), [smart people](#), [smart solution](#), [Training](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Friday, November 25, 2011

Easy Smart Metering and IEC 61850 MUC (Multi Utility Communication)

Solvimus (Ilmenau, Germany) offers an Easy Smart Metering and IEC 61850 MUC (Multi Utility Communication) device – combining metering and IEC 61850.

The MUC.easy(TM) supports:

- M-Bus, wM-Bus, RS-232, RS-485, S0, or CL to connect to meters
- Integrated Webserver
- GSM/GPRS
- Ethernet
- DSL
- Powerline Communication (PLC), and
- a powerful embedded IEC 61850 solution

Click [HERE](#) for the News in German.

Click [HERE](#) for some overview of the MUC with IEC 61850

Posted by [Karlheinz Schwarz](#) at [5:11 AM](#) [0 comments](#)

Labels: [61850](#), [Gateway](#), [IEC 61850](#), [M Bus](#), [meter](#), [MUC](#), [Multi Utility Communication](#), [smart metering](#)

Wednesday, November 23, 2011

Details of NEW Hirschmann RSP and Embedded Switches With IEC-Standard Redundancy and IEEE 1588 disclosed

The recently announced new Ethernet Switches from Hirschmann that support redundancy protocols are now officially disclosed.

With Hirschmann™ RSP Switches, Which Support the New IEC-Standard Redundancy Protocols (PRP, HSR), Networks Can Now be Built for the First Time With Genuinely Uninterrupted Data Communication.

The Advantages at a Glance

- Extensive range of redundancy methods: PRP, HSR, PRP/HSR Red Box, MRP, Fast MRP, RSTP
- Precise synchronization compliant with IEEE 1588v2
- Enhanced security mechanisms: authentication, radius, role based access, port security, SSHv2, HTTPS and SFTP, plus others currently in preparation.
- Fast device replacement, comprehensive logging and storage of all configuration data, plus operating software updates via SD card
- High level of vibration resistance
- Broad immunity to electrostatic discharges and magnetic fields
- Temperature range from -40°C to +70°C

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- Strong and compact metal housing

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The New Embedded Ethernet EES20 and EES25 Switches from Hirschmann™ Combine the Functional Scope of a Powerful Managed Switch With Interruption-free Redundancy Protocols and Precise Synchronization.

- This module allows automation equipment to be extended to include state-of-the-art switch technology with very little effort
- The additional network functionality gives the equipment sustained competitive advantages
- Development process and time-to-market are significantly shortened thanks to Embedded Ethernet

Click [HERE](#) for the technical Brochure [pdf, English]

Click [HERE](#) for the technical Brochure [pdf, Deutsch]

Posted by [Karlheinz Schwarz](#) at [12:48 AM](#) [0 comments](#) 

Labels: [communication](#), [Ethernet](#), [Ethernet switches](#), [hirschmann](#), [redundancy](#)

Saturday, November 19, 2011

The Aging Workforce in the Electric Power domain

The Electric Power Utility domain is looking for many electrical power engineers all over. One example can be found by searching the simplyhired.com:

Click [HERE](#) for a search on **power system engineer**

The search results in **38,329** hits for the U.S. allone !!

Some **6.000 hits** are related to protection, **800** to SCADA, and **55** to IEC 61850, **12** to DNP3.

Click [HERE](#) for a search on **electrical engineer**

The search results in **86,596** hits for the U.S.

72 are related to IEC 61850 and 20 to DNP3.

Power systems require skilled and experienced engineers. How to become an experiences and skilled engineer? By education, training, learning-by-doing, ...

During the year 2011 a lot more electric power engineers and IT experts have received one or the other education and training with regard to IEC 61850.

I see a lot more of interest on the radar screen for 2012.

Have you ever thought about to get a training that build up your skills in the application of IEC 61850 and related standards? Note that in many of the open positions you can read something like: experience in relevant **protocols** and interfaces (IEC 61850, IEC 60870-x, DNP, etc.).

Many people still expect that IEC 61850 is a protocol. It is definitely much more than a protocol.

Click [HERE](#) to see some differences.

[IEC 61850 and IEC 61499 in Action at SPS/IPC/Drive...](#)

► [October](#) (22)

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► [August](#) (11)

► [July](#) (23)

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► [April](#) (6)

► [March](#) (16)

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► [January](#) (8)

► [2010](#) (153)


► [2009](#) (162)

► [2008](#) (82)

Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

Posted by [Karlheinz Schwarz](#) at [1:49 PM](#) [0 comments](#) 

Labels: [DNP3](#), [education](#), [electrical engineer](#), [engineer](#), [engineering](#), [IEC 61850](#), [power system engineer](#), [power systems](#), [protocol](#), [workforce](#)

Thursday, November 17, 2011

IEC 61850 soon for Steam and Gas turbines

A New Work Item has been proposed by Sweden to use IEC 61850 for Steam and Gas Turbines (Document 57/1193/NP). IEC 61850-7-410 defines already extensions of the Information models for applications in Hydro Power Plants.

The draft second edition of IEC 61850-7-410 has been extended to cover power system stabilizer (PSS) functions, as well as complex excitation systems. In order to use the IEC 61850 communication system for thermal power plants, additional data models for e.g. steam turbines with ancillary equipment is required. In a further future work, additional models for boilers, burner management, flue gas cleaning could be added.

The ballot of the NP closes 2012-02-17.

If you are interested in getting involved contact your IEC TC 57 National Committee.

Click [HERE](#) for the list of countries involved in IEC TC 57.

Posted by [Karlheinz Schwarz](#) at [5:26 AM](#) [0 comments](#) 

Labels: [gas power plants](#), [hydro power](#), [IEC 61850](#), [IEC 61850-7-410](#), [Power Plants](#), [steam power plants](#)


Integration of Renewables in the Grid – A Huge Challenge

Sometimes some experts expect that IT is one of the most crucial aspects of the future power delivery system – yes it is important ... to some extent.

The Power System is STILL (and forever) an ELECTRICAL SYSTEM! Mark O'Malley writes in the 2011-11/12 issue of the IEEE Power & Energy magazine that the "Grid integration is, in his view, the most interesting and exciting area of research in the world today." ... and tomorrow and for the next decade at least.

After many years of low investments in the power industry (material, equipment, systems, human resources, ...) it is expected that it will grow now. Some companies have already increased their budgets for education in Energy and IT related issues.

Click [HERE](#) for the complete opinion of Mark O'Malley.

Posted by [Karlheinz Schwarz](#) at [5:01 AM](#) [0 comments](#) 

Labels: [education](#), [power systems](#), [renewables](#)

Thursday, November 10, 2011

IEC 61850 Editions – Help to Prevent Confusions

After my recent Newsletter on IEC 61850 many experts visited the blog post of the first discussion on Editions which summarizes:

BUT there will be not an EDITION 2 of the standard SERIES IEC 61850 per se!! Various parts (of the **first 16** parts) will be revised and extended and then published tagged as EDITION 2.

New parts will be published with the tag **EDITION 1**, e.g., IEC 61850-80-1 (Guideline to exchanging information from a CDC-based data model using IEC 60870-5-101 or IEC 60870-5-104) - **IEC/TS 61850-80-1, Edition 1.0, 2008-12**

Click [HERE](#) for the complete post.

There are a lot of confusions when people talk about Editions of IEC 61850.

In a new paper it is reported: "**Edition 2.0 of IEC 61850 Standard** has been released considering valid technical issues and future aspects of protocol usage. ... compares **the IEC 61850 Edition 2.0** specification to its predecessor Edition 1.0."

Click [HERE](#) for that paper.

There is hope that experts will use more precise language when it comes to editions of the many parts of IEC 61850 and related documents.

In addition to the question of the Edition of the standard there is another question, when it comes to the **Devices that implement IEC 61850**: Does this or that Device **conform to IEC 61850 Edition 1** or **Edition 2**?

Since there is NO EDITION 2 of the STANDARD, a Device could **NOT** be characterized as an IEC 61850 Edition 2 Device!!

We have to differentiate the various aspects of the Standard: Which Logical Nodes, Common Data Classes, Services, which subset of the Configuration Language Edition 2, et cetera are implemented.

Edition 2 of any part of IEC 61850 can mean the following:

1. **(Usually: Most) Definitions of parts tagged Edition 1** have been taken over in the same parts tagged Edition 2 **without any change**.
2. **(Some) Definitions of parts tagged Edition 1** have been taken over in parts tagged Edition 2 with **fixes or minor changes**. During the tissue process the parts tagged Edition 1 have already been "fixed" to some extend.
3. **(Less or more) New Definitions** have been added in parts tagged Edition 2. [Service tracking in IEC 61850-7-2, many new LNs in IEC 61850-7-4, ...]
4. **(Some) Definitions of parts tagged Edition 1** have been moved to parts tagged Edition 2 without changes. [e.g., LN STMP from IEC 61850-7-410 Ed1 to IEC 61850-7-4 Ed2; Substitution has been moved from IEC 61850-7-2 Ed1 to IEC 61850-7-3 Ed2, ...]

A Device A that implements those definitions from several parts tagged Edition 1 that have not changed in Edition 2 of these parts is compliant to edition 2 of these parts without any modifications! If a Device B implements some new features of one or more parts tagged Edition 2, then these new features have to be listed in some detail to understand the situation. Some detail means that **the implemented features per part tagged Edition 1 and/or Edition 2 have to be listed**.

Examples:


1. A Device may just implement a new LN from Edition 2 of part IEC 61850-7-2; the other definitions are used as defined in Edition 1 of the other parts like IEC 61850-7-3, 7-2, 8-1, ... **So, is this an Edition 1 or Edition 2 Device? Both! But we better do NOT TAG a Device being Edition 1 or Edition 2.** It's a Device implementing the services according to the PICS of part IEC 61850-7-2 Edition 1 (the subset used may be unchanged in Edition 2), IEC 61850-8-1 Edition 1, ... and the STMP LN of IEC 61850-7-4 Edition 2.).
2. The same Device could be understood as implementing the STMP LN according to a part that is **tagged Edition1**: The STMP LN is still officially published in IEC 61850-7-410 Edition 1. Edition 2 of 7-410 will not have the STMP LN any more – it is already moved to 7-4 Edition 2.

Users should **not wait until a Device or the Communication Stack is compliant to Edition 2 of the Standard IEC 61850!!** You will never get such a Device because there is NO Edition 2 of IEC 61850. You may want to use one or the other new service of IEC 61850-7-2 Edition 2 (like Service tracking of control block services) or a new LN from IEC 61850-7-2 Edition 2 or from IEC 61850-7-420 Edition 1 or IEC 61850-90-7 Edition 1 ...

Always list some details what has been implemented from the various parts tagged Edition 1 or Edition 2 – if you want to prevent confusion.

Additional discussions on this topic will follow – time permitted.

Stay tuned.

Posted by [Karlheinz Schwarz](#) at [10:57 PM](#) [0 comments](#) 

Labels: [communication](#), [conformance](#), [Edition 1](#), [Edition 2](#), [IEC 61850](#), [IEC 61850 edition 2](#)

Monday, November 7, 2011

Seminário e Treinamento NORMA IEC 61850 - Instituto Instronic

Dear expert in Brazil and other countries, please note the **final call** for the IEC 61850 course in Sao Paulo (Brazil):

NOTE the course will be simultaneously translated into **Portuguese**.

Seminário e Treinamento IEC 61850

OSASCO - SÃO PAULO - 21 A 23 DE NOVEMBRO

A Instronic em parceria com a STRI traz para o Brasil o Seminário e Treinamento Prático sobre a IEC 61850

A IEC 61850 é o padrão global para Automação do Sistema de Energia. Ela permite um design aberto e possibilita a combinação de produtos de vários fornecedores. Para que os usuários e integradores de sistemas maximizem os benefícios da IEC 61850, é necessário que as empresas eduquem seu recurso mais importante - as pessoas, e comecem a migração para o IEC 61850.

O treinamento traz o processo de design e engenharia para aplicações reais e também uma configuração em uma instalação de teste real.

O curso é ministrado pelo especialista Karlheinz Schwarz, da Netted Automation



Não perca essa oportunidade!

Para outras informações entre em contato conosco:

Tel.: 11.3383.3700 - Rm. 159

Email: instituto@instronic.com.br

www.instronic.com.br



STRI

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Posted by [Karlheinz Schwarz](#) at 2:30 PM 0 comments

Labels: [61850](#), [hands-on Training](#), [IEC 61850](#), [IEC 61850 edition 2](#), [seminar](#), [Training](#)

Sunday, November 6, 2011

Distribution Company Vector's Ten-Years Plan for IEC 61850

Vector Limited is the electric power distribution company in the Auckland (New Zealand) area. The company publishes every year an **Asset Management Plan (AMP)** – informing the public and others

what the company is planning to do with their assets. The current plan covers a ten year planning period from 1 April 2011 to 31 March 2021.

One goal of the current AMP is to demonstrate innovation and efficiency improvements. What does this mean related to **IEC 61850**? A lot in the past and in the future:

- Vector's substation automation system is based on resilient optical Ethernet local area network running **IEC 61850 compliant IEDs**.
- Vector's current standard for **internal and external communication systems is IEC 61850 standard**. DNP3 is also used as an interim solution.
- At present over **50% of Vector's primary substation** are equipped with **IEC 61850 compliant IEDs**.
- Vector has been running an annual **RTU replacement programme** for a number of years, and is currently replacing approximately **10 RTUs per region per annum**. To replace conventional RTUs, two approved solutions have been used, traditional RTUs with a **migration path to IEC 61850, and fully compliant IEC 61850 solutions**.
- ...

Click [HERE](#) for the current plan (2011-2021) [PDF, 10 MB]

Posted by [Karlheinz Schwarz](#) at [10:30 PM](#) [0 comments](#) 

Labels: [asset management](#), [CIM](#), [communication](#), [condition monitoring](#), [distribution automation](#), [IEC 61850](#), [RTU](#), [utilities](#)

Thursday, November 3, 2011

IEC 61850 and IEC 61499 in Action at SPS/IPC/Drives in Nuremberg, Nov 22-24, 2011

If you want to see IEC 61850 and IEC 61499 in action at SPS/IPC/Drives in Nuremberg (Germany), Nov 22-24, 2011, visit the ISaGRAF booth please:

Hall 7A / booth 502

Click [HERE](#) for a free ticket to visit the SPS/IPC/Drives exhibition [German].

Click [HERE](#) for a free ticket to visit the SPS/IPC/Drives exhibition [English].

There is also a special presentation on IEC 61499 on 23rd of November, 2011:

Click [HERE](#) for more information.

Posted by [Karlheinz Schwarz](#) at [1:14 PM](#) [0 comments](#) 

Labels: [IEC 61499](#), [IEC 61850](#), [ISaGRAF](#)

Friday, October 28, 2011

Use-Cases for Distributed Photovoltaic and Storage Systems

EPRI (Electric Power Research Institute, Palo Alto, USA) has been active in the research and development of the electrical power delivery systems. Just remember the projects UCA 1.0 (Utility Communication

Architecture) and UCA 2.0. Both projects have contributed to the IEC TC 57 (Power System Management) and influenced several crucial standard series like the CIM, IEC 60870-6 TASE.2 and IEC 61850.

The work on the "Utility Communication Architecture" is going on in various IEC TC 57 projects and EPRI is still contributing to this process (especially to the definition of **IEC 6185-90-7 - Object models for photovoltaic, storage, and other DER inverters**). A very interesting EPRI report looks into the "**Uses for Distributed Photovoltaic and Storage Systems**". The report lists and discusses briefly the following use-cases:

- Energy Generation
- Local Energy Storage to Compensate for Photovoltaic Intermittency
- Use of Energy Storage for Arbitrage Benefit
- Use of Local Energy Storage to Maximize Photovoltaic Generation Value
- Energy Storage for Customer or Community Backup Power
- Energy Storage to Reduce or Limit Peak Loading on the Utility System
- Energy Storage for Load Following
- Energy Storage to Reduce Customer Peak Demand
- Energy Storage for Local Power Quality Control
- System Stabilization – Transient Watt Modulation with Line Frequency
- System Stabilization - Transient Watt Modulation with Line Voltage
- Var Production for Voltage Regulation
- Var Production for Voltage Stabilization
- Var Production for Power Factor Management
- Var Compensation for Intermittent Generation
- Connect/Disconnect from Grid – Non Islanding
- Connect/Disconnect from Grid – Islanding
- On/Off Control of PV and/or Storage Inverter
- Adjusting Maximum Generation Level
- Metering Energy from Photovoltaic or Storage Device
- State Monitoring
- Event Reporting by Exception
- Event Logging

Click [HERE](#) for the 44 page report on use cases.

Click [HERE](#) for an overview about IEC 61850-90-7.

In an up-to-date publication of the German VDI nachrichten it is reported about storage possibilities on 2011-10-28 that:

- The capacity of all German pumped-storage hydropower plants would provide power for **1 hour**.
- The capacity of 42 million German cars would last for **24 hours**.
- The capacity of the German oil and gas storages would last at least for **2 months**.
- The storage of "Wind or PV Power" (Converting Electricity to Natural Gas) is also an option.

Click [HERE](#) for an R&D report on Converting Electricity to Natural Gas.

Whatever the energy Mix will be – there is a crucial need for information and communication systems supporting the future power delivery system!

The good news is that there is no need to develop standards for information and communication systems from scratch! There are sufficient standards available, implemented and tested so that the power industry can straight use them: IEC 60870-6 TASE.2, CIM, IEC 61850, IEC 61400-25, ...

Posted by [Karlheinz Schwarz](#) at [2:30 AM](#) [0 comments](#) 

Labels: [communication](#), [EPRI](#), [IEC 61850](#), [IEC 61850-90-7](#), [inverter](#), [PV](#), [storage](#), [wind power](#)

Thursday, October 27, 2011

“Visit” a U.S. Power Grid Control Center

The New York Times provides some information about the work in Control Centers of the U.S. Power Grid ... quite interesting information.

Click [HERE](#) for the article.


If you want to apply for a job managing the North American power grid, you have to answer communication related questions like this (from NERC):

6. Standard COM-001-1, encourages “redundant and diversely routed” telecommunications facilities. Why “would “diversely routed” facilities be encouraged?

1. So communications can be simultaneously sent and received over the redundant paths.
2. **So as not to create a monopoly for one particular telecommunication service.**
3. So more neighboring systems can tie into the telecommunications network
4. So one specific problem could not eliminate redundant facilities

If you would answer with 2. ... you may ... hmmm ... ;-)

Click [HERE](#) for this and more questions.

Posted by [Karlheinz Schwarz](#) at [5:09 AM](#) [0 comments](#) 

Labels: [communication](#), [control center](#), [operator](#)

Wednesday, October 26, 2011

SGIP calls for Comments on Draft NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 2.0

The NIST SGIP (Smart Grid Interoperability Panel) has published the

Draft NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 2.0

for public comments via Federal Register Notice on October 25, 2011

Click [HERE](#) for the NIST Framework and Comments page.

Click [HERE](#) for the Draft Release 2.0 [PDF, 5.3 MB].

What is new in the Release 2.0 (Draft)?

Interoperable standards and protocols for the Smart(er) Grids are the focus of NIST. To reach these objectives NIST developed a three-phase plan:

1. To accelerate the **identification** of an initial set of standards;
2. To establish a robust Smart Grid **Interoperability Panel** (SGIP) to sustain the development of the many additional standards that will be needed; and

3. To set up a **conformity testing and certification** infrastructure.

The results of Release 1 (2009-11) have been improved in the draft Release 2. The most crucial result so far (in my view) is the fact that the relevant standards listed in Release 1 has been accepted – one way or the other – by the stake holders in the Smart(er) Grid community! There are some additional standards listed – but the list from 2009 is still representing the core standards.

The most crucial result of all these activities in the power utility domain is that we have prevented a situation found in the industrial automation market with **more than 100 Fieldbus standards** – with some 50+ in a single standard (IEC 61158)!

Draft Release 2 identifies 20 Smart Grid-relevant standards, 15 other requirement and guideline documents, 9 cyber security documents; and another list of some 60 specifications/requirements that are listed for further review. The 20 standards are:

	Standards	
1	BACnet	Building Automation
2	ANSI C12	Metering
3	LON	Various applications
4	IEEE 1815 (DNP3)	Substation and feeder automatio
5	ICCP (IEC 60870-6 TASE.2)	Inter-control center communication
6	IEC 61850	Power utility automation (Transmission, Distribution, Generation, ...) at field level
7	IEC 61968/61970	CIM; communication between control center systems
8	IEEE C37.118/IEC 61850-90-5	Phasor measurements
9	IEEE 1547	Physical and electrical interconnections between utilities and distributed generation (DG) and storage.
10	IEEE 1588/IEC61588	Time synchronization
11	IETF RFC 6272	Internet Protocols
12	IEEE 1901	Broadband Power Line
13	Multispeak	Application software integration within the utility operations domain
14	NEMA SG AMI I	Smart meters
15	SB WEQ19, REQ18	Energy Usage Information
16	NISTIR 7761	NIST Guidelines for Assessing Wireless Standards for Smart Gr Applications
17	OpenADR	Open Automated Demand Response
18	OPC-UA	Exposes complex data and metadata defined by other information model specifications (e.g. IEC 61850, BACnet, OpenADR).
19	GML	Open Geospatial Consortium, Geography Markup Language
20	Zigbee Smart Energy Profile 2.0	Home Area Network (HAN) Device Communications and Informatior

		Model
	Requirements and Guidelines	
21	OpenHAN	Home area network (HAN)
22	AEIC Guidelines	Testing criteria for standards-based AMI
23	SAE J1772	SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler
24	SAE J2836/1	Use Cases for Communication Between Plug-in Vehicles and the Utility Grid
25	IPRM	SGTCC Interoperability Process Reference Manual (SGIP's Smart Grid Testing and Certification Committee)
26	--	
	Cyber Security	
27	Security Profile for Advanced Metering Infrastructure, v 1.0	
28	Department of Homeland Security (DHS), National Cyber Security	Recommendations
29	DHS Cyber Security Procurement Language for Control Systems	Guidance to procuring Cyber security technologies for control systems products and services
30	IEC 62351 Parts 1-8	This family of standards defines information security for power system control operations.
31	IEEE 1686	Intelligent electronic devices (IEDs) to accommodate critical infrastructure protection
32	CIP 002-009	NERC Critical Infrastructure Protection
33	NIST Special Publication (SP) 800	Cyber security standards and guidelines for federal information systems, including those for the bulk power system.
34	IEC 61851	Charging electric road vehicles
35	NISTIR 7628	Introduction to NISTIR 7628 Guidelines for Smart Grid Cyber Security

The second list comprises standards for review like GPS, IEC 61400-25 (IEC 61850 for wind turbines), IEEE P1901 (Broadband powerline), ISO/IEC 8824 ASN.1 (Abstract Syntax Notation), IEEE 802, 3GPP, 2G, 3G, 4G, ISA SP 100 (Wireless), IEC 61000, ISA SP 99, ISO 27000, WS-Security, ...

The second list contains standards that do (to my interpretation) **NOT contain any competing solutions for IEC 61968/70, IEC 61850, IEEE 1815 DNP3**, ... they cover other crucial aspects. And there is very little overlap between the 35 standards listed above.

Congratulation to all people involved in the work of SGIP!

It would be very helpful to provide your comments to the draft – in order to reach a global consensus.

Posted by [Karlheinz Schwarz](#) at [5:16 AM](#) [0 comments](#) 

Labels: [building automation](#), [CIM](#), [Cyber Security](#), [distribution automation](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [interoperability](#), [NIST](#), [NIST Roadmap](#), [OPC UA](#), [Power Automation](#), [Smart Grid](#), [Substation Automation](#), [TASE.2 ICCP](#), [wind power](#)

Tuesday, October 25, 2011

New Embedded Modules from TQ with IEC 61850 and IEC 61400-25 using ARM Architectures and Linux

Two New Embedded Modules developed by TQ with IEC 61850 und IEC 61400-25 (using ARM Architectures, Linux and the very simple and powerful SystemCorp IEC61850 API) are available:

ARM9 Modul with i.MX28 from Freescale
Click [HERE](#) for more details.

ARM11 Modul with i.MX35 from Freescale
Click [HERE](#) for more details.

TQ is conducting a one day introduction into the standards IEC 61850 and IEC 61400-25 and demonstrates how to build applications for IEC 61850 based on the above controllers.

Date: 2011-12-14 (Wednesday)

Location:

TQ-Systems GmbH
Mühlstraße 2
82229 Seefeld
Germany (near Munich)

Click [HERE](#) for **more details on the seminar**.

Click [HERE](#) for the **Program (Presentation Language: German)**

If you are interested in a presentation in English, please contact TQ.

Posted by [Karlheinz Schwarz](#) at [2:14 PM](#) [0 comments](#) 

Labels: [API](#), [applications](#), [Arm processor](#), [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [Linux](#), [seminar](#), [stack](#), [starter kit](#), [SystemCorp](#), [TQ](#)

NEW Hirschmann Ethernet Switches for Substations and other Critical Applications

Hirschmann is (to my knowledge) the leading manufacturers of Ethernet Switches for mission critical industrial applications. Hirschmann is also quite active in the domain of substations (IEC 61850, ...). The following new products offer standardized features like **RSTP** (Rapid Spanning Tree Protocol), **PRP** (Parallel Redundancy Protocol) and **HSR** (High-availability Seamless Redundancy).

With these components there is sufficient timeliness guaranteed in mission critical substation protection and automation systems. This is far above the old "yellow cable" Ethernet of the 80s and 90s.

Hirschmann™ presents **switches from its new RSP family**

Redundancy with zero switchover time:

Click [HERE](#) for further information (English)

Click [HERE](#) for further information (German)

Hirschmann™ once again demonstrates its market leadership in Industrial

Ethernet Hirschmann™ switches support seamless redundancy. The new **PRP (Parallel Redundancy Protocol)** and **HSR (High-availability Seamless**

Redundancy) protocols are two newly developed redundancy methods that significantly increase the availability and reliability of network connections:

Click [HERE](#) for further information (English)

Click [HERE](#) for further information (German)

Hirschmann™ markets new **Embedded Ethernet components Module with the functional scope of a standalone switch:**

Click [HERE](#) for further information (English)

White Paper on **Media Redundancy Concepts** - High Availability in Industrial Ethernet:

Click [HERE](#) for further information (English)

Posted by [Karlheinz Schwarz](#) at [11:30 AM](#) [0 comments](#) 

Labels: [Belden](#), [Ethernet](#), [Ethernet switches](#), [hirschmann](#), [HSR](#), [IEC 61850](#), [PRP](#), [redundancy](#), [RSP](#)

Monday, October 24, 2011

Cleanup of IEC 61850-7-4 Edition 2

The edition 2 of the base information models of IEC 61850 (published in 2010 as IEC 61850-7-4) has some definitions that need corrections. You can find the most crucial ones documented on the IEC 61850 Tissue Database (Technical Issues).

Click [HERE](#) for the complete list of part 7-4 Ed2.

Example:

Annex A defines the Interpretation of mode and behaviour

There is an obvious error in the table. When Beh=on AND incoming data with q=test THEN the expected behaviour of LN shall be "Processed as **invalid**", and not "Processed as **valid**".

Recommendation for readers of the various parts of IEC 61850: Please check the list of the Tissue Database in order to figure out the corrections made by the IEC 61850 community. As the above example shows, the corrections could be very critical!

Posted by [Karlheinz Schwarz](#) at [1:47 AM](#) [0 comments](#) 

Labels: [corrections](#), [IEC 61850](#), [maintenance](#), [tissues](#)

Thursday, October 20, 2011

Need Help regarding MMS (ISO 9506)?

Experts that are looking for further helpful information on MMS (Manufacturing Message Specification – ISO 9506) can download a report published as part of MSc Thesis "Security in Industrial Networks" in Norway, 2007:

Click [HERE](#) for the links to two papers.

Unfortunately the authors did not mention IEC 61850 and IEC 61400-25 as the most crucial standard series that use MMS.

The security measures for MMS are defined in IEC 62351-4.

Click [HERE](#) for additional information on security and IEC 61850/MMS.

Click [HERE](#) for find more information on MMS.

Posted by [Karlheinz Schwarz](#) at [1:07 PM](#) [1 comments](#) 

Labels: [ASN.1](#), [BER](#), [Encoding](#), [IEC 61400-25](#), [IEC 61850](#), [message encoding](#), [MMS](#), [security](#)

Improvements of IEC 61850-6 (System Configuration Language) and other parts

The IEC 61850 System Configuration Language (SCL) as defined in IEC 61850-6 Edition 2 is a very crucial, successful and comprehensive part of the standard series IEC 61850. This part has a major impact of System Design, System Engineering and Device Configuration Tools.

The standard defines many concepts and a lot of details! People in the SCL Team and other groups have worked hard to provide a consistent and complete specification. As usual, there are typos, incompletely defined details, ... The IEC 61850 community takes these inconsistencies and errors very serious.

Since the publication in 2009 there have 21 tissues (technical issues) been reported on part 6:

Click [HERE](#) for the list of the IEC 61850-6 Edition 2 tissues.

One typical tissue (Tissue 719) is about the "maxAttributes" definition in clause 9.3.1:

The definition of ConfDataSet - maxAttributes is confusing especially the part in brackets (an FCDA can contain several attributes).

2 interpretations seem possible :

- maxAttributes = max nb of members in the dataset
- maxAttributes = max sum of attributes of all dataset member

The tissue has helped to clarify what is meant:

"ConfDataSet.maxAttributes shall define the maximum number of members in a data set ..."

Click [HERE](#) for the complete tissue 719.

Please check the tissue database if you find anything in the published standards (of any Edition) that may be wrong or not complete or unclear. **Before you post a tissue check if it has already been reported and solved.**

Click [HERE](#) for the Tissue Database entry on IEC 61850 and [HERE](#) for IEC 61400-25.

You can help the IEC 61850 community to improve the standard by checking the content of the tissue data bases and posting your findings on possible deficiencies.

Thanks!

Posted by [Karlheinz Schwarz](#) at [12:53 PM](#) [0 comments](#) 

Labels: [bugs](#), [fixes](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-6](#), [quality](#), [SCL](#), [tissues](#)

Tuesday, October 18, 2011

Power Outage in San Diego on September 08, 2011, and Synchrophasors

The other day I [reported on standards for synchrophasor](#) measurements. The question was and still is: Could synchrophasor measurements prevent huge black outs? Some say yes – others say maybe or no.

Today it has been reported by Platts (Atlanta) that "The installation of phasor measurement units on part of the power grid affected by the September 8 power outage in Arizona, California and Mexico **is aiding the data collection process** as entities look into the cause of the outage, the head of the North American Electric Reliability Council said Monday. ... Synchrophasors provide precise measurements of critical grid operating data from devices called phasor measurement units, **which inform operators of conditions on a real-time basis**. The **goal of having the units in place** is to help operators see conditions deteriorate and take actions **to avoid large outages**, Paul Barber of the NERC board of trustees said Tuesday."

Obviously the synchrophasor measurements could not prevent the power outage on September 8, 2011. There needs to be experts to interpret the values!! and understand what to do to stabilize the electric system ... or software needs to be written by experts ...

What is missing in many organizations to keep control over the electric power delivery system? [Peopleware](#)!! Well educated Experts that understand the **electrical system** !! Measurements are a tool: Even a fool with a tool is a fool. And: A fool with a tool can foul-up a system much faster than a fool without a tool. In this regard, IEC 61850 is also just a tool.

Click [HERE](#) for the complete report from today.

Posted by [Karlheinz Schwarz](#) at 2:17 PM 0 comments 

Labels: [education](#), [IEC 61850](#), [outage](#), [peopleware](#), [phasor measurements](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Monday, October 17, 2011

IEC 61400-25 at the Two-Day Windpower Monthly Forum in Hamburg


Anders Johnsson, Marketing & Standardization Coordinator of USE61400-25 User Group, will give a presentation under the title "**How close are we to standardization of wind turbine data?**"

at the Wind Farm Data Management & Analysis - Harnessing your data to optimize performance, reduce downtime & increase profitability, a Two-Day Windpower Monthly Forum 15- 16 November 2011, Hamburg, Germany.

He will present the results of the standardization work done so far and provide an outlook.

Click [HERE](#) for more details.

Click [HERE](#) for a brief introduction to IEC 61850 and IEC 61400-25 [pdf].

Posted by [Karlheinz Schwarz](#) at [10:07 PM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [wind power](#)

New Book on CIM (Common Information Model)

IEC TC 57 (Power System Management) publishes standards for control center internal information models (CIM: IEC 61968 and IEC 61970) and for monitoring and controlling the process level (IEC 61850 and IEC 61400-25).

Four experts involved in the application of CIM in projects have written a book on CIM to provide an introduction and describe the basic use cases. The book will be available in January 2012.

Click [HERE](#) for a description of the book and order information.

Click [HERE](#) for a brief introduction to IEC 61850 and IEC 61400-25.

Posted by [Karlheinz Schwarz](#) at [9:54 PM](#) [0 comments](#) 

Labels: [CIM](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#)

Saturday, October 15, 2011

Sensors in Smart(er) Grids Not Only For Electrical Measurement

Smart Grid (condition monitoring) Sensors may detect faulting fuses,

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[SGIP calls for Comments on Draft NIST Framework an...](#)

[New Embedded Modules from TQ with IEC 61850 and IE...](#)

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[IEC 61400-25 at the Two-Day Windpower Monthly Foru...](#)

insulators, conductors, transformers, as well as fires, ice, water level, floods, oil spills & air pollution conditions and and ...

Myriads of sensors will be installed in the context of Smart(er) Grids the years to come.

Click [HERE](#) for a 10 minute video on various use cases.

Click [HERE](#) for a roll-out of sensors in a distribution network.

Click [HERE](#) on a discussion "How many protocol interfaces can we afford?"

Click [HERE](#) for a project where IEC 61850 is used for exchanging sensor data.

With IEC 61850 – one ne or the other – it is possible to let all sensors speak a SINGLE LANGUAGE. Intelligent sensors may speak IEC 61850 integrated in the sensor itself, or the sensors may communicate to an aggregation device (like an RTU) that provides IEC 61850 connectivity to the next level of monitoring and so on.

Click [HERE](#) for the IEC 61850-7-4 Ed2 Logical Node STMP (Temperature Supervision).

Posted by [Karlheinz Schwarz](#) at 9:58 PM 0 comments 

Labels: [building automation](#), [control center](#), [Data concentrator](#), [distribution automation](#), [IEC 61850](#), [IEC 61850-7-4 Ed2](#), [monitoring](#), [SCADA](#), [Sensors](#), [Smart Grid](#)

Thursday, October 13, 2011

Open Source Synchrophasor Framework for IEC 61850-90-5 under development

On October 02, 2011, I [announced that the IEC TR 61850-90-5](#): "Use of IEC 61850 to transmit synchrophasor information according to IEEE C37.118" is on its way for official publication; expected by end of 2011.

To accelerate the application of the technology defined by IEC 61850-90-5, **Cisco**, Inc. (CSCO) and Systems Integration Specialists Company, Inc. (**SISCO**) have begun an **open source project** intended to provide an implementation framework for synchronized phasor measurement communications.

They expect that an "open source project will foster innovation and faster adoption of the standards using IP-multicast and a scalable security architecture". ... For the open source project, **Cisco will provide source code for the Group Domain of Interpretation (GDOI) protocol**. This protocol provides the type of advanced cyber key management services that are needed to secure communications for power system automation applications, including substation automation and protection, as well as for Smart Grid applications such as metering and demand response. **SISCO will provide the source code for the IEC 61850-90-5 communication profile and the integration of that profile with the GDOI code.** ..."

Click [HERE](#) for the press complete release published by Cisco.

It is very likely that this project will push the application of IEC 61850 in North America and all over.

Posted by [Karlheinz Schwarz](#) at 11:46 AM 0 comments 

Labels: [IEC 61850](#), [iec 61850-90-5](#), [open source](#), [phasor measurements](#)

[New Book on CIM \(Common Information Model\)](#)

[Sensors in Smart\(er\) Grids Not Only For Electrical...](#)

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Tuesday, October 11, 2011

IEC 61850 Training Courses in Sao Paulo and Frankfurt

Plan now for attending one of the training courses conducted by NettedAutomation:

Why should you attend? IEC 61850 is a bit more than DNP3, IEC 60870-5-101/104 or any of the many field busses ... IEC 61850 is THE solution when it comes to advanced information, information exchange and system configuration in the electric power delivery world and in many domains outside. Understanding the basics of IEC 61850 and IEC 61400-25 will help you to get smoothly to systems that are based on interoperable devices.

[Sao Paulo \(Brazil\), 21.-23. November 2011 \(NEW DATE\)](#)

3 day IEC 61850 Seminar/Hands-on Training


[Frankfurt \(Germany\), 09.-11. May 2012](#)

[Frankfurt \(Germany\), 17.-19. October 2012](#)

3 day IEC 61850/61400-25 Seminar/Hands-on Training (NettedAutomation) with with several embedded Controller Development Kits (Linux, RTOS, ...), Starter Kit (Windows DDL), and several other demo software

[?? \(USA\), Remote Conference, September 2012](#)

2 day Seminar (NettedAutomation) on Power System Communication covering IEC 61850, IEC 61400-25, DNP3, NIST Interoperability Roadmap, Smart Grids, ...

Posted by [Karlheinz Schwarz](#) at [10:59 PM](#) [0 comments](#) 

Labels: [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Substation Automation](#), [Training](#)

Plug and Play for IEC 61850 – Supported by Siemens

Siemens pushes for a crucial extension of IEC 61850: to allow Plug and Play features for IEDs according to a future IEC 61850:

IEC 61850's primary focus (in the late 90's) was on Substation Automation – this is still the crucial application domain today and for a long time. The application of IEC 61850 in various power generation and distribution application domains is likely to require further features – not yet defined. Several projects (E-Energy in Germany, SGIP' Priority Action Plan (PAP), and other) have investigated in finding gaps in the standard definitions. One result is the definition of a Plug&Play extension developed by Siemens. Siemens has registered their ideas at the ip.com website. What does that mean? **"Defensive publishing is a low cost way to prevent competitors from obtaining patents and protect your freedom to practice."**

Click [HERE](#) for a description what "Defensive Publishing" means.

Excerpt:

"The Plug and Play reference architecture based on well-known protocols like **UPnP (Universal Plug and Play)** and **DPWS (Devices Profiles for Web Services)** is used. Several exchanges and additions, e.g. with respect to discovery mechanisms, are proposed **enabling IEC 61850 to support Plug & Play for "Smart Distribution"**."

Click [HERE](#) for more information.

► [February](#) (16)

► [January](#) (8)

► [2010](#) (153)

► [2009](#) (162)


► [2008](#) (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

The work on [Web Services that has been proposed by a New Work Item Proposal](#) will become a crucial work for future applications.

Posted by [Karlheinz Schwarz](#) at [5:28 AM](#) [0 comments](#) 

Labels: [DWPS](#), [E-Energy](#), [IEC 61850](#), [iec 61850-8-2](#), [mapping](#), [PAP](#), [plug and play](#), [SGIP](#), [Web Service](#), [webservice](#)

Substation Automation Specialist Wanted in the U.S. – IEC 61850 is a MUST

Siemens offers an open position for a Product Management Specialist for Substation Automation. One of the position requirements is “Must have worked with **advanced digital Substation Automation using IEC 61850** protocol and functionalities”

Click [HERE](#) for the description.

Posted by [Karlheinz Schwarz](#) at [4:26 AM](#) [0 comments](#) 

Labels: [61850](#), [IEC](#), [IEC 61850](#), [open position](#), [USA](#), [workforce](#)


Monday, October 10, 2011

Long-Term Supply Agreement on Ethernet Components between Hirschmann and Yokogawa Electric Corporation

“Yokogawa will use Hirschmann Industrial Ethernet switches [Neckartenzlingen, Germany] in their Vnet/IP® high-speed control networks and provide maintenance services to facilitate the deployment of highly reliable control networks. Plant control communication network in markets such as oil & gas, power transmission & distribution, pharmaceuticals and water/wastewater must endure harsh environments with extreme ambient temperatures and corrosive gasses.”

Hirschmann is also deeply involved in IEC 61850 standardization and application. More to come ...

Click [HERE](#) for the news report from Belden.

Posted by [Karlheinz Schwarz](#) at [12:29 PM](#) [0 comments](#) 

Labels: [Ethernet](#), [Ethernet switches](#), [hirschmann](#), [IEC 61850](#)

Utility Experience with IEC 61850 at eThekwini Electricity

There are just a few reports from utility personnel describing the impact of IEC 61850 on substation protection and automation systems. A report from eThekwini Electricity provides some results of the application of IEC 61850 based systems. Worth to read report.

With regard to the Financial Implications the reports states:

“An exercise has been carried out to determine the financial impact of the new philosophy. This exercise has produced some better than expected results.”

Click [HERE](#) for the complete paper [7 pages pdf].

Posted by [Karlheinz Schwarz](#) at [1:51 AM](#) [0 comments](#) 

Labels: [cost saving](#), [IEC 61850](#), [implementation](#), [utilities](#)

Sunday, October 9, 2011

Wireshark Analyzer to encode MMS, GOOSE, and SAV Messages

In July 2011 I reported about a [problem analyzing MMS messages with Wireshark](#).

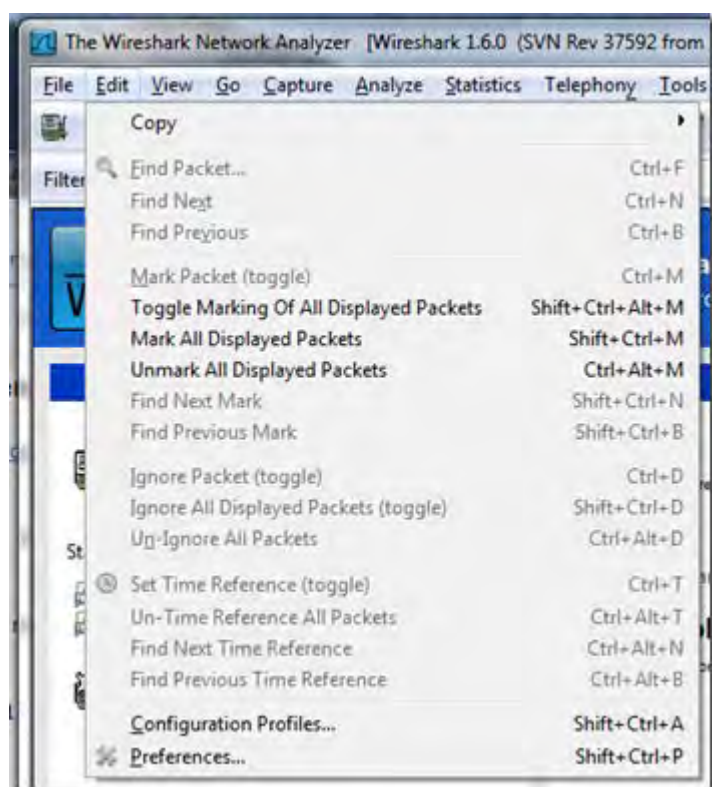
A comment to that post suggests the following successful solution ... configure the analyzer as follows:

Set in **PRES** protocol preferences new user context item:

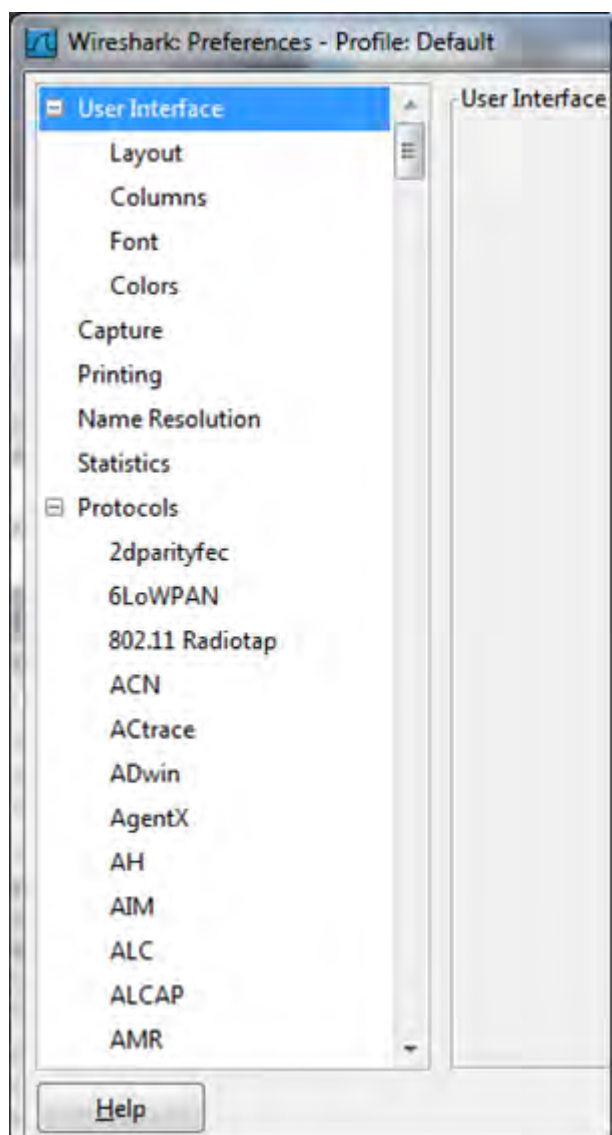
Context Id: 3

Syntax Name OID: 1.0.9506.2.1

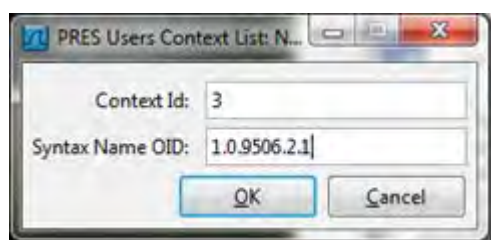
Select **Edit** and **Preferences** at the bottom:



Select Protocols ... and PRES:



Edit PRES and select New and enter the values from above::



Thanks for the recommendation!

Have a great week.

Posted by [Karlheinz Schwarz](#) at 1:12 PM 0 comments 

Labels: [IEC 61850-8-1](#), [IEC 61850-9-2](#), [message encoding](#), [MMS](#), [wireshark](#)

Market Trend: IEC 61850-9-2 Sampled Values accepted

Omicron has published a paper on the benefits and acceptance of the IEC 61850-9-2 sampled values:


- [English \(Page 47-49\)](#)

- [Deutsch \(Page 43-45\)](#)

By Dr Fred Steinhauser:

Technology of the future: **Sampled Values provide many benefits for the power systems of tomorrow**

Abstracts: "IEC 61850 defines several kinds of communication mechanisms. The Client/Server communication for SCADA and the GOOSE protocol for peer-to-peer status messaging have been widely adopted in a quite short time. Now, after years of experience with these new protocols, also the application of **Sampled Values has become a common topic.**"

Posted by [Karlheinz Schwarz](#) at [11:32 AM](#) [0 comments](#) 

Labels: [9-2LE](#), [IEC 61850](#), [IEC 61850-9-2](#), [sampled value](#)

Friday, October 7, 2011

New Work Item Proposal on IEC 61850-8-2 – Mapping to Web Services

As expected, the New Work Item Proposal on Web Service Mapping has been officially published on 2011-10-07 for ballot:

Future IEC 61850-8-2: Specific communication service mapping (SCSM)
– Mappings to web-services (Document 57/1181/NP).

Closing Date of ballot: 2012-01-13

In order to get a copy of the NP document [contact your TC 57 national committee.](#)

Posted by [Karlheinz Schwarz](#) at [9:32 PM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [iec 61400-25-4](#), [IEC 61850](#), [IEC 61850-8-1](#), [iec 61850-8-2](#), [mapping](#), [Web Service](#), [webservice](#)

Sunday, October 2, 2011

IEC 61850-90-5 defines How to Use IEC 61850 to transmit synchrophasor information according to IEEE C37.118

The new Technical Report IEC TR 61850-90-5: "Use of IEC 61850 to transmit synchrophasor information according to IEEE C37.118" is on its way for official publication.

Synchrophasor information are measured and calculated by PMUs (Phasor Measurement Units) are used to assess the condition of the electrical power delivery system. The synchrophasors and related message formats transmit synchrophasor information over long distances. The payload is defined in IEEE C37.118.

IEC 61850-90-5 will provide a way of exchanging synchrophasor information between PMUs and WAMPAC (Wide Area Monitoring, Protection, and Control), and for and between control center applications.

IEC 61850-90-5 also provides communication profile extensions to allow to route GOOSE and sampled value messages (IEC 61850-8-1 and IEC 61850-9-2) using UDP/IP. These routable messages can be utilized to transport any IEC 61850 information as well as synchrophasor

information.

Applications comprise:

- Synchro-check
- Adaptive relaying
- Out-of-step (OOS) protection
- Situational awareness
- State Estimation and on-line security assessment
- Archive data (event & continuous)
- Special Protection Schemes
- Predictive Dynamic Stability Maintaining System
- Under Voltage Load Shedding

Posted by [Karlheinz Schwarz](#) at [11:27 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [iec 61850-90-5](#), [synchrophasor](#), [UDP/IP](#), [wide area network](#)

Tuesday, September 27, 2011

Major German RTU Vendor implements IEC 61850 instead of phased-out model IEC 60870-5-101 and 104

The [IDS company](#) based in Ettlingen (Germany) offers a gateway to collect data from many underlying protocols and converts them into IEC 61850 Models for the communication with control centers. They wrote in a recent publication that the **classical RTU protocols IEC 60870-5-101 and –104 are phase-out solutions for the communication with control centers**. One crucial issue they highlight is the semantic information models and self-description services defined in IEC 61850.

The same company was a very strong supporter for using IEC 60870-5-101 and –104 for the communication with control centers – and partly within substations. What I see these days: More and more people are changing their mind!

The protocol gateway (which is a server) uses for the uplink to the control center **IEC 61850 information objects and web services according to IEC 61400-25-4 Annex A** for the protocol. This combination (IEC 61850 models and IEC 61400-25-4 mappings) is technically feasible. Formally it is not defined in any standard!

That is why **the gateway (server) cannot interoperate with any IEC 61850 client**. It is a product that can communicate with a client according to IEC 61400-25-4 Annex A only.

The first reason they provided why they did not use MMS is as follows: MMS would require to have permanent TCP and MMS connections maintained! That is true for substation automation, where short reaction times for crucial spontaneous event reports are required. If the required reaction is in the seconds, there is no reason why a permanent connection should be required! MMS does not require permanent connections! A MMS client can close the connection as soon as a service is completed.

Click [HERE](#) for the paper published in the etz magazine [German only].

It is also important to know that (to my knowledge) most vendors implementing IEC 61400-25 are using the mapping according to IEC 61400-25-4 Annex C (MMS, IEC 61850-8-1): [Bachmann](#), [Beckhoff](#), [Ingeteam](#), Siemens, ...

Finally: a new work item has been proposed to IEC TC 57 (home of IEC 61850) to standardize a web service mapping as IEC 61850-8-2. The

question is now: Which solution should be chosen or developed? Three candidates are already discussed and proposed for further investigation:

1. [DPWS](#) (Device Profile Web Services)
2. OPC UA WS
3. IEC 61400-25-4 Annex A (as a starting point)

Nobody knows which solution will finally be standardized for IEC 61850 and how long it will take. There may be additional candidates proposed during the official ballot on the new work item once it is out for ballot ... may be by end of 2011. Hopefully we will see a single solution being published in 8-2. Nobody knows.

Having multiple standards for the mappings means: **split the market in non-interoperability domains!**

Click [HERE](#) for a further a discussion on web services.

Posted by [Karlheinz Schwarz](#) at 7:18 PM 0 comments 

Labels: [control center](#), [DWPS](#), [Gateway](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [iec 61400-25-4](#), [IEC 61850-8-1](#), [mapping](#), [MMS](#), [OPC UA](#), [RTU](#), [Web Service](#)

Monday, September 26, 2011

Final Call for IEC 61850 (61400-25) Seminar and Hands-On Training in Frankfurt, October 05-07

The 3 day IEC 61850/61400-25 Seminar/Hands-on Training with real IEDs (embedded controller programmable in C/C++ and IEC 61131-3) and free evaluation software (DLL etc. fully functional - free to take home) is scheduled to be held in **Frankfurt (Germany)** from **05.-07. October 2011**.

There are a few seats available. You can even register the latest by Tuesday evening (Oct 04) ... I can print another set of hand-outs before I leave to Frankfurt ... ;-)

Click [HERE](#) for details. Questions on the attendance fee etc? [Contact us](#).

I have conducted some 140 courses and educated more than 2,650 experts all over. The experience I collected throughout these events – will be given to you – in case you attend next week. One of the attendees of last week's event in Nashville (TN, USA) wrote me today:

"I really did enjoy the workshop and did get lots of information both from the material and your expertise. I feel I have a better understanding of 61850- which was my goal. Thank you."

See you next week.

Posted by [Karlheinz Schwarz](#) at 3:45 PM 0 comments 

Labels: [61850](#), [DNP3](#), [Evaluation](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#)

Sunday, September 25, 2011

Two Are Better Than One – An Old Wisdom

King Salomon wrote some 3,000 years ago about redundancy:

Ecclesiastes 4:9-12: "**Two** are better than **one**, because they have a good reward for their labor. For if they **fall**, the one will **lift up his**

fellow; but woe to him that is alone when he falleth, and hath not another to lift him up. and a **threefold cord is not quickly broken.**"

It would be very helpful in the future electric power delivery system if a higher degree of redundancy would be implemented! There is still a lot ... but it is degrading in many places all over.

The major power outage in the San Diego region two weeks ago caused a failure in "a portion of the "north loop" of San Diego County's Regional


Communications System (RCS) experienced a **major failure** when the county-wide power outage hit on September 8, 2011. This was the second major **outage for the redundant 800 MHz RCS** that was designed to carry public safety communications **without the need for a backup system.** ..."

Accountants may say: The backup costs a lot of money ... ;-)

Yup!

Click [HERE](#) to read the full report.

I have seen communication "boxes" for wind turbines that offer **three** communication channels ... just in case! TCP/IP over Ethernet, GPRS, and Satellite. That should work highly reliable and offer a high availability.

Posted by [Karlheinz Schwarz](#) at [12:15 PM](#) [0 comments](#) 

Labels: [IEC 61131-3](#), [IEC 61850](#), [power outage](#), [power systems](#), [redundancy](#)

Friday, September 23, 2011

Modeling Logics with IEC 61850-90-11

IEC TC 57 has started to work officially on models for Logics:

IEC TR 61850-90-11: Communication networks and systems for power utility automation – Part 90-11: Methodologies for modeling of logics for IEC 61850 based applications

The national committees of TC 57 are requested to contribute to the new part of the standard series IEC 61850.

Standards like IEC 61131-3, IEC 61499 and others will be taken into account.

If you are interested in this work, contact your TC 57 National Committee or myself.

A discussion of the use of IEC 61499 in conjunction with IEC 61850 can be found [HERE](#) (Towards Intelligent Smart Grid Devices with IEC 61850 Interoperability and IEC 61499 Open Control Architecture)

Or check [these](#).

Posted by [Karlheinz Schwarz](#) at [6:34 PM](#) [0 comments](#) 

Labels: [IEC 61499](#), [IEC 61850](#), [logic](#), [programming](#)

Power Outage in the South-West – Controlling Huge

Power Systems is a Challenge

A huge interconnected power system follows 100 per cent the rules of laws like the [Kirchhoff's Law](#) and others. The Physics of the electrical system does not care about share-holder value, regulation and de-regulation – it is a law that can't be changed by lawyers and bank managers!

The electrical power in every homes outlet is understood as a given – as sun shine and rain!! It is just here.

Two weeks after the power outage in the South-Western, it is likely that missing communication at the level of humans had a big impact on the stability of the power system.

Click [HERE](#) for some more details.

Click [HERE](#) for a discussion if the regulation or the de-regulation of the power market had a huge impact on the power outage.

Whatever people's interpretation is: the electrical system is an electrical system that cannot be cheated.

I'm wondering why the control systems involved in providing a stable power system in the South-West seemed to not have all crucial information about the power system exchanged between all technical systems (parties) involved. There is a standard available for many years that would allow to exchange all real-time information needed to control the power system: IEC 60870-6 TASE.2 (ICCP).

There is one lesson we have to learn: The information systems could also not change the Kirchoff's and other laws. The electrical system is an electrical system for the last 100+ years and for the future ...

Posted by [Karlheinz Schwarz](#) at [6:18 PM](#) [0 comments](#) 

Labels: [blackout](#), [communication](#), [IEC 60870-6](#), [real-time](#), [TASE.2 ICCP](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Friday, September 16, 2011

Some more Details on the September 8 Power Outage in San Diego


Some more details on the causes that let to the big Power Outage in California, Arizona and Mexico on September 8, 2011 have been published.

The SignOnSanDiego reports on Sept 16: " ... the Cal-ISO chief said, investigators so far have identified **23 separate events that occurred during the 11-minute span**, each of which **played a role** in denying electricity to San Diego County and beyond." 23 is a lot!

Click [HERE](#) for the complete report.

Whatever caused the power outage: There will be something to learn and to change ... and I guess there will be a growing need to exchange more real-time or near real-time information between humans, systems and devices. Standards will help to implement new measures.

Please let me know as soon as you have more details.

Posted by [Karlheinz Schwarz](#) at [11:26 PM](#) [0 comments](#) 

Labels: [DNP3](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [information exchange](#), [Power Automation](#), [power outage](#), [power systems](#), [standards](#)

Thursday, September 15, 2011

IEC 61850 knowledge required for many new Jobs all over

Nine positions in Germany are open for engineers [today: 2011-09-15] with IEC 61850 (and partly with DNP) background according to the website Simplyhired!

Click [HERE](#) for the list of positions in Germany.

And in North America? The website links to **107 open positions** within North America [today: 2011-09-15] !!! Yes!

Click [HERE](#) for the list in the USA.

11 new positions have been added the last 7 days [today: 2011-09-15]:

Click [HERE](#) for the list of that last 7 days.

Good luck if you are looking for a job where you can use your IEC 61850 experience and knowledge.

IEC 61850 and DNP3 applications are picking up!

Posted by [Karlheinz Schwarz](#) at [2:21 AM](#) [0 comments](#)

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Labels: [61850](#), [DNP3](#), [electric power system](#), [GOOSE](#), [IEC 61850](#), [protection](#), [SCADA](#), [schutztechnik](#), [seminar](#), [Smart Grid](#), [standards](#), [Training](#)

Sunday, September 11, 2011

Southern California Edison's Vision for Tomorrow's Smart Electric Grid – Invest in yourself

In the IEEE power & energy magazine, issue of September/October 2011, you can find very interesting and important statements on the future electric power grid. The current issue provides several papers on power distribution systems. One remarkable paper is "Good Vibrations" (p 22-32) from Robert J. Yinger and Ardalan E. Kamiab (both with Southern California Edison, Westminster, California).

They state at the very beginning that "A smart grid involves adding to the grid **millions of smart electronic devices** like phasor measurement units, fault indicators, meters, and electric vehicle chargers that will send and receive **millions of pieces of data per minute** to produce actionable information and using that information to enhance the operations and control of the electric system."

New hardware and software needs to be developed, installed and used – by engineers and programmers that may still be students at a high school. And what about the senior technicians? Are they "open" for "open" systems?

Whatever the mix of renewable power will be – one thing is sure: the future power delivery system needs a lot more information systems for the millions of smart electric devices!! Standards help to keep the cost quite low – by preventing the proliferation of the myriads of vendor specific solutions.

Be aware that standards are just tools – in the hands of people: young and senior experts, and newbies.

For Southern California Edison's vision standards like IEC 61850 and DNP3 are quite crucial. In order to really benefit from the standards, "one of the challenges facing the utility industry over the **next few years is training** the necessary workforce for **planning, building, operating, and maintaining the smart grid**. A large number of new technologies are being applied to the smart grid, including new equipment, state-of-the-art communications technologies, and advanced control capabilities ... that can help the entire utility industry **prepare the workforce of the future** to implement the smart grid ... The **workforce needs to be trained so that all of these new technologies can be implemented smoothly** ... Planning for these advanced smart grid systems **needs to be done now** ..."

There is a chance next week (in Nashville, TN, 20-21 September, 2011) to get prepared for the new standards IEC 61850 and DNP3:

Click [HERE](#) for the program and further details of event next week.

Invest in becoming a valued power automation professional!

Posted by [Karlheinz Schwarz](#) at 1:11 PM 0 comments

Labels: [61850](#), [Automation](#), [distribution automation](#), [DNP3](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [peopleware](#), [Power Automation](#), [protection](#), [seminar](#), [Smart Grid](#), [smart people](#), [smart solution](#)

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Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Friday, September 9, 2011

Huge Power Outage in South-West of U.S.A – started in Substation?

The South-West of the U.S.A. was hit by a major power outage (some 5 million people had no power) that was likely being caused by some event in a substation yesterday (Thursday, 2011-09-08). Reports say that it is likely that an employee removing a piece of monitoring equipment has caused a massive power outage. Investigations are underway.

What does this mean for standards like IEC 61850 and IEC 61400-25, DNP3, CIM, ... ? It means a lot for people that deal with the power system! Why? Because we have to understand that the **power delivery system is a huge and complex POWER system!!!** Power engineers and electrical engineers are very crucial to the availability of the power 24 hours and 7 days a week! All the smart(er) grid and substation automation activities and solutions based on **information models and communication standards are secondary** (even they are becoming more important in the future).

When I conducted the [workshop on IEC 61850 and IEC 61400-25 in Shanghai \(China\) last Monday](#), I highly recommended to the 110 young engineers and students that they **should closely team up with the experienced senior power and electrical engineers that have run the power grid so far!**

Information Technology WILL (and MUST) SUPPORT the operation of the future power system – BUT it is more important to have **enough power and electrical engineers**. So, **TEAMWORK** of all people involved in the power system is VERY CRUCIAL!! **And PEOPLEWARE** – well experienced and educated engineers.

Teamwork requires that each person involved has a basic understanding of all the many aspects of the grid, how to operate and maintain it! Electrical engineers need to understand the huge influence that will come through the new standards like IEC 61850, ... and IT people need the basics of the power grid!

If you get more details on the cause of the blackout in San Diego this week, please post it through the comment link to this post. Thanks.

We all (as a Team) have to learn something out of this big event!

Posted by [Karlheinz Schwarz](#) at 2:58 AM 0 comments 

Labels: [blackout](#), [IEC 61400-25](#), [IEC 61850](#), [monitoring](#), [Power Automation](#), [power systems](#), [protection](#), [SCADA](#), [Substation](#), [Substation Automation](#)

Thursday, September 8, 2011

110 Young People attended the Shanghai IEC 61850 and IEC 61400-25 Workshop

The workshop on IEC 61850 and IEC 61400-25 organized by the State Energy Smart Grid R&D Center (Shanghai) hosted at Shanghai Jiao Tong University on Monday, 05 September 2011, was very successful.

The **110 young attendees** from 37 organizations came to the event to get up-to-date information about the standards, market acceptance, challenges with the new standards, experience, and implementation hints.

One of the students of the workshop and the teacher at the entrance:



The 110 attendees (mostly young people):



Professor Peichao Zhang and his colleague Professor Dong Liu organized the event:



Click [HERE](#) for the program of the event.

According to a report given during the IEC TC 57 Plenary meeting in Shanghai (6.-7. September 2011), one substation per day and one wind power turbine per hour are installed in China. So, there is a huge demand for solutions according to IEC 61850 and IEC 61400-25.

The young people are eager to learn how to use the standards for the various products and applications. The workshop has helped them a lot to get the basics of the standard.

Posted by [Karlheinz Schwarz](#) at 4:42 AM 0 comments 

Labels: [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [protection](#), [Smart Grid](#), [smart solution](#), [Substation](#), [wind power](#), [wind turbine controller](#)

Friday, September 2, 2011

Reporting and GOOSE compared


IEC 61850 and IEC 61400-25 offers various possibilities for exchanging data values in real-time or near real-time. Whatever your definition of real-time is, here are some hints on the options and some hints on how to use them:

List of possibilities to exchange data values:

Information exchange

Summary of accessing data objects (1

- Get a value of single data object ([GetDataValues](#) – [Client driven](#))
- Get a list of values of data objects ([GetDataValues](#) with list sent each request – [Client driven](#))
- Get the complete list values of data objects using a dataset object ([GetDataSetValues](#) – [Client driven](#))
- Get the complete list of values of data objects (of a dataset) using reporting ([reporting](#), [General Interrogation](#) – [Client driven](#))
- Get the complete list of values of data objects (of a dataset) using reporting ([reporting](#), [Integrity period](#) – [Server driven](#))
- Get one ($\text{BufTm}=0$) or more ($\text{BufTm}>0$) value(s) of data objects (dataset) using [reporting](#) on data and quality change and data update ([Server driven](#))
- GOOSE and Sampled Values ... exchanges complete list of values of data objects of a dataset (events: application specific – [Server driven](#))
- Get sequence of value(s) of data objects (of a dataset) using [logging](#) (on data and quality change and data update – [Client driven](#))



Page 83 © 2004-2011 Netted Automation

Comparison of Reporting and GOOSE / Sampled measured values (SMV):

Summary of accessing data objects (2)

	Reporting	GOOSE / SMV
Max. message size	... 64.000 ... octets	< 1.500 octets
Segmentation	Yes (option in Report)	No
Flow control	Yes (TCP)	No
Detection of loss	Yes (TCP)	Yes (var. counters)
Reliable transmission	Yes (TCP)	Yes (re-transm. / cyc.
Network routing	Yes (IP)	No
Relation – 1:1	Yes	No / Yes
Relation – 1:n	Yes (multiple CBs)	Yes (Layer 2 multicast)
Timeliness	... 1 sec few msec ...
General Interrogation	Yes	No
Layers	1 ... 7, Application	1,2,7, Application
Document	IEC 61850-7-2, 8-1	IEC 61850-7-2, 8-1 / 9



Note that all message contents are encoded ASN.1 BER – with the exception of the data values in SMV and optionally in GOOSE Edition 2 where the data values are fixed encoded (for optimization!).

The timeliness of GOOSE and SMV depends on the definition of the standard (e.g., using special messages directly on data link) AND on the IMPLEMENTATION! The bottleneck is usually in the end-nodes and not in the communication.

Posted by [Karlheinz Schwarz](#) at 2:18 AM 3 comments 

Labels: [61850](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [real-time](#), [SMV](#)

Sunday, August 21, 2011

PV Power to (de)stabilize the European Power Delivery System?

One swallow does not make a summer – But 100.000 do. One PV system on a roof in the nineties did not make a smart grid based on renewable resources. But due to the growth of renewable resources like PV the power delivery system changes a lot. Usually today the PV inverters do automatically frequency disconnection.

ENTSO-E the “European Network of Transmission System Operators for Electricity” noted in a letter to Commissioner Oettinger of the European Commission that too many “swallows” are flying somehow “uncontrolled” – flying alone ... not being aware what’s going on around them ... not seeing the system (!):

“This letter is to brief you on a security of supply issue arising from the **automatic frequency disconnection settings** of installed photovoltaic (PV) panels in some European countries and to request your support in encouraging the national Regulatory authorities in impacted countries to facilitate the timely implementation of remedial actions.

Due to the interconnected nature of the transmission system until such remedial actions are implemented the synchronous Central European power system **is at increased risk to significant frequency deviations of a magnitude that would generate a widespread loss of supply.**

In several European countries, connection standards applicable to photovoltaic panels and other distributed generation have been or are still specifying that the panels automatically disconnect from the grid whenever the system frequency reaches **0.2 or 0.3 Hz deviations** from the required normal value of 50.0 Hz.

Current information from our Member TSOs, including for example Germany and Italy, indicate that the significant growth in photovoltaics in recent years has resulted in a PV installed capacity (with such settings) approaching 25 000 MW. At these levels there is clearly a risk of an instantaneous generation loss far in excess of the 3000MW generation loss „ride-through“ design limit for the Continental European system. ...”

Click [HERE](#) for the letter from ENTSO-E [English, pdf]

Ok, what to do now? Act! There are many actions needed to get CONTROL over the system in the future system based on many distributed resources! One aspect is to change limits ... but more important is the **control** of the power resources.

A group of IEC TC 57 WG 17 is working on a very crucial part of IEC 61850: Draft IEC 61850-90-7 TR – “Communication networks and systems for power utility automation – Part 90-7: IEC 61850 object models for photovoltaic, storage, and other DER inverters” (57/1155/DC).

Major PV inverter manufacturers and other experts have drafted the above document.

Crucial aspects covered by 90-7 (in addition to IEC 61850-7-420 – DER) are:

7. DER management functions for inverters.

7.1 Immediate control functions for inverters

7.1.1 Function INV1: connect / disconnect from grid

7.1.2 Function INV2: adjust maximum generation level up/down

7.1.3 Function INV3: adjust power factor.

7.1.4 Function INV4: request real power (charge or discharge storage)

7.1.5 Function INV5: pricing signal for charge/discharge action

7.2 Modes for volt-VAR management

7.2.1 Var management modes using volt/VAR arrays

7.2.2 Volt-VAR mode VV11: normal energy conservation mode

7.2.3 Volt-VAR mode VV12: maximum VAR support mode

7.2.4 Volt-VAR mode VV13: static inverter mode

7.2.5 Volt-VAR mode VV14: passive mode.

7.3 Modes for frequency-related behaviours

7.3.1 Frequency management modes

7.3.2 Frequency-watt mode FW21: high frequency reduces active power.

7.3.3 Frequency-watt mode FW22: constraining generating/charging by frequency (see diagram below)

7.4 Dynamic grid support during abnormally high or low voltage levels

7.4.1 Dynamic grid support mode TV31: dynamic grid support during abnormally high or low voltage levels

7.4.2 Example of dynamic grid support capabilities.

7.5 Functions for “must disconnect” and “must stay connected” zones

7.5.1 “Must disconnect” MD curve

7.5.2 “Must stay connected” MSC curve

7.6 Modes for watt-triggered behaviours

7.6.1 Watt-power factor mode WP41: feeding power controls power factor

7.7 Modes for voltage-watt management.

7.7.1 Voltage-watt mode VW51: voltage-watt management: generating by voltage

7.7.2 Voltage-watt mode VW52: voltage-watt management: charging by voltage

7.8 Modes for behaviours triggered by non-power parameters

7.8.1 Temperature mode TMP

7.8.2 Pricing signal mode PS

7.9 Setting and reporting functions

7.9.1 Establishing settings DS91: modify inverter-based DER settings

7.9.2 Event logging DS92: log alarms and events, retrieve logs

7.9.3 Reporting status DS93: selecting status points, establishing reporting mechanisms

7.9.4 Time synchronization DS94: time synchronization requirements

Example (without further explanations):

7.3.3 Frequency-watt mode FW22: constraining generating/charging by frequency:

Example Settings

RmpTms for P1	10s
RmpTmmDec	100% Wmax/minute
RmpTmmInc	40% Wmax/minute
RmpRsUp	10% Wmax/minute

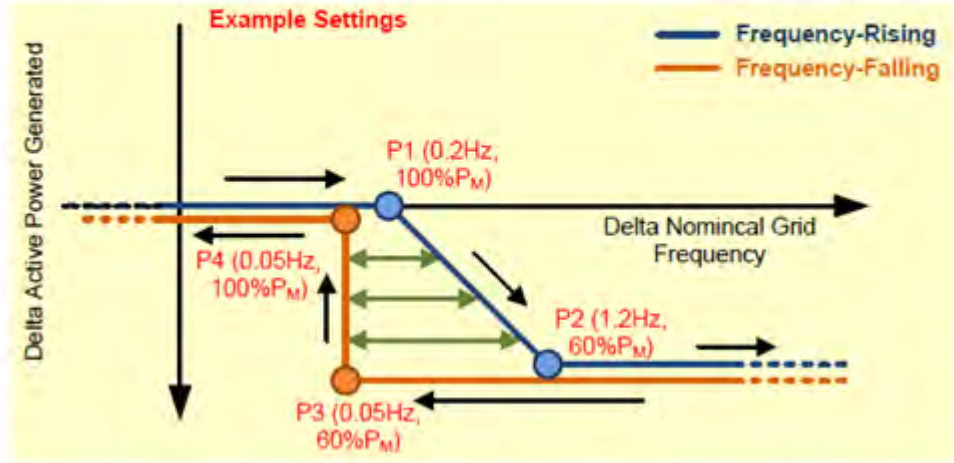


Figure 19: Frequency-based active power modification with the use of an array

It is expected that this part IEC 61850-90-7 is one of the crucial parts of IEC 61850 for the stability of the future power delivery systems all over.

It’s “PV summer time” – there are millions of PV inverter installed (most of them are not controlled ... just “flying” around.

Please contact your national IEC TC 57 committee to get a copy of the document.

Click [HERE](#) for an interesting ENTSO-E Draft "Requirements for Grid Connection Applicable to all Generators" dated 22 March 2011

The Power Systems are quite comprehensive ... and complex!

Posted by [Karlheinz Schwarz](#) at [12:25 PM](#) [0 comments](#) 

Labels: [active power control](#), [control](#), [IEC 61850](#), [IEC 61850-7-420](#), [IEC 61850-90-7](#), [inverter](#), [photo voltaic](#), [PV](#)

Thursday, August 18, 2011

IEC 61850 for Substations Only?

The title and scope of IEC 61850 was for many years very restricted:

2001 – 2009: Communication networks and systems in **substations**

2010 – ... : Communication networks and systems for **power utility automation**

The new title and scope is still too restrictive! The working group wanted to change to "... for automation". This was not accepted by the IEC Central Office. IEC deals with electro-technical matters. The term "automation" was understood as too broad.

From a content point of view IEC 61850 could be used all over where measurements and status information needs to be communicated – in any application domain. Even if you are just monitoring a process or system (no control need) you can use IEC 61850 models, messages and configuration tools.

The Model "STMP" (temperature supervision logical node) can be used wherever a temperature measurement is taken: Temperature of a transformer, of a room, ambient temperature or your body temperature. When the "STMP.Tmp.mag" value reached the configured limit (Alarm limit or Trip limit) an report or a GOOSE message may be issued.

By the way, IEC 61850 has rules how to define extended logical nodes and data objects. All values can be communicated the Ethernet and TCP/IP based information exchange methods.

Experts pointing to the scope "substations" are not up-to-date. Those arguing that IEC 61850 is for "power utility automation" only may not like to accept that IEC 61850 is very generic or common – applicable in a wide range of applications.

The title and scope are just "toner on paper".

Posted by [Karlheinz Schwarz](#) at [10:07 PM](#) [1 comments](#) 

Labels: [Automation](#), [building automation](#), [communication](#), [condition monitoring](#), [electric power system](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [Information Model](#), [utilities](#)

Progress in Smart Grid Deployment – Too slow?

Many people all over expect that the Electric Power Delivery system will be changed to become smarter over night. A system that has been build over a period of 20, 50, 100+ years cannot be changed in short time! The change is likely to occur in steps over several decades – may be for ever.

Peter Fox Penner (US consultant) has summarized what is going on in the process of change. He concludes: "... Taken together, the trends discussed here show that **the smart grid is expanding and developing**, even if the most successful entities and programs are surprising. More importantly, these trends illustrate the evolutionary **nature of smart grid development**. Arguments that the **smart grid is moving too slowly** underestimate the **scale and complexity** of rebuilding our entire grid. Utilities are tasked with deploying a complex series of infrastructure investments that must work in harmony with their current (already smart) systems, use innovative pricing that customers support, and produce a net benefit. Under **these conditions**, **slow and steady wins the race**. We can expect smart grid development to occur in stages **over decades**, ultimately transforming the power industry into a very different business."

Click [HERE](#) for his report in the IEEE Smart Grid Newsletter.

When we talk about the pace of change in the information technology in industrial automation we should not get nervous when we see the slow progress! How long did it take to get Gigabit/s Ethernet for substation environments developed ... and accepted!? New approaches in Automation take often decades before they are accepted and used.

Click [HERE](#) for a brief discussion on Ethernet and Tokenbus ... written decades ago.

The future for standards is quite bright. When a utility decides to deploy information technology for the next 10 or 20 years it will likely chose a stable standard – so that there is no need to change the solution every 4 or 5 years ... when manufacturers have developed a new solution.

MMS (Manufacturing Message Specification, ISO 9506, used in IEC 61850-8-1 to define the message encoding) has been developed in the late eighties (80s !) – some 25 years ago. Web services are understood by some people as an option for messaging – more up-to-date. I have seen a Report message of a simple state change message using IEC 61400-25-2 Web Services the other day. The length of the XML coded Report message was some 850 octets !! A Report message encoded with MMS/ASN.1 BER (as per IEC 61850-8-1) is really shorter: by a factor of about 10 !!

Don't hurry. Take your time. Rome hasn't be built over night!

I usually sate in my seminars that the deployment of IEC 61850 happens too fast – users often do not have any clue what they got installed. They got it because it was cheaper than xyz. All in a sudden they have several substations with hundreds of IEDs communicating with IEC 61850 – and many (may be almost all) utility engineers have to struggle with this new way to do protection and automation. Many of them have started to get training in IEC 61850 ... and you?

Don't **start slow** and **slow down fast** ;-)

Just start – there is something to learn!

Posted by [Karlheinz Schwarz](#) at 9:47 PM 0 comments 

Labels: [Automation](#), [communication](#), [distribution automation](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-90-7](#), [inverter](#), [power systems](#), [Smart Grid](#), [standards](#)

Wednesday, August 17, 2011

**Engineer for IT Security in Industrial Automation
Wanted (TÜV SÜD)**

Der TÜV SÜD in München sucht einen Ingenieur für IT-Sicherheit (w/m)

Aufgaben:

- Erstellung von Prüf- und Testszenarien nach einschlägigen Standards (z.B. IEC 62351, IEC 15408 etc.)
- IT-Sicherheitsberatung und Audits von Industriesystemen (z.B. Leit- und Steuernetzwerke)
- Analyse/Auswertung von (industriellen) Kommunikationsprotokollen (z.B. TCP/IP, XML, PROFINET)
- Durchführung von IT-Sicherheits- und Risikoanalysen
- Durchführung von IT-Sicherheitstests und Penetrationstests
- Berichterstellung
- Mitwirkung bei Fachveranstaltungen (Schulungen, Seminare, Tagungen)

[HIER](#) für weitere Informationen klicken.

Übrigens: die Norm [IEC 62351 wird auch für Geräte nach IEC 61850 und IEC 61400-25](#) eingesetzt.

Posted by [Karlheinz Schwarz](#) at [3:59 AM](#) [0 comments](#) 

Labels: [IEC 62351](#), [security](#)

Test Engineer for IEC 61850 Wanted (TÜV SÜD Munich)

Der TÜV SÜD in München sucht einen Ingenieur für Schaltanlagen (w/m)

Aufgaben:

- Erstellen von Prüf- und Testszenarien zur Prüfung der Konformität und Interoperabilität nach IEC 61850 und IEC 61400-25
- Erstellen, Erweitern und Modifizieren von Test-Skripts für die automatisierte Testdurchführung und -auswertung
- Prüfung von Konfigurationen und technischen Datenmodellen beim Kunden
- Analyse und Auswertung von Kommunikationsprotokollen und Testergebnissen
- Erstellen von Prüfberichten nach vorgegebenen Qualitätsstandards
- Unterstützung des Kunden bei der Umsetzung von Normanforderungen sowie der Bewertung und Behandlung von Testergebnissen
- Mitarbeit bei nationalen und internationalen Standardisierungsgremien, Vertretung bei Konferenzen und Fachveranstaltungen

[HIER](#) für weitere Informationen klicken.

Posted by [Karlheinz Schwarz](#) at [2:16 AM](#) [0 comments](#) 

Labels: [conformance test](#), [IEC 61400-25](#), [IEC 61850](#), [testing](#), [wanted](#)

Thursday, August 11, 2011

Progress in IEC 61850 standardization

The FDIS IEC 61850-9-2 Ed.2:

Communication networks and systems for power utility automation -
Part 9-2: Specific communication service mapping (SCSM) -

Sampled values over ISO/IEC 8802-3

has been accepted as International Standard.

The CDV IEC 61850-10 Ed.2 (57/1162/CDV):
Communication networks and systems for power utility automation -
Part 10: Conformance testing

has been published for comments and ballot by 2012-01-06.

The following has been changed and extended:

- Update of Server device conformance test procedures
- New Client system conformance test procedures
- New Sampled values device conformance test procedures
- New Engineering Tool related conformance test procedures
- New GOOSE performance test procedures

Posted by [Karlheinz Schwarz](#) at [10:28 PM](#) [0 comments](#) 

Labels: [conformance test](#), [GOOSE](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61850-9-2](#), [sampled value](#)

Wednesday, August 10, 2011

Developers Workshop for IEC 61850 Client/Server and Publisher/Subscriber for Smart Grids in Shanghai

A one-day Developers Workshop for IEC 61850 Client/Server and Publisher/Subscriber Devices and Applications will be conducted by Karlheinz Schwarz at the

State Energy Smart Grid R&D Center (Shanghai) hosted
at Shanghai Jiao Tong University

800 Dong Chuan Road

Shanghai, China, 200240

05. September 2011 (Monday)

智能电网标准 · 应用与开发研讨会

由IEC TC 57核心成员Karlheinz Schwarz先生主讲 内容针对

两种服务类型 客户/服务器架构 发布/订阅架构

两类应用平台 嵌入式装置 Windows应用系统

国家能源智能电网 上海 研发中心

上海交通大学 上海市东川路800号

2011.9.5 (周一)

Click [HERE](#) for the Program in English and Chinese [pdf].

Click [HERE](#) for the profile of the instructor [pdf].

Click [HERE](#) for the registration and contact information [Word document].

Posted by [Karlheinz Schwarz](#) at [12:18 AM](#) [0 comments](#) 

Labels: [Beck Chip](#), [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Smart Grid](#)

Tuesday, August 9, 2011

Germany Increases Energy Research by 75 percent to 3.5 Billion Euros

The German government announced the other day that it will spend much more research money into the development of a clean energy delivery system. The government will spend 3.500.000.000 Euros (\$4.9 billion) into research for renewable generation, higher energy efficiency, energy storage and grid-technology in the next three years (2011-2014).

Click [HERE](#) for the press release [in German only]

It is very likely that a reasonable part of this money will be spend for the IT infrastructure needed for the many applications of future power delivery system. There are at least two stable solutions that have to be taken into account: (1) the electrical system (A.C. and D.C.) and (2) the IP infrastructure. The future power system will be based on these corner stones. The electrical system will be supported by myriads of new intelligent controllers of the power resources (renewable, storage, ...) and new controllers of the grid (transmission and distribution) – and many of the controllers need to **work** (communicate over Ethernet and TCP/IP) **together and being supervised** by other controllers, which are part of the overall control of the power system ...

The international standard series IEC 61850, IEC 61400-25, IEC 61968/70 (CIM), IEC 60870-6 (ICCP), ... are here to help that the dream of the German government becomes true. Without these standards, the future power delivery system would be a nightmare with hundreds of proprietary communication solutions.

Many more companies in Germany and Europe are starting to put their hands on the standards IEC 61850 and IEC 61400-25 to be prepared for the future power delivery system in 2011. More than 20 companies will have received an in-house course on IEC 61850 and other IEC standards by Karlheinz Schwarz by end of 2011, and he will have run about an additional 10 public courses this year.

There is a lot to be done – let's get started or continue dealing with the IT infrastructure using IEC standards.

Of course: The IT infrastructure is just a vehicle for the future power delivery system. There is much more to do than to communicate. By applying already available standards it saves a lot of R&D money that should better be spend on questions like, "What does demand response really mean?"

Click [HERE](#) for a nice paper that discusses questions like: "What happens with the electrical system if a huge number of customers start their dishwashers, washing machines, stoves, AC, ... at the same time after a real-time price information has been received by the consumers?" " Could they behave in a way to cause power outages? May be ...

Posted by [Karlheinz Schwarz](#) at [2:08 AM](#) [0 comments](#) 

Labels: [61850](#), [communication](#), [distribution](#), [distribution automation](#), [E-Mobility](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [IEC61850](#), [monitoring](#), [Power Automation](#), [power distribution](#), [power systems](#), [seminar](#), [Smart Grid](#), [Training](#)

Tuesday, August 2, 2011

Corrected URLs for IEC 61850 Hands-on Training Course in Sao Paulo (Brazil) on 11.-14. October 2011


The URLs for the STRI/NettedAutomation hands-on training course

scheduled for Sao Paulo (Brazil) on 11.-14. October 2011 were damaged ... please find the correct links:

Click [HERE](#) for the Program and Registration information for attendees from Brazil.

Click [HERE](#) for the Program and Registration information for all other attendees.

The course will be conducted at Instronic: <http://www.instronic.com.br/>

Posted by [Karlheinz Schwarz](#) at [10:52 AM](#) [0 comments](#) 

Labels: [hands-on Training](#), [IEC 61850](#)

Cisco's conclusion on FERC's Non-Ruling on IEC Standards

FERC (Federal Energy Regulatory Commission) decided [in July 2011 to not \(yet\) rule on five Smart Grid standard series](#) suggested by the National Institute of Standards Technology (NIST) / Smart Grid Interoperability Panel (SGIP). These families of standards defined by the International Electrotechnical Commission (IEC) were nominated by NIST/SGIP for consideration by FERC in rule making in October 2011. These are:

- IEC 61968: Application Integration at Electric Utilities-System Interfaces for Distribution Management
- IEC 61970: Energy management system application program interface
- IEC 61850: Communication Networks and Systems for Power Utility Automation
- IEC 60870-6 series: Telecontrol protocols compatible with ISO standards and ITU-T recommendations
- IEC 62351: Power systems management and associated information exchange - data and communications security

Cisco's position on this FERC non-ruling (according to their website – see below) is:

- **"Are the IEC standards really not ready for prime time?** This is unlikely because most of these standards are already in use outside North America.
- **Is cyber security a solved problem?** Not likely, as long as there are hackers in the world, cyber security will be an on-going challenge.
- **Is cyber security an intractable problem?** Far from it, the public Internet and private Internets (e.g. DoD) can be highly secure networks. And open-standards, community-based security mechanisms are far superior to "security by obscurity", or the status quo in utility networking which largely consists of hundreds of parallel SCADA networks.
- **Is greater awareness and education required? Indeed yes. The utility industry and the regulatory commissions need to hear from the Internet community of vendors, service providers, network operators, system admins, and cyber security experts, how** packet networks can be made secure.

The FERC non-action is both a temporary setback and a call-to-action for the Smart Grid community. The concerns expressed by FERC and the regulators are genuine and need to be addressed. Unfortunately, **the need for standards in transmission and distribution networks can't be put off.** Fortunately, the cyber security questions related to

the Smart Grid **have good answers available** from the long experience of the Internet.

Click [HERE](#) for the Cisco Developer Network statement on FERC's non-ruling.

What is true for the security issues (IEC 62351) is true for the other standard families, too! Many engineers need to become aware of the huge challenges by more education and training!!

Investment in peopleware is one of the needed actions to keep the power flowing.

Click [HERE](#) for more discussions on peopleware.

Next opportunity in North America:

Nashville (TN, USA)

20.-21. September 2011

Remote Conference

2 day Seminar (conducted by NettedAutomation) on Power System Communication covering IEC 61850, IEC 61400-25, DNP3, NIST Interoperability Roadmap, Smart Grids, security standards, ...

http://www.remotemagazine.com/rem-conf11/rem11_workshop.php

Posted by [Karlheinz Schwarz](#) at 4:46 AM 2 comments 

Labels: [Cisco](#), [education](#), [FERC](#), [IEC 61850](#), [IEC 62351](#), [peopleware](#), [security](#), [Training](#)

IEC 61869-6: The IEC 61850 Interface for Instrument Transformers

IEC TC 38 has published the new Committee Draft (CD) for the Digital interface for instrument transformers (38/418/CD):

IEC 61869: Instrument Transformers -
Part 9: Digital interface for instrument transformers

This standard defines a method for digital communications of instrument transformer

measurements. It is **based on the IEC 61850** series of standards, IEC 60044-8 and the IEC International User Group document Implementation Guideline for Digital Interface to Instrument Transformers Using IEC 61850-9-2 (known as 9-2LE). It includes additional improvements including IEC 61588 network based time synchronization, and frequency response requirements.

This new standard will be part a product family standard for instrument transformers. It provides an application of the horizontal standard series IEC 61850, which details layered substation communication architecture in the world of instrument transformers.

By providing tutorial material such as examples and explanations, it also gives an access for instrument transformer, protective relay and meter **experts** to concepts and methods applied in the IEC 61850 series.

An overview about the standard series 61869 is shown in the next picture:

PRODUCT FAMILY STANDARDS	PRODUCT STANDARD	PRODUCTS	OLD STANDARD	
61869-1 GENERAL REQUIREMENTS FOR INSTRUMENT TRANSFORMERS		61869-2 ADDITIONAL REQUIREMENTS FOR CURRENT TRANSFORMERS	60044-1 60044-6	
		61869-3 ADDITIONAL REQUIREMENTS FOR INDUCTIVE VOLTAGE TRANSFORMERS	60044-2	
		61869-4 ADDITIONAL REQUIREMENTS FOR COMBINED TRANSFORMERS	60044-3	
		61869-5 ADDITIONAL REQUIREMENTS FOR CAPACITIVE VOLTAGE TRANSFORMERS	60044-5	
	61869-6 ADDITIONAL GENERAL REQUIREMENT FOR LOW POWER INSTRUMENT TRANSFORMERS	61869-7	ADDITIONAL REQUIREMENTS FOR ELECTRONIC VOLTAGE TRANSFORMERS	60044-7
		61869-8	ADDITIONAL REQUIREMENTS FOR ELECTRONIC CURRENT TRANSFORMERS	60044-8
		61869-9	DIGITAL INTERFACE FOR INSTRUMENT TRANSFORMERS	
		61869-10	ADDITIONAL REQUIREMENTS FOR LOW-POWER STAND-ALONE CURRENT SENSORS	
		61869-11	ADDITIONAL REQUIREMENTS FOR LOW POWER STAND ALONE VOLTAGE SENSORS	60044-7
		61869-12	ADDITIONAL REQUIREMENTS FOR COMBINED ELECTRONIC INSTRUMENT TRANSFORMER OR COMBINED STAND ALONE SENSORS	
		61869-13	STAND ALONE MERGING UNIT	
		61869-14	ADDITIONAL REQUIREMENTS FOR DC CURRENT TRANSFORMERS	
		61869-15	ADDITIONAL REQUIREMENTS FOR DC VOLTAGE TRANSFORMERS	

- Part 9 Replaces IEC 60044-8 digital solution.
- Provides a product standard for instrument transformers with a digital interface according to 61850; similar to what IEC 62271-3 is doing for switchgear.
- Includes backward compatibility for the UCA International User Group Implementation Guideline for Digital Interface to Instrument Transformers Using IEC 61850-9-2.
- Uses IEC 61588-Ed2 for time synchronization, with an option for 1PPS.

The CD ballot closes 2011-11-04.

Contact your national IEC TC 38 or TC 57 committee to get a copy of the CD.

Posted by [Karlheinz Schwarz](#) at 2:12 AM 0 comments 

Labels: [9-2LE](#), [ct](#), [IEC 61850](#), [IEC 61869](#), [instrument transformer](#), [merging unit](#), [vt](#)

Wednesday, July 27, 2011

Hannover (Germany) Black Out Caused by Aging Infrastructure

Some 600,000 people of the city of Hannover (Northern Germany) were hit by a blackout (up to 81 minutes) on July 13, 2011.

First a power plant was tripped due to some internal problems. Then it was expected that a 220 kV / 110 kV transformer substation would transform more power from the 220 kV network into the 110 kV network – this would have balanced the load in the city and provided power from outside.

The transformer was protected by protection functions that prevent overloading (overheating) the transformer – in order to not damage the transformer windings by too high temperatures ... Due to the increase of power flow after the power plant outage in the city, the protection tripped, because it decided that the flow was above the configured limit. The limit was correctly set – but a capacitor (worth a few Euro) was defect and the result was that the protection tripped the circuit breaker even at a current below the configured limit! It would be interesting to know how old the protection relay was.

Due to the aging of the hardware (capacitor) it happened in Hannover recently. What city or region will be next hit by the aging infrastructure of our electrical delivery system?

More to come.

More maintenance (as decided by the utility in Hannover) is not an anti-aging means – refurbishment of aged components of the infrastructures may help ... but costs a lot of money.

Click [HERE](#) for the press release of the enercity utility of Hannover [German only].

Click [HERE](#) for a discussion of aging infrastructures [German only]

Posted by [Karlheinz Schwarz](#) at [1:36 AM](#) [0 comments](#) 

Labels: [aging infrastructure](#), [electric power system](#), [outage](#), [protection](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Monday, July 25, 2011

What Do You Need to Know to Retrieve Process Values from an IEC 61850 Compliant Device?

The answer is quite simple: Almost nothing! It depends – of course – on the availability of software for IEC 61850. Let's assume that we have a device that plays the role of an IEC 61850 server (providing a data model and services to access the values referenced by the model).

What you need is a software that plays the IEC 61850 client role. There are several options:

- Purchase source code and build your own client and API (Application Program Interface)
- Purchase source code and build your own client with an API already incorporated
- Purchase a client DLL with a simple and easy to use API
- Purchase a ready to go Browser with a graphical interface

If you want to just **retrieve some data values from a IEC 61850 compliant device**, you **JUST need to know the IP address of the device** and a free Browser evaluation software. Download the well known OMICRON IEDScout; the IEDScout runs in Demo mode for free (restricted services!):

Click [HERE](#) for more information and download link for the IEDScout.

Install the IEDScout, go to Configure (right), select New Server just by entering the below IP address and assign a server name:

SEL-421: 99.14.76.126

Use default values ... click on OK ... OK ... done. Go to Discover ... select the server you just configured ... and start communication with the corresponding device. Retrieving the information model may take several minutes! The IEDScout retrieves the model ... some thousand messages exchanged ... you may trace the messages using the Wireshark analyzer. Start the Wireshark first and then start IEDScout and connect to any IED.

Once you have the model retrieved, open the model tree and read a value in the tree or see DataSets and Control Blocks.

How long did it take to access data values from an IEC conformant device? 30 minutes ... may be 45. Maybe it took another 30 minutes to make it run on your Windows system ;-)

How many of the following standards have you read to get access to one of the above IEDs? IEC 61850-7-x, IEC 61850-8-1, ISO 9506-1/-2, ISO 8824, ISO 8825, IEEE 802.1Q, IETF RFC 792, ... 1.000, 2.000, or 5.000 pages?

To use a (graphical) interface at a client there was NO NEED to read any of the above standards! What you may need is basic information

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about IEC 61850.

Of course, this IEDScout is not an API to be used by client applications. You cannot store the retrieved data values ... ok, the full version allows to store the model as an SCL document ... and store subscribed GOOSE messages.

Another easy to use API is the SystemCorp API used to build a very simple client HMI – a .Net/C# application:

<http://blog.iec61850.com/2011/02/updated-c-client-application-for-iec.html>

The API (in form of a DLL) can be used to build your own client application in Windows (DLL) or in Linux (library).


Even the use of the DLL for the client and the use of the C# build HMI does not require to understand all details of the protocol.

Lesson 1 learned: To use the comprehensive protocols like IEC 61850, IEC 60870-5-105, IEC 60870-6 TASE.2, or DNP3 ... a simple and easy to use API is needed!! Reading thousands of pages of standards is NOT what is required!!

Lesson 2 learned: The efforts to use any of the above protocols is more or less the same! Of course there is a configuration language SCL in IEC 61850 that requires a little bit more information/education ...

Implementing the protocols requires a lot of time and efforts ... there may be some difference depending on the protocol.

Be happy by just applying simple and easy to use APIs for clients and servers. Get your first data values communicated within hours – not months ...

Posted by [Karlheinz Schwarz](#) at [10:22 PM](#) [0 comments](#) 

Labels: [API](#), [applications](#), [DLL](#), [DNP3](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61850](#), [implementation](#)

What About Siemens Simatic S7 and IEC 61850?


Siemens Energy has a wide range of IEC 61850 compliant IEDs. This is what the power utility market expects. But: Does Siemens' Simatic S7 also support IEC 61850? Yes, Siemens Industry offers a wide range IEC 61850 compliant solutions for Simatic S7 and PCS7; there are several solutions available:

- Client and server for SIMATIC PLCs S7-300, S7-400 and S7 meC.
- Client as WinCC Channel
- Client as DLL
- Gateway IEC 60870-5-104 to IEC 61850

Click [HERE](#) for more details including pricing and contact information [English]

[HIER](#) klicken für mehr Details, Preise und Kontaktinformation [Deutsch]

More to come in various other Siemens Industry products.

Posted by [Karlheinz Schwarz](#) at [9:17 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [PLC](#), [Siemens](#), [Simatic S7](#), [WinCC](#)

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► June (20)

► May (10)


► April (6)

► March (16)

Siemens Energy Sold more than 170,000 IEC 61850 IEDs

Siemens Energy reported yesterday that they have sold more than **170,000 Protection and Control IEDs compliant with IEC 61850** applied in substation automation systems.

Click [HERE](#) to read the press release.

Posted by [Karlheinz Schwarz](#) at [8:35 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [IED](#), [Siemens](#)

IEC 61850 Hands-on Training Course in Sao Paulo (Brazil) on 11.-14. October 2011 confirmed

The STRI/NettedAutomation hands-on training course scheduled for Sao Paulo (Brazil) on 11.-14. October 2011 is now confirmed. The registration is now open.

Click [HERE](#) for the Program and Registration information for attendees from Brazil.

Click [HERE](#) for the Program and Registration information for all other attendees.

The course will be conducted at Instronic: <http://www.instronic.com.br/>

Posted by [Karlheinz Schwarz](#) at [12:23 AM](#) [0 comments](#) 

Labels: [hands-on Training](#), [IEC 61850](#), [Training](#)

Sunday, July 24, 2011

Another Discussion on IEC 61850 versus DNP3

For more than a decade there are discussions on "IEC 61850 versus DNP3". I just saw a discussion which seems to be quite new.

These discussions happened in the field bus area for the last 20+ years – and still happen. They do not really help the industry. Hope we will not run into the same situation in the power utility domain as in the field bus war!

Click [HERE](#) for the full discussion. There are many aspects discussed in the paper ... I just want to discuss one issue raised:

Excerpt: "In addition, IEC 61850's major advantage—that holistic concept to solutions—is also a major disadvantage for training. It's different from the old system, requiring "a rather steep learning curve," Muschlitz said.

"Many people get depressed when the stack of 1,500 pages of IEC 61850 is put in front of them with the directive 'learn this,' " he said."

Hm? Why should somebody read 1,500 pages of general information and many technical details? Why? Any idea? For what reason?

Have you ever read the technical specification of the many RFCs for TCP and IP and the Ethernet standards? What most people need – in order to use these technologies – is to have a simple API (Application Programmer Interface) for their Application (e.g., Internet Browser).

The real challenge with IEC 61850 is, that – before you can exchange a

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Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

single bit with a MMS message – you need the MMS server and MMS client **AND** a specific API (at least at the client side).

Why should you care about MMS and ASN.1? Just use the API and exchange your application data by reading, reporting, GOOSE, Logging, ... DON'T read the many parts of the standard!! The price of the standards will definitely be lower than the cost for reading AND understanding them!!

By the way, how many people that successfully use DNP3 have read and understood all parts of the DNP3 specification (xxx pages)?? I guess most do not have read all the docs – I would get depressed to do so as well ... and you?

One of the key issues is the availability of reasonable and easy to use APIs. See my discussion on an IEC 61850 API from the other day: Click [HERE](#).

If I would have to read and understand all specifications applied for an Airbus A380 in order to fly on it from Frankfurt to Johannesburg – I would never get there! I would better ride my bike ... ;-) ... but then there are the many bridges I have to go over ... and ferries ... to study first their specification and check if they are safe ... I better would stay at home.

Anyway, I have run many trainings on IEC 61850 – A one, two or three day training is much cheaper than buying, reading, and understanding all parts of the standard series. Reading and understanding may take several weeks and cause depressions.

Attending seminars prevents you from becoming depressed! Almost all people that attended our seminars were quite happy! Read what an attendee said: Click [HERE](#).

I wish you a stress-less application of IEC 61850 and other standards!! Good luck!!

Posted by [Karlheinz Schwarz](#) at [11:06 AM](#) [0 comments](#) 

Labels: [DNP3](#), [education](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Training](#)

Friday, July 22, 2011

High Level of Interoperability of Devices in the Power Utility Domain

There are no (almost no) competing solutions in reaching interoperability of monitoring, protection and control devices in the various areas of the power delivery domain. There is no need for a (FERC, EU, ...) mandate for interoperability standards ... **we have already a high level of interoperability and acceptance of standard families like IEC 60870-6 IEC, IEC 61968/70, IEC 61850, IEC 61400-25, IEC 62351, ...** for the process and for the control center level in transmission, distribution, and generation.

Compare it with the international Field Bus standard IEC 61158 – there are little competing international standards for field busses!! YES!! BUT: There are some **60 solutions competing in ONE SINGLE standard: IEC 61158**. See:

<http://blog.iec61850.com/2008/10/iec-fieldbus-edition-2008.html>

Have you ever seen such a (non) standard? I have seen it when I took the photo of the stack on my desk in my office in 2008! ;-)

We could be very lucky in the power utility world!!

I am happy to read FERC's encouragement of "...utilities, smart grid product manufacturers, regulators, and other smart grid stakeholders to actively participate in the NIST interoperability framework process to **work on the development of interoperability standards and to refer to that process for guidance on smart grid standards.**"

Smart(er) grids need to be build on interoperable standards – Because there is one huge interconnected, interoperable application to be monitored, protected, and controlled: The interconnected power delivery system. The largest machine globally is the European interconnected system. So, interoperability (of the electric power system) is a key objective in the power world.

We need standards for IEDs that are as interoperable as a power generator (or inverter) from Alstom and a transformer from Siemens producing 400/230 V and 50 Hz and a hair dryer from GE that consumes 230 V and 50 Hz.

Electrical Engineers should understand the need of interoperability of IEDs. Just require the same for monitoring, protection and control IEDs.

Posted by [Karlheinz Schwarz](#) at [10:15 PM](#) [0 comments](#) 

Labels: [condition monitoring](#), [Critical Infrastructure Protection](#), [distribution automation](#), [electric power system](#), [fieldbus](#), [IEC 61158](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC 62351](#), [interoperability](#), [Power Automation](#), [Smart Grid](#), [standards](#)

Workshop IEC 61850 und IEC 61400-25 für die Energie-Versorgungssysteme der Zukunft

Nach dem erfolgreichen Workshop Anfang Juli 2011 bieten Beck IPC GmbH und NettedAutomation GmbH weitere eintägige Workshops zum Thema IEC 61850, IEC 61400-25 und IPC@CHIP® an:

30. September 2011	9:30 - 17:00	Deutsch *1
10. January 2012	9:30 - 17:00	English *2
11. Januar 2012	9:30 - 17:00	Deutsch *1

*1 Program siehe Link unten.

*2 Program in English will be provided soon.


Veranstaltungsort:

Beck IPC GmbH
35415 Pohlheim,
Grüninger Weg 24

Kosten: 399 € pro Teilnehmer

Die Schulung bietet eine Einführung in die Normenreihen und vermittelt die wichtigsten Schritte zur schnellen und kostengünstigen Implementierung von IEC 61850 und IEC 61400-25 konformen Geräten und Systemen basierend auf Beck-Komponenten und dem [SystemCorp API](#).

Hier [KLICKEN](#), um weitere Informationen und das Programm zu erhalten.

Posted by [Karlheinz Schwarz](#) at [12:38 PM](#) [0 comments](#) 

Labels: [Beck Chip](#), [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#),

[Power Automation](#), [seminar](#), [Training](#)

Getting Started with SystemCorp's IEC 61850 API on Embedded Linux in Hours

Yesterday (July 21, 2011) I conducted a one day seminar and hands-on training for a German vendor that offers embedded controllers with embedded Linux. SystemCorp ported their IEC 61850 software including the easy to use API ([Application Program Interface](#)) onto the embedded Linux controller and provided a simple example for digital inputs and outputs. They shipped the controller with an IEC 61850 example to me to run some tests and demonstrate the solution to the vendor of the controller (in Northern Germany).

During the morning I presented IEC 61850 basics in modeling, engineering, configuration, and communication. My intention was: Help the programmers to understand basics of IEC 61850 and support them to enhance the simple application program example with an temperature measurement (STMP logical node) that provides random values. I provided the enhanced CID file with the extended model (STMP).

After lunch we set up the environment and all needed components. Then the C-Programmer started to understand the given simple application program and the API at about 14:00 h. Some three hours later the extended application was up and running and providing values through IEC 61850 messages – just 2 minutes before the general manager of the company joined our meeting!

We were able to use the new information (temperature) with the various IEC 61850 services like polling, reporting, ...

This exercise has again proven that Application programmers can learn the basics of IEC 61850 and write their own application software on the SystemCorp API within a few hours – instead of weeks and months.

The customer was very happy to reach such a challenging objective within a day – before summer vacation season starts!

The embedded Linux platform will be available within the next few months.

Please come by and check this blog – or simply subscribe to the blog (see above right corner).

Posted by [Karlheinz Schwarz](#) at 2:35 AM [0 comments](#) 

Labels: [API](#), [applications](#), [IEC 61850](#), [stack](#)

Wednesday, July 20, 2011

FERC and the five IEC Standard Families

FERC recommended in October 2010 to start a rulemaking process in order to mandate the five families (IEC 61968, IE 61970, IEC 60870-6 TASE.2, IEC 61850 and IEC 62351) for the North American market. For details click [HERE](#).

After many meetings and discussions FERC decided now to recommend these standards – but not to mandate them.

There are good reasons to keep the standardization process going and

not to stop the development of these standards and not to freeze the current content. As I always say: We are still at the very beginning of the development and application of these standards. Of course, the basic technology is defined and mature – but we all need more experience and feedback so that the standards can be improved and extended.

Adoption of any of these standard series mandated by a regulator could harm the whole process of adoption of these standards – because it could stop or blockade the needed maintenance of the standards.

At this time, the five standard families are still recommended by NIST and FERC for guidance in the development of smart(er) grid supporting technologies.

For the standards IEC 61850, IEC 61400-25, IEC 60870-6 TASE.2, and IEC 62351 there seems to be no discussion anymore if these standards will be adopted by the power utility market or not !! The market HAS ADOPTED these standards already. Even if a utility does not ask for IEC 61850 – it will get it! What else?

These standards don't need any rule making, don't need to become mandatory standards in the North American market. They are already THE GLOBALLY ACCEPTED AND USED STANDARDS!! The North American market is also about to adopt these standards. The wait for the rulemaking is over (for now) – these standards can and will be used in North America as in the rest of the world.

Note: There is NO competing solution for these standards on my radar screen at all – really.

Click [HERE](#) for the official order of FERC [Docket No. RM11-2-000] dated July 19, 2011.

Posted by [Karlheinz Schwarz](#) at [10:07 PM](#) [0 comments](#) 

Labels: [FERC](#), [IEC 60870-6](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC 62351](#), [Mandate](#), [NIST](#), [NIST Roadmap](#)

Tuesday, July 19, 2011

News from the IEC TC 57 Standardization Work

The following documents and New Work Proposals have been approved for final publication on 2011-07-15:

IEC 62351-8 TS Ed.1 [Approved Technical Specification]:
Power systems management and associated information exchange –
Data and communications security – Part 8: Role-based access control

IEC 61850-10-2 TS Ed.1 [Approved New project of Working Group 18]:
Communication networks and systems for power utility automation –
Part 10-2: Interoperability test for hydro equipments based on IEC 61850

IEC 62351-9 TS Ed.1 [Approved New project of Working Group 15]:
Power systems management and associated information exchange –
Data and communications security – Part 9: Cyber security key management for power system equipment

The following draft documents have been provided for publication on 2011-07-15:

Draft IEC 61850-90-4 TR [WG 10 Document for Comments by 2011-09-02]

Communication networks and systems for power utility automation –
Part 90-4: Network engineering guidelines for substations

Draft IEC 61850-90-7 TR [WG 17 Document for Comments by 2011-09-02]

Communication networks and systems for power utility automation –
Part 90-7: IEC 61850 object models for photovoltaic, storage, and other DER inverters

IEC 61850 together with IEC 61400-25 and IEC 62351 provides a complete suite of standards for automation – even the title restricts the scope to power utility automation. This restriction is just toner on the paper! Almost all definitions in these standards can be used in many other domains. The communication stack (including object dictionary, ACSI, MMS, TCP/IP, Ethernet, ... most of SCL) are completely independent of the electrical world.

Posted by [Karlheinz Schwarz](#) at [10:31 PM](#) [0 comments](#) 

Labels: [IEC 61850-10-2](#), [IEC 61850-90-4](#), [IEC 61850-90-7](#), [IEC 62351](#), [inverters](#), [security](#)

2,500 Experts Educated in IEC 61850 and other IEC standards

Karlheinz Schwarz has trained 2,500 experts in IEC 61850, IEC 61400-25, ICCP/IEC 60870-6, IEC 60870-5-10x, DNP3, ISO 9506 MMS, ... by mid of July 2011. He conducted more than **130 courses** that run from **one to eleven days**. Attendees from more than **70 countries** followed the presentations by one of the most requested trainers in this domain.

One of the attendees thanked for what he got:

"It was a very useful seminar. Karlheinz Schwarz is highly qualified professional in the field. I must say that we got the information from first hands and he was able to answer every question almost at once and if not - knew where to look for the answer. It is great that we had such an opportunity to attend such a seminar.
If to compare this seminar with those provided by vendors I must state that vendors have a different approach – the approach that states that IEC 61850 standard is going to solve all the existing problems. And it is not like that at the moment. What is true here is that we need to have skills and a higher level of competence in the field – either way the standard is not going to bring benefits. It was mentioned by Karlheinz Schwarz during the seminar and it is right. It was very good to know about the existing problems. Nobody before mentioned about those things we should take care of to use the possibilities of IEC 61850 with the highest efficiency. And we can understand why the vendors do not talk about such things – because every need to acquire new knowledge and get the higher level of competence would require more investments from the utilities. It is important for the utilities to know about that."

The next public events are as follows:

Nashville (TN, USA)

20.-21. September 2011

Remote Conference

2 day Seminar (NettedAutomation) on Power System Communication covering IEC 61850, IEC 61400-25, DNP3, NIST Interoperability Roadmap, Smart Grids, ...

http://www.remotemagazine.com/rem-conf11/rem11_workshop.php

Frankfurt (Germany)

05.-07. October 2011.

3 day IEC 61850/61400-25 Seminar/Hands-on Training (NettedAutomation) with Measurement IED and free evaluation software (DLL etc. fully functional - free to take home).

<http://nettedautomation.com/seminars/uca/sem.html#standard>

Sao Paulo (Brazil)

11.-14. October 2011.

IEC 61850 Comprehensive & Independent Hands-on Training.

NettedAutomation/STRI.

www.nettedautomation.com/download/Sem/sp11/STRIA_Spec_IEC61850-hands-on-tr2011v2.pdf

Pohlheim (Germany, 60 km north of Frankfurt at Beck IPC)

30. September 2011 - 1 day workshop [German]

10. January 2012 - 1 day workshop [English]

11. January 2012 - 1 day workshop [German]

Schnelleinstieg in die Produktentwicklung IEC 61850 und IEC 61400-25 konformer Geräte. Fast Track introduction in IEC 61850 and development of standard conformant products.

Gothenburg (Sweden)

IEC 61850 Hands-on Training with Multivendor IEDs

19.-21. October 2011

<http://www.stri.se/index.pl?id=9332&isa=Category&op=show>

Posted by [Karlheinz Schwarz](#) at [11:44 AM](#) [0 comments](#) 

Labels: [Beck](#), [Beck Chip](#), [education](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [seminar](#), [Training](#)

IEC 61850 in Papers at the CIRED 2011 Conference in Frankfurt (Germany)

One of the topics presented and discussed at the CIRED 2011 Conference in Frankfurt (Germany) was IEC 61850. 15 papers were about IEC 61850 with different objectives and scope.

You can freely access these papers from the CIRED website. Just click on the following links:

- [Minimum common IEC 61850 specification document published by the Spanish gr](#)
- [A Plug & Play concept for IEC 61850 in a Smart Grid](#)
- [A Study on the Application Method of IEC 61850 for Data Acquisition and Exc](#)
- [Compatibility of IEC61850 edition 1 and edition 2 implementations](#)
- [Configuring a IEC 61850 based standard Automation System for a standard Dis](#)
- [From Smart Substations to Smart Grid - How IEC 61850 can help making power](#)
- [Graphical specification for IEC 61850 based substation automation systems](#)
- [IEC 61850 Based Adaptive Distribution Protection](#)
- [IEC 61850 GOOSE over WIMAX for Fast Isolation and Restoration of Faults in](#)
- [IEC61850 9-2 Process Bus: Operational Experiences in a Real Environment](#)
- [IEC61850-BASED LOSS OF MAIN PROTECTION:THE MILANO WI-POWER PROJECT](#)
- [Toward an Auto-Configuration Process Leveraging The IEC 61850 Standard](#)
- [Benefits of converting conventional instrument transformer data](#)

[into Smart](#)

- [On-line condition monitoring and expert system for power transformers - Int](#)
- [Smart eVolution, simplicity and reliability in the MV distribution network](#)

There seems to be a lot of applications which people have not thought about some five or ten years ago.

One of the key needs seems to be all over to USE the standard for many applications in a **FAST TO MARKET** approach – instead of discussing one or the other protocol issues. The use of WIMAX applications demonstrates what we have said many times: the layered architecture of IEC 61850 can leverage the progress in communication systems. The same is true for 1 GBit/s Ethernet and time synchronization according to IEC 61588 (IEEE 1588).

The last two papers introduce IEC 61850 for condition monitoring – quite interesting and good examples for the application of IEC 61850 in power distribution.

The last but one paper from ABB (On-line condition monitoring ...) says:

“This new circuit breaker (CB) is a highly integrated device that combines measurement, protection and control capability with the primary power disconnection, switching and interruption technology. The CB embeds a protection and control Intelligent Electronic Device (IED) **designed to unleash the full potential of the IEC 61850 standard for communication and interoperability.** ...

Fast delivery

The high technology production line and component standardization enable to guarantee the **same delivery** time for the new CB series **as the standard** circuit breaker.”

Fast delivery means fast development. Embedded Controllers with IEC 61850 software already integrated into the platform could provide an easy to use and fast to go API (Application Program Interface). You can start right away with your application development – skip the IEC 61850 software integration that usually may take six to 12 months!!

The first small footprint embedded controller with an integrated IEC 61850 stack providing a simple API is the Beck IPC 61850@CHIP. There will be two other controllers running LINUX available soon that have the same IEC 61850 stack from SystemCorp and the same simple API.

Many IED vendors are already developing their HW and SW applying the Beck IPC Chip for various applications (protection, control, measurements, charging stations, ...).

Stay tuned to this Blog to get information on the two new powerful LINUX based embedded controllers with IEC 61850. Product announcements will be released this summer (2011). More to come.

Last but not least: There is still confusion what the Edition 1 and Edition 2 of IEC 61850 mean.

Click [HERE](#) to read what Edition 1 and Edition 2 means.

Posted by [Karlheinz Schwarz](#) at [6:02 AM](#) [0 comments](#) 

Labels: [Beck Chip](#), [condition monitoring](#), [distribution automation](#), [Edition 2](#), [Ethernet](#), [GOOSE](#), [IEC 61850](#), [IEC61850](#), [merging unit](#), [monitoring](#), [smart solution](#), [Synchrophasor](#), [time synchronization](#)

The Parts of IEC 61850 – Status 2011-06

The status (2011-07-15) of the various parts of IEC 61850 is as follows (blue means: Edition 2 of the corresponding document):

System Aspects

- 1 Introduction and Overview
- 2 Glossary
- 3 General Requirements (EMC, ...)
- [4 System and Project Management](#)
- 5 Comm. Requirements for Functions and Device Models (reaction time ...)

Configuration

- [6 Configuration Language for electrical Substation IED's \(App., IEDs, System, ...\)](#)

Abstract Communication Services

- 7-1 Principles and Models
- [7-2 Abstract Communication Services \(ACSI\)](#)

Mapping to real Communication Networks (SCSM)

- [8-1 Mapping to MMS and ISO/IEC 8802-3](#)
- 9-2 Sampled Values over ISO/IEC 8802-3

Testing

- 10 Conformance Testing
- 10-2 Interoperability test for hydro equipments based on IEC 61850

Data Models und usage of models

- [7-3 Common Data Classes](#)
- [7-4 Compatible Logical Node and Data Classes](#)
- 7-410 Hydroelectric power plants
- 7-420 Distributed energy resources (DER)
- 7-5 Usage of information models SAS
- 7-500 Use of LN to model functions (SAS)
- 7-510 Use of LN (hydro power plants)
- 7-520 Use of LN (DER)
- 7-10 Web-based access to the IEC 61850 models

Use-cases and network infrastructure

- 80-1 Guideline ... CDC-based data model using IEC 60870-5-101 or IEC 60870-5-104
- 90-1 Using IEC 61850 for SS-SS communication
- 90-2 Using IEC 61850 for SS-CC communication
- 90-3 Using IEC 61850 for Condition Monitoring
- 90-4 Network Engineering Guidelines
- 90-5 Exchange of synchrophasor information
- 90-6 Use of IEC 61850 for Distribution Automation
- 90-7 Object Models for PV, Storage ... inverters, ...
- 90-8 Object Models for Electrical Transportation
- 90-9 Object Models for Batteries

The number of Information Models are:

- 7-3 Common Data Classes [40]
- 7-4 Compatible Logical Node / Data Classes [158 LN /982 DO]
- 7-410 Hydroelectric power plants [63/350]
- 7-420 Distributed energy resources (DER) [50/450]
- 90-3 Using IEC 61850 for Condition Monitoring [?]

90-5 Exchange of synchrophasor information [?]
90-6 Use of IEC 61850 for Distribution Automation [?]
90-7 Object Models for PV, Storage ... (important!) [5/50]
90-8 Object Models for Electrical Transportation [?]
90-9 Object Models for Batteries [?]
61400-25-2 Wind Turbines [16/250]

Posted by [Karlheinz Schwarz](#) at [1:02 AM](#) [0 comments](#) 

Labels: [asset management](#), [batteries](#), [communication](#), [distribution automation](#), [IEC 61850](#), [Information Model](#), [logical node](#)


Tuesday, July 12, 2011

The first Commercial IEC 61850-9-2 Installation by ABB

ABB is implementing the first commercial installation of IEC 61850-9-2 LE process-bus technology (exchanging sampled values), according to a publication from early 2011.

ABB: "Powerlink (Brisbane, Australia) awarded the contract for upgrading the first iPASS substation to ABB. This project represents the world's first commercial implementation of a process bus according to IEC 61850-9-2 LE. Its implementation is now well under way."

Click [HERE](#) for the complete 5 page ABB publication.
Click [HERE](#) for further information provided by Powerlink.

Posted by [Karlheinz Schwarz](#) at [11:01 AM](#) [1 comments](#) 

Labels: [ABB](#), [IEC 61850-9-2](#), [process bus](#), [sampled value](#)

Can IEC 61850-7-2 Edition 2 be used to build Agents?

There are more and more discussions on the question if IEC 61850 could be applied to build an Agent. Some understand this as IEC 61850 versus Agent.

What is an Agent? There are as many answers when you ask experts.

I found a very interesting definition of an (special) Agent on [Wikipedia](#):

"Monitoring and surveillance agents (also known as predictive agents) are a type of intelligent agent software that **observes and reports** on computer equipment. Monitoring and surveillance agents are often used **to monitor complex** computer networks to predict when a crash or some other defect may occur. Another type of monitoring and surveillance agent works on computer networks **keeping track of the configuration of each computer connected to the network**. It tracks and updates the central configuration database when anything on any computer changes, such as the number or type of disk drives. An important task in managing networks lies in prioritizing traffic and shaping bandwidth."

More generally [Wikipedia](#) provides a definition of an Agent:

"In computer science, a software agent is a piece of software that **acts for a user or other program**".

IEC 61850 can be used for many applications: **Protection and Control** in Substations, **SCADA, monitoring** any simple and complex computer based applications in the (power system) Automation or assets like

transformer, etc. This covers also network components like Ethernet Switches – there is work underway to model the **network management MIB onto Logical Nodes and DataObjects** and use the IEC 61850 services!. An IEC 61850 Server can **act for a Client** (and its User – a person or program). Crucial characteristics of Agents can be found in IEC 61850, too. You are not (yet) convinced!?

Let me point to the Edition 2 of IEC 61850-7-2 (ACSI) published in August 2010. What is new there? A lot great stuff for more secure systems!

Edition 1 had already the service model of Reporting and Logging observing (monitoring) **application information** like status or limit violations – allowing to send and log spontaneous events. There was also a possibility to monitor **attributes of the various control blocks** (Reporting, Logging, GOOSE, SMV); allowing to report or log the enable request of a control block. This last application has been extended in Edition 2 to **keeping track of all ACSI services**.

Edition 2 of IEC 61850-7-2 introduces the concept of the **Service tracking** in clause 14:

The reporting and logging functions of process and function related data objects as defined in Edition 1 of IEC 61850-7-x and IEC 61400-25-2 are extended in Edition 2 of IEC 61850-7-2 to **keep track of changes, event, or actions in the process related information** modeled as Logical Nodes and DataObjects. IEC 61850-7-2 Edition 2 provides the possibility to **keep track of all services**, even those with negative responses. The services are classified as follows:

- Control block related services
- Command related services
- Other services

IEC 61850-7-2 Edition 2 defines additional **specific common data classes** for each type of service to be reported or logged. For a given Server, a single data object instance (tracking data object) needs to be instantiated in the object model for each kind of service, that will mirror the value of the service parameters exchanged and its acceptance by the server. This allows that a service can be logged or reported to any client. This requires that the tracking data object is a member of the data-set referenced by a LCB, BRCB, or URCB.


The following additional Common Data Classes (CDC) are defined in IEC 61850-7-2 Edition 2:

- Common service tracking (CST)
- Buffered report Tracking Service (BTS)
- Unbuffered report Tracking Service (UTS)
- Log control block Tracking Service (LTS)
- GOOSE control block Tracking Service (GTS)
- MSVCB Tracking Service (MTS)
- USVCB Tracking Service (NTS)
- SGCB Tracking Service (STS)

The tracking of services could be used to record the “manipulation” of the process and the information exchange control block attributes, e.g., the settings of relays or other functions. The FERC CIP (Critical Infrastructure Protection) requires to keep logs (records) of many information changes. The reporting and logging of IEC 61850-7-2 and the extended common data classes could be used to implement such a “Recorder” or “Data Logger”.

IEC 61850 (IEC 61400-25) provides a reach suite of **service-oriented, event-driven or agent-oriented** application and information exchange models.

The answer of the question in the headline is simply: YES, IEC 61850 can.

Posted by [Karlheinz Schwarz](#) at [4:14 AM](#) [0 comments](#) 

Labels: [61850](#), [ACSI](#), [CIP](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61850-7-2](#), [logging](#), [recording](#), [Reporting](#), [tracking](#)

Sunday, July 10, 2011

Is IEC 61850 Plug&Play or like DNP4.0 or IEC 60870-5-105?

There are many different expectations I heard from protection and control experts all over. Some people guess that IEC 61850 provides Plug&Play capabilities – meaning: Utilities just purchase IEC 61850 IEDs and (all in a sudden) their protection and control systems are up and running! There is a group of other people that expects that IEC 61850 is just another protocol – a bit more than today's solutions ... something like "DNP4.0" or "IEC 60870-5-105" [of course DNP4.0 and 105 are not real!].

IEC 61850 is **much more** than DNP3.0 and IEC 60870-5-104, and it does **NOT** provide Plug&Play. Building substation protection and control systems requires to **understand the applications** (the many protection and protection related requirements) and to **find a way how to apply IEC 61850 compliant IEDs and tools to solve their many needs**.

IEC 61850 is a **suite of tools** that can be used to solve application needs. How to use the tools and when, is NOT defined in the standard! Utilities have to find their (step by step) way to get started with IEC 61850 based solutions. It is important to get started – don't wait until IEC 61850 solves all your needs and problems. This will never happen!

Some US experts have discussed in 2005 or early 2006 what IEC 61850 provides and what needs to be done to apply the standard and standard based solutions. They show that IEC 61850 has an impact on many aspects in system design and deployment.

IEC 61850

A Practical Application Primer for Protection Engineers

Bogdan Kasztenny, James Whatley, Eric A. Udren, John Burger, Dale Finney, Mark Adamiak

Click [HERE](#) for the 43 page paper – worth to read.

My hope is that readers of the paper (hopefully readers from the utilities – or students finishing their education soon) understand that IEC 61850 requires **utility people that are well educated in IEC 61850** – in order to **understand what the big vendors have commissioned and how to use the various features of the new design**.

Today I received an email from one the international biggest transmission utilities asking for help in better understanding what is needed and what has been commissioned:

"Karlheinz, ... As you probably know, there are more and more digital substations in XXX, provided by XXX and XXX for the time being. Even if our contracts does not specify explicitly the use of 61850, they are based on this standard. Today, these substations can be viewed as black boxes, without really taking into consideration the advantages of new digital technologies. ..."

One of the crucial needs is: MORE EDUCATION FOR UTILITY EXPERTS!!

I have met many utility people that were responsible for the substations based on IEC 61850 – but DID NOT any clue how to use IEC 61850 build in functions.

IEC 61850 has a crucial impact on the WHOLE system and the engineers that build systems.

Finally, **SCADA applications** (to get status changes, limit violations, measurements, statistical information, historical information, ...) can apply IEC 61850 right away with commercially available Off-The-Shelf (COTS) solutions like the well appreciated Windows DLL for IEC 61850 (applicable for servers, clients, publishers, and subscribers).

Click [HERE](#) for a Windows DLL evaluation kit with an C# application example including source code of the client and server applications (that use the DLL).

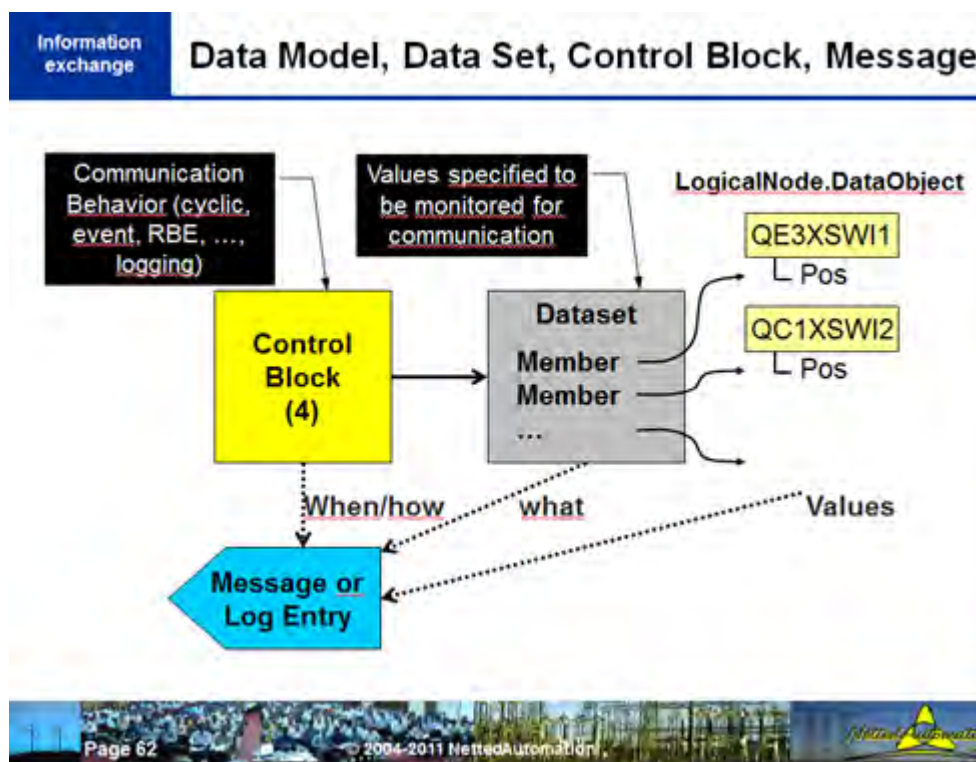
Posted by [Karlheinz Schwarz](#) at [10:20 PM](#) [0 comments](#) 

Labels: [61850](#), [DNP3](#), [IEC 61400-25](#), [IEC 61850](#), [Migration](#), [peopleware](#), [protection](#), [RTU](#), [Training](#), [utilities](#), [workforce](#)

Basics of IEC 61850 Control Blocks and Communication

The standards IEC 61850 and IEC 61400-25 provide a reach suite of information exchange mechanisms. The basis of all exchanges are the information models (e.g., Logical Node "QE3XSWI1.Pos" that represent the real world information. The information models are shown on the right side of the following figure. DataObjects can be read at any time.

The next level on-top of the information models are the DataSets. A DataSet is a list of references to attributes of DataObjects (e.g., Pos). DataSets can be read – which is an optimization: instead of a list of references, there is only a single name to be provided (the DataSet name) for reading.



The third level are the Control Blocks (for reporting, Logging, GOOSE,

and Sampled Values). All three levels constrain the way how values are communicated.

Details are presented, discussed and trained in the hands-on trainings of NettedAutomation.

Note that all four control blocks provide appropriate services for SCADA, real-time control, and protections. Applications in distributed automation (for power distribution automation) are likely to require additional features (communication between hundreds of devices, ...).

One of the real crucial approaches is that the Data Objects are independent of the Data Sets, which are independent of Control Blocks. The SystemCorp IEC 61850 API provides almost everything discussed in this post! The API supports any Logical Node (standardized and extended!). The API runs smoothly on the BECK IPC 61850@CHIP.

If you want to know which of the above options you should apply, please let me know WHAT YOU NEED !!

Posted by [Karlheinz Schwarz](#) at [12:44 PM](#) [0 comments](#) 

Labels: [ACSI](#), [control block](#), [data set](#), [distribution automation](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [logging](#), [Reporting](#), [SystemCorp](#)

The four Keep-alives in IEC 61850

IEC 61850 uses several mechanisms to **monitor the communication** between two devices (Client/Server) or between a publisher and many subscribers and to **monitor functions – in order to increase the overall reliability of the information exchange**.

The four mechanisms allow to check connected devices and determine whether the connection and the devices are still up and running or not. Reactions on failures are a local matter of applications.

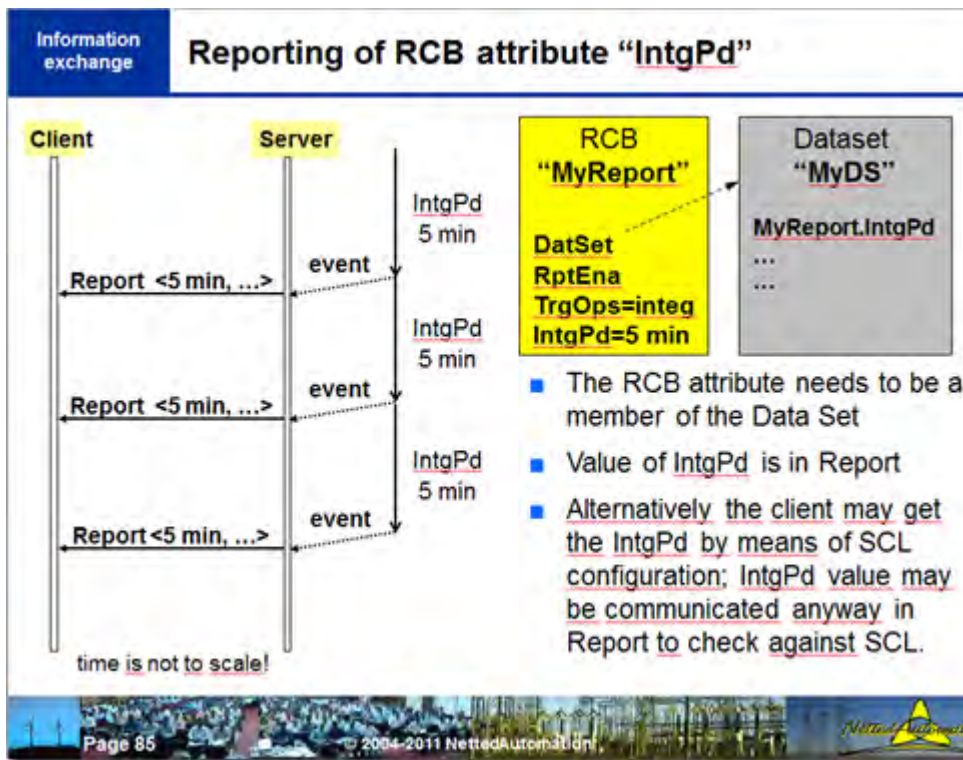
The two mechanisms for Client/Server are:

- Keep-alive in TCP connections (used by MMS) [RFC 1122]
- Reporting of Report Control Block attribute "IntgPd" [ACSI, 7-2]

The two mechanisms for Publisher/Subscriber (Layer 2 multicast) are:

- Time-Allowed-to-Live in GOOSE messages (next message in) [8-1]
- Sample Rate in SMV message (sampled measured value) [ACSI, 7-2]

The following figure shows how Integrity Period (communicated in a Report message) could be used to cyclically inform the client that the Reporting mechanism is up and running. Integrity Period is often used in cases where events happen very seldom and where the client wants to have a "heart beat" from the reporting server.



The configuration of the DataSet and the Report Control Block is usually provided by a SCL file. In the case of SystemCorp's IEC 61850 API it is easily be done by uploading the corresponding SCL File to the IED, e.g., the Beck IPC IEC61850@CHIP.

Click [HERE](#) to evaluate the "Keep-Alives" with Reporting and GOOSE and real software running under Windows.

Click [HERE](#) in case you are looking for education and training about the possibilities, philosophy, and details of IEC 61850 and IEC 61400-25.

I have educated more than 2.500 people from more than 60 countries and more than 600 companies. More to come ... see you soon.

Posted by [Karlheinz Schwarz](#) at 8:37 AM 0 comments

Labels: [61850](#), [communication](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [Reporting](#), [sampled value](#), [seminar](#), [TCP/IP](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Friday, July 8, 2011

Use of IEC 61400-25 to secure access to key O&M data

Vattenfall (one of the big European power utilities) plans to use IEC 61400-25 (an extension of IEC 61850) for operational and maintenance (service) applications.

Here is the conclusion of the paper:

"The IEC 61400-25 series of standards provides the means to get open and easy **access to key O&M data [operation and maintenance data]**. This data is a necessity for making the evaluations and analysis needed **to improve operation and maintenance of the wind power plants**. The paper has shown how the standard can be implemented and what benefits are associated with its use.

The standard does not restrict nor mandate specific customer-supplier roles, but provides a solution that supports the whole range of business cases where the different actors can cooperate. **Both the customer and the supplier can benefit from IEC 61400-25 through decreased costs for data access and system integration.** Time and money can instead be put on the development of applications, functions and methods that increase the performance of the wind turbines. Vattenfall considers standards such as IEC 61400-25 to be an important part in the development of the wind power business. The IEC 61400-25 series of standards is therefore part of Vattenfall technical requirements for future procurements."


The same is true for any other energy resource feeding electric energy into the grid – at any voltage level. The renewable resources and – more general – distributed energy resources (DER) are key for the future electric power delivery system. A government funded project in Germany (EUMONIS: Innovationsallianz zur Entwicklung einer Software- und Systemplattform für Energie- und Umweltmonitoringsysteme) is looking for accessing, storing and using information from the sheer unlimited number of power resources in the near future: PV, CHP, hydro, wind, flying wheels, ... One objective is to have information about the status and availability of the resource in a central database, in order to operate and maintain the "distributed Power Plant". This seems to be one of the crucial challenges in the years to come.

Click [HERE](#) to access the complete Vattenfall paper [pdf].
Click [HERE](#) for the website of EUMONIS [German].

Did you know that **IEC 61400-25 covers also Condition Monitoring** needs?

Wind turbines - Part 25-6: Communications for monitoring and control of wind power plants - Logical node classes and data classes for condition monitoring

Click [HERE](#) for the preview of part IEC 61400-25-6

Posted by [Karlheinz Schwarz](#) at [10:41 PM](#) [0 comments](#) 

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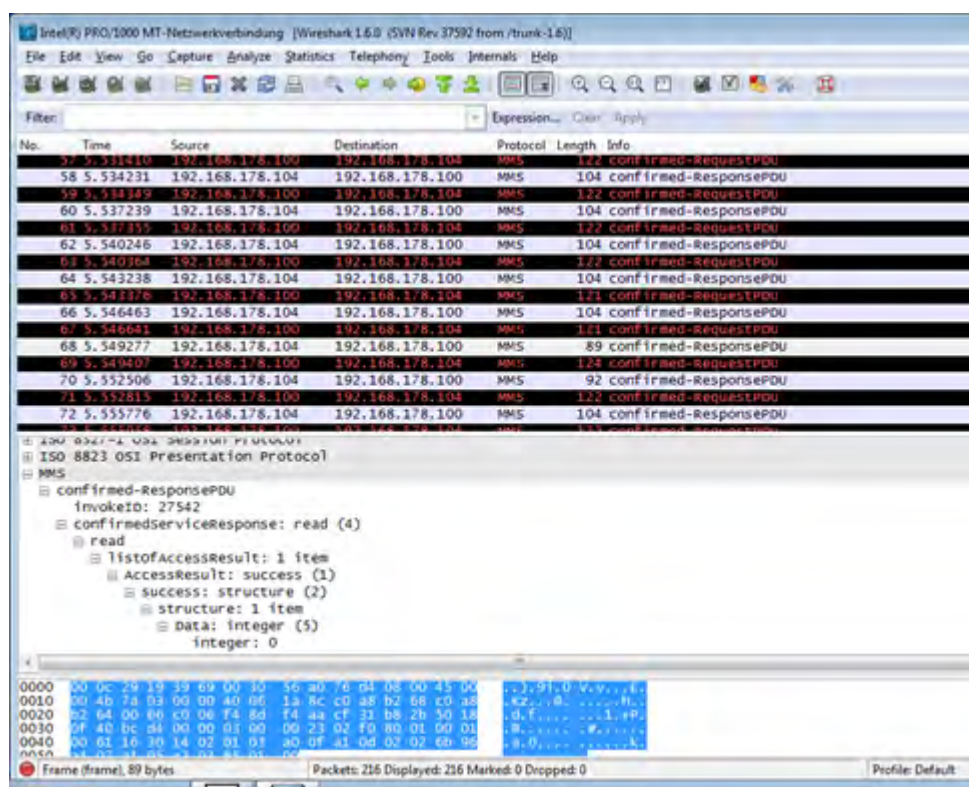
Labels: [condition monitoring](#), [electric power system](#), [IEC 61400-25](#), [IEC 61400-25-6](#), [IEC 61850](#), [maintenance](#), [Power Automation](#), [Power Plants](#), [Vattenfall](#), [wind power](#)

Thursday, July 7, 2011

Wireshark Analyzer and IEC 61850 Messages (MMS, GOOSE, SAV)

When you use Wireshark (I run Version 1.6.0) you may have had a problem to see GOOSE and MMS messages. There is a simple solution how to visualize the MMS and GOOSE messages:

You have to start the Wireshark first, start analyzing and THEN connect from a IEC 61850 client to a server to open a MMS association. Now you see the messages ... strange but it works ... as you can see:



Posted by [Karlheinz Schwarz](#) at 5:09 AM 2 comments

Labels: [61850](#), [Encoding](#), [GOOSE](#), [IEC 61850](#), [MMS](#), [network analyzer](#), [wireshark](#)

Monday, July 4, 2011

Another Dissertation dealing with IEC 61850: Secure Multicast

JIANQING ZHANG has analyzed the multicast services in power system communications. His dissertation discusses one of the crucial issues in distributed power automation. He "proposes an application-aware approach to setting up secure multicast for power grid communications that automatically derives group memberships and verifies configuration conformance from data dependencies in system specifications ... To evaluate the approach, we present a case study of IEC 61850 power substation networks and have developed a demo system, SecureSCL. ..."

Click [HERE](#) for the dissertation.

[Getting Started with SystemCorp's IEC 61850 API on...](#)

[FERC and the five IEC Standard Families](#)

[News from the IEC TC 57 Standardization Work](#)

[2,500 Experts Educated in IEC 61850 and other IEC ...](#)

[IEC 61850 in Papers at the CIRED 2011 Conference i...](#)

[The Parts of IEC 61850 - Status 2011-06](#)

[The first Commercial IEC 61850-9-2 Installation by...](#)

[Can IEC 61850-7-2 Edition 2 be used to build Agent...](#)

[Is IEC 61850 Plug&Play or like DNP4.0 or IEC 60870...](#)

[Basics of IEC 61850 Control Blocks and Communicati...](#)

[The four Keep-alives in IEC 61850](#)

[Use of IEC 61400-25 to secure access to key O&M da...](#)

[Wireshark Analyzer and IEC 61850 Messages \(MMS, GO...](#)

[Another Dissertation dealing with IEC 61850: Secur...](#)

[Dissertation on IEC 61850-9-2 Merging Unit](#)

- June (20)
- May (10)
- April (6)
- March (16)

More to come ...

Posted by [Karlheinz Schwarz](#) at [1:06 PM](#) [0 comments](#) 

Labels: [GOOSE](#), [IEC 61850](#), [Multicast](#), [real-time](#)

Dissertation on IEC 61850-9-2 Merging Unit

Marcin Adam Gurbiel received her Dr.-Ing. (PhD) with the Dissertation on "Definition and Testing of a Digital Interface of a Power Substation". Her findings are quite interesting. She writes in the summary: "... it is possible to apply the common information exchange protocol based on IEC 61850 to the process level of the substation automation system by implementing a digital interface or so called "Merging Unit".

ISSN 16-12-2526

ISBN 978-3-940961-54-9

Click [HERE](#) for some interesting results of her work.

Posted by [Karlheinz Schwarz](#) at [2:42 AM](#) [4 comments](#) 

Labels: [61850](#), [IEC 61850](#), [IEC 61850-9-2](#), [merging unit](#)

Friday, June 24, 2011

E3 Group for Studies on IEC 61850 Went Public

I have reported earlier on the very appreciated "Teamwork" of Spanish utilities in working together to reach a higher level of interoperability in IEC 61850 multivendor projects.

Their objective is (from their website):

- Share information among companies and walk together through IEC 61850
- Generate a minimum common specification (available for download at the [Documents](#) page) of an IEC 61850 substation automation system (SAS) that should be valid for the companies in the group
- Lead the technological gap between now-available IEC 61850 systems and the desired final picture
- Improve efficiency and optimise IEC 61850 deployment

The E3 group went public:

Click [HERE](#) for their group Website.

Posted by [Karlheinz Schwarz](#) at [2:02 PM](#) [0 comments](#) 

Labels: [E3](#), [education](#), [IEC 61850](#), [interoperability](#), [peopleware](#), [Power Automation](#), [power systems](#), [Smart Grid](#), [utilities](#)

Thursday, June 23, 2011

Mapping IEC 61850 on Web Services

Just a few hours after my post on

► [February](#) (16)

► [January](#) (8)

► [2010](#) (153)

► [2009](#) (162)

► [2008](#) (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Message Specification and Encoding – A Never Ending Story

earlier today I received an email with a very interesting contribution on the mapping of IEC 61850 on Web Services from my friend Wolfgang Maerz (Dortmund/Germany). Wolfgang is one of the few senior utility experts involved in IEC TC 57 – even after he retired from RWE many years ago, he is still very active in IEC TC 57 standardization work. He has implemented protocols on his own ... to study the details! He “hired” me as a consultant in the early nineties to support IEC 60870-6 (ICCP) and later IEC 61850.

Please find his very detailed contribution on the Web Service mapping (I post this information with his permission):

“Here are some fundamentals to IEC 61850 over MMS versus IEC 61850 over Web Services:

As I wrote in my last email Web Services is a strongly typed communication system using a WSDL (Web Service Definition Language) XML type and service specification for mainly two purposes: (1) check the correct syntax of XML-messages, (2) allow the creation of the SEI (Service Endpoint Interface) including the binding (or mapping) of XML to the application business object types of any language (Java, C#, ..).

Fundamental of Web Services is the strict separation of XML message values and their XML type schema which is part of the type declaration of the WSDL implemented at both sides of the communication system using document / literal style. This means that for Web Services the types of communicated values must be known “before” any communication takes place by its WSDL.

The problem is that some services of IEC 61850 are of dynamic nature as shown by the example of the 61850 Report-Control-Block (RCB) class model. The report service of the RCB sends reports from the server to the client based on the dynamic structure of the Report Format Specification to allow spontaneous transmission of altered event-driven objects of any type. The receiving application to decode this dynamically created type must know this type!

This cannot be mapped to static WSDL specifications. Possible would be a WSDL with a sequence of choice types as in MMS but a possible implementation is not known and is even conceptual impossible. Of course you can use any-type in the WSDL and use Web Services as a simple type transparent messaging service but that only moves the problem with no communication interface as SEI directly to the application.

So, what is then the fundamental difference between IEC 61850 over MMS and IEC 61850 over Web Services when it comes to dynamically created types? The point is the encoding!

MMS is written in ASN.1 using the Basic Encoding Rules (BER). With BER, the encoding of every data value in an abstract syntax is constructed in TLV-style (Tag, Length, Value): The three parts here are actually termed identifier (I), length (L) and contents (C). The important thing to mention here is the identifier part which consists of one single octet with three parts: tag class (2 bit for universal, application-wide, context-specific, private-use), form (1 bit for primitive or constructed), and INCLUDES the tag number defining the type (5 bit, e.g. decimal 16 means type Integer)!

THAT MEANS:

With MMS / BER the type information is INCLUDED in the message and allows the client / server to even understand dynamical event-driven or service created messages of any type not even known before runtime!

This is in contrast with Web Services / WSDL where the type of XML-message values is defined separately BEFORE runtime in the WSDL's XML type and service definition used to implement the (static) SEI (Service Endpoint Interface).

If all this is true this would mean that IEC 61850 over Web Services would be restricted to a specific domain or to certain use cases with reduced requirements where only a subset of IEC 61850 can be used. Most think Web Services is simple compared with MMS, I do not think so."

Comments are welcome.

Posted by [Karlheinz Schwarz](#) at [7:50 AM](#) [1 comments](#) 

Labels: [Encoding](#), [IEC 61850](#), [MMS](#), [Web Service](#), [webservice](#), [XML](#)

IEC 61850, IEC 61400-25 and DNP3 at Remote Conference

2 day Seminar (NettedAutomation) on Power System Automation, Configuration, and Communication covering IEC 61850, IEC 61400-25, DNP3, NIST Interoperability Roadmap, Smart Grids, ...

Nashville (TN, USA) at Remote Conference

20.-21. September 2011

Click [HERE](#) for more detail and registration information.

Become smart before your system will become smarter!

Posted by [Karlheinz Schwarz](#) at [6:55 AM](#) [0 comments](#) 

Labels: [Backnet](#), [DER](#), [distribution automation](#), [DNP3](#), [electric power system](#), [embedded system](#), [engineering](#), [Gateway](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [power distribution](#), [power systems](#), [RTU](#), [seminar](#), [Smart Grid](#), [Substation Automation](#)

Message Specification and Encoding – A Never Ending Story

Some 30 years ago I started studying digital communication like IEEE 802.4 (Token Passing) and IEC 802.3 (Ethernet) when I worked for Siemens. The "war" between the Token Passing supporters and the Ethernet friends caused a lot of struggle and generated many solutions to find a common way for information exchange in automation systems. One of the approaches was to make Ethernet deterministic. I invented a simple algorithm that used the three states of the transmission line: no-carrier, carrier and collision. The solution allowed a semi-deterministic behavior of Ethernet ... the solution was patented in 1985.

Click [HERE](#) for the European Patent EP 0110015.

Unfortunately Siemens did not implement the patent – the direction was towards Token Passing

The international project MAP (Manufacturing Application Protocols) preferred Token Passing ... then fieldbusses arrived ... MAP opened the way for Ethernet – too late (or too early).

Ethernet "came" back some 10 years later, when it was obvious that

traditional fieldbusses were quite limited in many aspects. Today Ethernet is the preferred solution in automation systems (industrial and power domain). Switched Ethernet has ended – to some extent – the wars on Data Link Layer solutions.

The communication wars for crucial automation domains are still ongoing! There are two issues discussed again and again: the approach of services and message encoding. What services are required (Get, Set, Event reporting, Event logging, Control, ...) and what is the best message encoding method (abstract/concrete, XML schema, ASN.1, XML encoding or binary encoding like ASN.1 BER)?

The questions that are most crucial: What should be carried in a message? How many implicit or explicit content is needed to be carried in each message? How often has a message be sent/repeated? ... and many other questions have a huge impact on the SYSTEM behavior. The focus should be on the **SYSTEM** and not on the encoding or message schema.

The most efficient encoding is to send an empty message! Really!

Click [HERE](#) for the story about a very efficient message.

It is quite interesting that old standards like Ethernet, TCP/IP and MMS have survived – even they are not the most efficient ways to communicate!

Why are they so successful – even in the electric power automation world, which is one of the most conservative markets? These standards are open and accepted globally!

I hope that the developer and users of automation systems will focus on the APPLICATION and SYSTEM ASPECTS – and not on communication layers 1 to 7!! The systems and applications based on open international standards will help to keep the power – more efficiently – flowing. IEC 61850 is one of the most crucial open standard.

The fastest way to get your information flowing with IEC 61850 information models, services and messages is: Develop your application using a simple IEC 61850 API. I have trained many experts in how to use IEC 61850 and a simple API to solve their APPLICATION needs!

Click [HERE](#) to evaluate such a simple API.

The power industry is short of experts – hope the remaining resources will focus on the applications and not on questions like: How can we optimize the message encoding, how can we save bits on the wire, ... ?

Focus on the Applications!

Posted by [Karlheinz Schwarz](#) at [5:17 AM](#) [0 comments](#) 

Tuesday, June 21, 2011

IEC 61850-8-1 Edition 2 Published

IEC 61850-8-1 Edition 2 has been published (English/French):

Communication networks and systems for power utility automation - Part 8-1: Specific communication service mapping (SCSM) - Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3

Click [HERE](#) for a Preview of IEC 61850-8-1.

Other parts with status Edition 2:

[Preview Part 4 Edition 2](#)

[Preview Part 6 Edition 2](#)

[Preview Part 7-2 Edition 2](#)

[Preview Part 7-3 Edition 2](#)

[Preview Part 7-4 Edition 2](#)

Posted by [Karlheinz Schwarz](#) at [11:52 AM](#) [0 comments](#) 

Labels: [61850](#), [GOOSE](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61850-8-1](#), [MMS](#)

Monday, June 20, 2011

What is a Stack?

The term **Stack** has many meanings, flavors, ... ask 10 experts and you may get 11 definitions. People talk about an IEC 61850 stack, an OPC UA stack, What do these mean? Are they comparable?

Let's start with the general definition:

According to the [Wikipedia](#): "The protocol **stack** is an **implementation** of a computer networking **protocol suite**. The terms are often used interchangeably. Strictly speaking, the suite is the definition of the protocols, and the **stack is the software implementation of them.**"

So, the **software that processes the protocols** is called the (protocol) **stack**.

With regards to IEC 61850 this can mean many things: Session, Presentation, ACSE, MMS, ACSI, MMS-SCSM, Model management and configuration language, API to the application, ... let's have a look at the server side of the communication:

	"Protocol" aspects	Remarks and Explanations
1	API to application	Control of Server SW, local services for write, events, control, ... "Protocol" that defines how the application can communicate with the underlying IEC 61850 software
2	Models, model management and model and ACSI configuration language	Describe the server's information model binding to application (LDs, LNs, DO, DI). Be aware that LNs have also services protocols (see below for LN GLOG). The information models have to be organized in the IED's software (including retrieving self-description of the model)
3	ACSI (Abstract Communication Service Interface)	The (protocol) software has to implement services Association control, retrieve self-description (Server, Client, Publisher, Subscriber, LD, LN, DO, DA, ControlBlock ...), Get, Set, DataSet services, Report (events), Logging (events; historian), Sampled Values, Control, File services, synchronization, ... The implementation of the protocols that define the dynamical behavior of the stack are one of the crucial parts of IEC 61850

4	MMS SC5M	The ACSI services use MMS to carry the payload between client and server. MMS provides the serialization of (service) messages. Example: A Buffered Report Control Block requires a quite comprehensive "Service" model \ set of service parameters (for control attributes). The state machine of the C Block requires a bit of a software!
5	MMS	Simple classes like NamedVariables, NamedDataSets, Journal, ... Messages (encoding using ASN.1)
6	ACSE	Kind of a remote procedure call
7	Presentation	Concrete encoding: ASN.1 BER
8	Session	Session between client and server
9	RFC 1006	Binding OSI upper layers to TCP
10	Security	Security according to IEC 62351 ... TLS
11	TCP/IP	you know ...!!
12	Lower layers	...

Note: GOOSE and Sampled Value messages are mapped directly to Ethernet!

What is the Logical Node **GLOG**? An application or a model with services and protocol (messages)? **The GLOG is a standardized application that defines a model, services and a protocol!** Guess you did not expect this ... others may not agree with me ...

IEC 61850-7-4 Edition 2 defines:

"5.7.4 LN: Generic log Name: GLOG

The LN GLOG refers to a **function** which **allows to log** not only changed data itself but also **any related data** being defined in the settings of LN GLOG. The logging is **started** by the **changed data object (TrgRef1) or by the operator (LogTrg)**. The **logged data are identified by the references** to the related source data objects in the data model." This in short the state machine of the GLOG service model and protocol (in abstract terms). The GLOG communicates with a client via services and a protocol ...

The logged Data Values will be stored in an IEC 61850 Log ... it can be queried by services from a client.

Let's come back to our question, what is implemented in a stack?

Stacks from different vendors may be for free, may be reasonable priced, or may be expensive! What does this mean? Almost nothing! Because the CRUCIAL question is: **WHAT would you get for your Euros or Dollars?**

A stack of vendor X may cover the implementation described under bullets 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.

A stack of vendor Y may cover only 5, 6, 7, 8, 9, and 10.

The difference is tremendous: The efforts to implement the requirements listed in bullets 1, 2, 3, and 4 are (to my experience) **likely more than 90 ... 95 per cent** of what needs to be implemented with regard to IEC 61850!

If you hear something like "the stack so-and-so is cheaper ..." **listen twice** and then **think about what you have heard three times** and **ask what that stack really provides four times AND ASK PEOPLE WITH EXPERIENCES WHAT IS LEFT FOR YOU TO DO** to get a compliant IED !!! I have talked to many experts that were surprised that it took sooo long ... and cost sooooo ... much to get a compliant IED.

When it comes to the comparison of OPC UA and IEC 61850: Listen very carefully, and ask questions ... and then ... and then you may understand the difference from a standard and from an implementation point of view.

Click [HERE](#) if you want to experience what could be provided by a specific stack providing integrated software for issues 1 to 10 ... with little left for you [German].

A workshop in English may be set up when you are interested ... let Beck IPC know that you would attend a workshop in English.

Posted by [Karlheinz Schwarz](#) at [11:56 AM](#) [0 comments](#) 

Labels: [applications](#), [ASN.1](#), [Automation](#), [BER](#), [communication](#), [configuration](#), [cost saving](#), [DER](#), [electric power system](#), [engineering](#), [GOOSE](#), [IEC 61850](#), [implementation](#), [Information Model](#), [interoperability](#), [MMS](#), [OPC UA](#), [Power Automation](#), [TASE.2](#), [webservice](#)

Sunday, June 19, 2011

Open Position for Protection Engineer with IEC 61850 Knowledge at Stadtwerke München

Stadtwerke München (Germany) has an open position for planning of substation automation and protection as well as telecontrol ... experiences in IEC 61850 and IEC 60870-101/104 are required.

Click [HERE](#) for the job description [German].

Posted by [Karlheinz Schwarz](#) at [5:35 AM](#) [0 comments](#) 

Labels: [61850](#), [Automation](#), [communication](#), [Fernwirktechnik](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [Power Automation](#), [Stationslettechnik](#), [Substation Automation](#)

Saturday, June 18, 2011

Open Position for Development Engineer with IEC 61850 Knowledge at Phoenix Contact

Phoenix Contact (Bad Pyrmont, Germany) has an open position for a Development Engineer for applications in embedded systems. If you have knowledge in programming embedded platforms, in substation automation, in IEC 61850 ... you may be the right person for that job.

Click [HERE](#) for the job description Job-ID: 1145 [German]

Posted by [Karlheinz Schwarz](#) at [10:01 PM](#) [0 comments](#) 

Labels: [61850](#), [Automation](#), [distribution automation](#), [electric power system](#), [embedded system](#), [IEC 61850](#), [implementation](#), [Phoenix Contact](#), [Power Automation](#), [Substation Automation](#)

Friday, June 17, 2011

Network Rail (UK) to improve reliability and cutting cost with IEC 61850

The Head of Electrification of Network Rail (UK) talks about the benefits of applying IEC 61850 for the electrification the other day. Please find an excerpt below:


"Ah, indeed. I'm personally really excited about this [IEC 61850] because I think it **represents a huge step forward.**" followed by statements like:

"IPC 61850 allows us to distribute the power – still enabling us to switch
– but limiting the number of fault breaking devices we need. This has two benefits. The first is that this **makes the switching less costly.**"

"But the second benefit is that we will no longer have to compromise between the electrical distribution needs of the system and the railway operations needs of the train operating people."

"It will enable us to think very carefully about using switching to focus on achieving **better reliability** for the operators while still maintaining that essential feature of distributing power ... all at what looks to be at a **considerable saving.**"

Click [HERE](#) to read the interview.

Posted by [Karlheinz Schwarz](#) at [12:43 AM](#) [0 comments](#) 

Labels: [61850](#), [cost saving](#), [IEC 61850](#), [power distribution](#), [Smart Grid](#)

Tuesday, June 14, 2011

Schnelleinstieg in die Produktentwicklung IEC 61850 und IEC 61400-25 konformer Geräte

Beck IPC (Pohlheim bei Gießen) bietet eine eintägige Schulung für den Schnelleinstieg in die Produktentwicklung von Geräten mit einer Schnittstelle nach IEC 61850 und IEC 61400-25 an. Neben einer konzentrierten Einführung in IEC 61850 und IEC 1400-25 lernen die Teilnehmer, wie sie während kurzer Zeit (Stunden anstatt Wochen!) die Normenreihen integrieren und sich auf die Implementierung ihrer Anwendungen konzentrieren können.

Mit den Beck IPC Lösungen gelingt der schnelle Einstieg in IEC 61850 und IEC 61400-25.

Die Schulung findet am 05. Juli 2011 statt.

Klicken Sie [HIER](#) für weitere Details.

Posted by [Karlheinz Schwarz](#) at [4:56 AM](#) [0 comments](#)

Labels: [Beck](#), [Beck Chip](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [stack](#), [starter kit](#), [Training](#)

Monday, June 13, 2011

White House Policy Framework for 21st Century Grid

The White House has published today "A Policy Framework for the 21st Century Grid: Enabling Our Secure Energy Future".

"The report delineates four overarching pillars that the Administration will pursue in order to ensure that all Americans benefit from investments in the Nation's electric infrastructure. These pillars describe how we can move forward to secure benefits of a smarter grid:

1. "Scale what works" to enable cost-effective smart grid investments
2. Unlock the innovation potential in the electricity sector with a **continued focus on open standards**
3. Empower consumers with education, access to their own energy usage information in consumer- and computer- friendly formats, and improved privacy safeguards and consumer protections
4. Continue to secure the grid against natural or other disasters."

Click [HERE](#) to download the report [PDF].

The speakers of the event "**Building the 21st Century Grid**" focused on the need to change the way how we generate, transport, store, distribute, and use electric power. There is a high potential for convert to a more efficient electric power system. One key player in this regard is to **apply open standards**.

Secretary Mr Chu (DoE) said: "We have no authority ..." to force the market to do this or that ... all the Government can do is keep the R&D and discussions going on – and expect that the most efficient solutions (on how to generate, transport, store, distribute, and use electric power) will win the battle.

Several global "winners" are already known: Standards published by IEC TC 57 and TC 88 like IEC 61968/61970 CIM, IEC 60870-6 IEC, IEC 62351 on Security, IEC 61850 on utility automation, and IEC 61400-25 on Wind Turbine Communication. These "standards will [according to the report] **not be mandatory**. In short, regulators should publicly **embrace the interoperability standards with the understanding that they will continue to develop** with the ongoing evolution in smart grid technology ..." [page 29].

In some cases the continuation of development will be very slow, e.g., in IEC. While other standards, like the information models in CIM and IEC 61850 will continue to grow while we go. The technology will not be frozen (it cannot stop to develop)! That's good news!!

One of the crucial aspects is that NIST and the DoE do obviously not expect that myriads of competing (de jure) standards should be embraced! ... like in other industries.

Today is a good day for the standardization efforts!

Keep going!

I hope that the power industry will now stop discussing protocols ... and start or continue to focus on APPLICATIONS using these standards. The standards are just a vehicle or a tool box. Meters, models and protocols

do not make a Grid Smart! It is the Smart People that will use the standards and build many applications using them!

Posted by [Karlheinz Schwarz](#) at [1:10 PM](#) [0 comments](#) 

Labels: [61850](#), [cost saving](#), [Cyber Security](#), [DER](#), [distribution automation](#), [IEC 60870-6](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC 62351](#), [interoperability](#), [NIST Roadmap](#), [Smart Grid](#), [smart solution](#), [TASE.2](#), [TASE.2 ICCP](#), [wind power](#)

Sunday, June 12, 2011

Building the 21st Century Grid – The White House reports today

On June 13, 2011, the White House will hold an event on "**Building the 21st Century Grid.**" Starting at 10 a.m., the event can be watched live at <http://www.whitehouse.gov/live>.

Federal Smart Grid Initiatives highlights key government-sponsored programs and activities related to the development and modernization of the electric grid in the United States.

One of the four pillars of the future grid is:

Unlock the innovation potential in the electricity sector with a continued focus on **open standards**.

I hope that the electric power industry will follow a few open standards instead of a myriad of solutions. Could you imagine a situation where each state or county would have a different frequency and voltage of the electric system!??

There are two main standards: 230V/50Hz and 110V/60Hz ... but there should be one standard to exchange information (measurements and statuses, ...). The MMXU (a measurement model of 3 phase electrical system defined in the open standard IEC 61850-7-4) could be used for any kind of 3 phase system.

Click [HERE](#) for some more models.

If you are interested you may watch the event today.

Posted by [Karlheinz Schwarz](#) at [10:49 PM](#) [0 comments](#) 

Labels: [models](#), [NIST](#), [North America](#), [open standards](#), [Smart Grid](#), [standards](#)

Comment on second Draft Release Smart Grid Roadmap of NIST

The Draft **NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 2.0** is now available for public comments.

NIST solicits comments on the draft Release 2.0 document.

Due to the fast growth in various aspects of Smart(er) Grids, it is required to speed up in the selection of the needed and recommended standards. IEC 61850 is one of the crucial standards for Smart(er) Grids!!

Click [HERE](#) for the SGIP website with more details on the draft.

The list of standards comprises also DNP3 as a new IEEE standard.

Click [HERE](#) for the draft list of standards ... which states on page 2:

"Because the Smart Grid is evolving from the existing power grid, NIST has also included **standards that support widely deployed legacy systems**. Priority Action Plans (PAPs) have been established with the goal of resolving interoperability issues between the standards for legacy equipment and those others identified for the Smart Grid. For example, PAP12 seeks to **enable implementations of the Distributed Network Protocol, DNP3.0 as specified in IEEE 1815, to work with implementations of the IEC 61850 standard ...**"

This will definitely help to tap the information provided by the running systems! ... without replacing one protocol (DNP3) by another (IEC 61850-8-1, MMS).

IEC 61850 and DNP3 are becoming good FRIENDS ... keep going!

Posted by [Karlheinz Schwarz](#) at [12:16 PM](#) [0 comments](#) 

Labels: [61850](#), [DNP3](#), [Gateway](#), [IEC 60870-5-104](#), [IEC 61850](#), [NIST Roadmap](#), [Smart Grid](#)

IEC 61850-9-2 FDIS of Edition 2 open for Ballot

The IEC 61850-9-2 Edition: Communication networks and systems for power utility automation – Part 9-2: Specific communication service mapping (SCSM) – Sampled values over ISO/IEC 8802-3

is open for FDIS ballot until 2011-07-29.

Changes comprise:

- Addition of an optional Link redundancy layer
Link Redundancy:
Parallel redundancy protocol and high availability seamless ring
IEC 62439-3, Amendment 1
- Redefinition of "reserved" fields in link layer
- USVCB and MSVCB components
- Encoding for the transmission of the sampled value buffer

Posted by [Karlheinz Schwarz](#) at [11:00 AM](#) [0 comments](#) 

Labels: [61850](#), [IEC 61850](#), [IEC 61850-9-2](#), [IEC61850](#), [message encoding](#), [redundancy](#), [sampled value](#), [time synchronization](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Sunday, June 12, 2011

IEC 61850-8-1 Edition 2 approved as International Standard

The 2nd Edition of IEC 61850-8-1 has been approved with 100 per cent support by the national committees of IEC TC 57.

IEC 61850-8-1 Ed. 2.0: Communication networks and systems for power utility automation - Part 8-1: Specific communication service mapping (SCSM) - Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3

The standard will be published soon.

This mapping has been implemented in many IEDs. Even in the wind power market, this mapping is the most crucial mappings ... the other four mappings defined in IEC 61400-25-4 may be implemented as well.

Please note that most of the changes and corrections have been implemented by many IEDs, because many of them have been made during the edition 1 Tissue process. The first Tissue goes back to 2005.

Click [HERE](#) for the list of Tissues for part IEC 61850-8-1 Edition 1. The green Tissues are those that have been solved already – most of them are required for conformance testing. IED's TICS (Tissue Implementation Conformance Statement) have to indicate which of the green Tissues have been implemented.

Click [HERE](#) for a sample TICS document.

8-1
 #116 GetNameList with empty response?
 #165 Improper Error Response for GetDataSetValues
 #183 GetNameList error handling

Click [HERE](#) for further details on Edition 2 of IEC 61850-8-1.

Posted by [Karlheinz Schwarz](#) at [10:37 AM](#) [0 comments](#) 

Labels: [61850](#), [ACSI](#), [conformance test](#), [Ethernet](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-8-1](#), [mapping](#), [protocol](#), [TICS](#)

Thursday, June 9, 2011

New Version of SystemCorp's IEC 61850 Software

After the first certified IED using the SystemCORP Embedded Technology IEC61580 Library (PIS10) SystemCorp has published information and documentation about the latest Version (1.36.02) today. This version comprises all modifications, fixes and extensions that take many experiences and the successful conformance test at KEMA into account.

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[What is a Stack?](#)

[Open Position for Protection Engineer with IEC 618...](#)

[Open Position for Development Engineer with IEC 61...](#)

[Network Rail \(UK\) to improve reliability and](#)

A comprehensive set of easy to browse web html pages are available.

Click [HERE](#) for more details on the updated stack software and documentation of version 1.36.02.

More details can be found [HERE](#) and [HERE](#).

This new version runs smoothly on the Beck IPC Chip and other embedded controllers on LINUX, ...

The interest in IEC 61850 Chips is growing very fast – all over.

Posted by [Karlheinz Schwarz](#) at [11:19 AM](#) [0 comments](#) 

Labels: [Beck Chip](#), [certificate](#), [DNP3](#), [embedded system](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [Power Automation](#), [power distribution](#), [SCADA](#), [Smart Grid](#), [Substation Automation](#), [SystemCorp](#)

Transformer Protection and Monitoring IED with IEC61850@Chip

C&S Electric Ltd (India) has developed a Transformer Protection and Monitoring IED with an IEC 61850 interface build on the Beck IPC Chip "IEC61850@CHIP" with SystemCorp's IEC 61850 solution integrated.

Click [HERE](#) for more technical information.

Posted by [Karlheinz Schwarz](#) at [2:12 AM](#) [0 comments](#) 

Labels: [Beck Chip](#), [IEC 61850](#), [IEC 61850-8-1](#), [measurements](#), [monitoring](#), [protection](#), [SystemCorp](#)

Wednesday, June 8, 2011

Podcast from Black and Veatch on IEC 61850 in the U.S.

A podcast provided by Black & Veatch reports how IEC 61850 is expected to be accepted in the U.S. power industry. It is also reported how American Electric Power uses the GE BRICK solution for the interface between the control room and the switch yard.

There is no doubt about the trend towards IEC 61850 in North America!

The GE Brick solution is based on IEC 61850 concepts. Many benefits provided by IEC 61850 are offered by the Bricks – except one crucial issue that is not supported: The Brick solution is NOT interoperable with fully IEC 61850 compliant IEDs like protection and control devices or merging units according to IEC 61850-9-2.

An IED with an IEC 61850 interface can NOT communicate with the Brick! So, the Brick is a vendor specific solution using mainly fiber optic cables and Ethernet and message formats from IEC 61850 to replace copper wires to the switch yard. The idea of an open international standard for multi-vendor systems is supported by fully IEC 61850 compliant merging units and other IEDs (as publisher) and other IEDs (as subscribers).

Click [HERE](#) for listening the podcast [some 14 minutes].
Click [HERE](#) for more information on the concept.

Posted by [Karlheinz Schwarz](#) at [5:10 AM](#) [1 comments](#) 

[cutti...](#)

[Schnelleinstieg in die Produktentwicklung IEC 6185...](#)

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Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

Labels: [61850](#), [IEC 61850](#), [IEC 61850-9-2](#), [merging unit](#)

Tuesday, June 7, 2011

Certified IEC 61850 compliant IEDs

KEMA has published a Test Register for conformance tested IEDs:

- IEC 61850 Client Systems
- IEC 61850 Server Devices
- IEC 61850 Ethernet Switches
- IEC 61850 Sampled Value Publishers (Merging Units)

Click [HERE](#) to access the test register dated 2011-01-27

Posted by [Karlheinz Schwarz](#) at [11:50 PM](#) [0 comments](#) 

Labels: [certificate](#), [conformance test](#), [IEC 61850](#)

Thursday, June 2, 2011

Telecontrol and IEC 61850

IEC 61850 is used in many applications inside substations and other domains. RTUs from many vendors provide IEC 61850 support for Telecontrol.

Click [HERE](#) for a set of 27 slides of an applications of ABB RTUs (used as substation control system) in 12 substations of Stadtwerke München [German].

Click [HERE](#) for Information about ABB's RTU 560 [English]

Click [HERE](#) for a description of a programmable device from WAGO that can be used for Telecontrol (RTU) [German]

Posted by [Karlheinz Schwarz](#) at [2:41 AM](#) [0 comments](#) 

Labels: [ABB](#), [Fernwirktechnik](#), [GOOSE](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [RTU](#)

Thursday, May 26, 2011

Photos from the AWEA WINDPOWER 2011 Anaheim, CA, May 22-25

Click [HERE](#) for some photos from the exhibition provided by Oscar Naval ... see IEC 61850 (IEC 61400-25) in action for the wind industry and other application domains.

Posted by [Karlheinz Schwarz](#) at [6:30 AM](#) [0 comments](#) 

Labels: [61850](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [ISaGRAF](#)

TÜV Süd – Getting involved in IEC 61850 Conformance Testing

The well known [TÜV Süd](#) has announced that it will offer Conformance Test services for IEC 61850 ... for Smart Grids and for Smart Metering.

Click [HERE](#) to access the corresponding webpage at TÜV Süd.

Posted by [Karlheinz Schwarz](#) at [6:21 AM](#) [0 comments](#) 

Labels: [conformance test](#), [IEC 61850](#), [interoperability tests](#)

Sunday, May 22, 2011

IEC 61400-25 & IEC 61850 at AWEA WINDPOWER 2011 Anaheim, CA, May 22-25

The interest in the International Standards IEC 61400-25 and IEC 61850 is picking-up globally and also in North America. Some 45 experts from BCIT (British Columbia Institute of Technology) and BC Hydro had been in a 3 day seminar and hands-on training in Vancouver, BC (Canada). More people were interested to attend – the meeting room just had 45 seats.

This week (Sunday – Wednesday, May 22-25) there is another step towards simple, powerful and easy to use automation devices that support at the

AWEA WINDPOWER 2011, Anaheim, CA, May 22-25:

1. Standardized information and information modeling (IEC 61400-25-2, IEC 61850-7-x),
2. Information exchange (IEC 61400-25-4, IEC 61850-8-1),
3. System configuration language (IEC 61850-6), and
4. Function programming (IEC 61131-3 and IEC 61499):

Booth 185 (Hall D) exhibits the full range of the above standards:

- **Beck IPC** (IEC 61400-25, IEC 61850, IEC 61131-3, ...): Chips, Devices, charging station, PLC, ...
- **SystemCorp** (IEC 61400-25, IEC 61850, IEC 61131-3, ...): Stack Software, Devices, Tools, ...
- **ISaGRAF** (IEC 61131-3, IEC 61499, IEC 61400-25, IEC 61850): Programming language/tool running on the Beck IPC Chip

See below the Booth 185 in Hall D:



A video of some 15 MB shows the steps in programming IEC 61131-3 using IEC 61400-25 and IEC 61850 on a Beck IPC Chip:

www.nettedautomation.com/download/isagraf/IEC61850_2011-05-18.mp4

Posted by [Karlheinz Schwarz](#) at 1:28 PM 1 comments 

Labels: [61850](#), [61850-7-420](#), [Beck Chip](#), [charging station](#), [DER](#), [distribution automation](#), [Functionblock](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [ISaGRAF](#), [wind power](#)

Wednesday, May 18, 2011

Remote Service Forum und IEC 61850


Das 19. Remote Service Forum findet vom 6.-7. Juli 2011 bei der IHK Karlsruhe unter dem Titel "Von der Technologie zu neuen Dienstleistungen" statt. Neue Dienstleistungen im Bereich der erneuerbaren Energien und intelligenten Energieversorgungs-Netze sind unumgänglich, um die Flut der Informationen zum Überwachen, Steuern und Regeln des Energieflusses zu beherrschen. Industrielle Kommunikationsnetze (Feldbusse) sind kaum als Basis geeignet, weil es zu viele gibt: mehrere hundert!

In der elektrischen Energieversorgung haben sich die Normen **IEC 60870-5-10x** (Telecontrol), **IEC 60870-6 TASE.2** (Inter-control center communication), **IEC 61850** (substation automation and protection, DER, Hydro power plant monitoring and control), **IEC 61400-25** (monitoring and control of wind turbines), und **IEC 61131-3** (open PLC programming language) durchgesetzt.

Herr Dipl.-Ing. Karlheinz Schwarz (SCC) wird am 7.Juli 2011 einen Vortrag unter dem Titel "Genormter Remote-Zugriff auf Informationen elektrotechnischer Erzeugungs-und Verteilungsanlagen mit IEC 61850" halten.

NettedAutomation GmbH wird in der begleitenden Ausstellung über die neuesten Trends bei der Realisierung von IEC 61850 basierten Komponenten berichten und Realisierungsmöglichkeiten für embedded controller und vieles mehr vorstellen.

[HIER klicken](#), um das Programm und die Anmeldeinformationen herunterzuladen.

Posted by [Karlheinz Schwarz](#) at [6:53 AM](#) [0 comments](#) 

Labels: [condition monitoring](#), [conference](#), [Feldbus](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61850](#), [monitoring](#), [Power Automation](#), [RTU](#)

Tuesday, May 17, 2011

Electro Mobility, Substation Automation and IEC 61850

The basics for the infrastructure needed for the Electro Mobility have already been standardized – the electrical power delivery system: generation – transmission – distribution of electric A.C. power. The standardization of the electrical system has a long tradition. The monitoring, protection and control of electric power is automated in many higher voltage levels. There are mainly five international standards used all over: **IEC 60870-5-10x** for telecontrol, **IEC 60870-6 TASE.2** for inter-control center communication, **IEC 61850** for substation automation and protection, DER, Hydro power plant monitoring and control, **IEC 61400-25** for monitoring and control of wind turbines, and **IEC 61131-3** for a open PLC programming language.


These standards cover most of the needs for information modeling, information, system configuration, information exchange, and function programming for substations and power generation.

Mr Roland Bent (CEO of Phoenix Contact) stated the other day in the Open Automation magazine that **EV charging stations are small low voltage substations**. He is absolutely right! It is crucial to understand that the above mentioned standards are applicable in all voltage levels. [What is the difference of a three phase Y-system for 400.000 V and 400 V?](#) The multiplier of factor 10^3 . There is no need to re-event the wheel again.

Here is an excerpt of Mr Bent's statement in German:

"Ein noch wesentlich größeres, neues Marktfeld findet sich in der Infrastruktur für Elektromobilität. **Ladestationen für Elektrofahrzeuge sind kleine Niederspannungsschaltanlagen mit all den Komponenten und Steuerungskonzepten aus diesem Bereich.** Sie müssen auch informationstechnisch in die intelligenten Netzstrukturen integriert werden und stellen neue Anforderungen an IKT-Strukturen, zum Beispiel im Bereich der Abrechnungssysteme. Auch hier werden wieder Kompetenzen und Know-how aus der Industrieautomation benötigt."

Click [HERE](#) to read the complete statement from Mr Bent.

Posted by [Karlheinz Schwarz](#) at [6:47 AM](#) [0 comments](#) 

Labels: [Automation](#), [distribution automation](#), [E-Energy](#), [E-Mobility](#), [IEC 60870-5-101](#),

[IEC 60870-5-104](#), [IEC 60870-6](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-420](#), [Phoenix Contact](#), [Power Automation](#), [Stationslettechnik](#), [Substation Automation](#)

Wednesday, May 11, 2011

New Date for Seminar and Hands-on Training in Frankfurt


Please note that due to the huge fair IAA 2011 in Frankfurt mid-September 2011 we have **deferred the date for the seminar** on IEC 61850 Seminar and Hands-on Training from

14.-16. September **to 05.-07. October 2011**

The seminar will be held at the NH Hotel Frankfurt/Moerfelden.

Click [HERE](#) for the program.

Click [HERE](#) for the registration information.

Posted by [Karlheinz Schwarz](#) at [12:13 PM](#) [0 comments](#) 

Labels: [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Training](#)

ICD Documents for programmable and modular IEDs

If you have a modular 61850 product that can be shipped with a variable number of I/O cards, this may have a number of consequences:

1. The number of LNs this product can support depends on the hardware configuration.
2. LNs use shared resources, so if the user adds an LN of one type, he may not be able to add an LN of another type.

Be aware: everything is limited!

These tradeoffs are complex. If you produced an ICD file with the maximum number of LNs of every type your IED supports, for the maximum hardware configuration, the resulting file would be ridiculously large and unwieldy.

How to solve this issue?

All IEDs with a fixed functionality have definitely an easy to build icd file.

IEDs that are programmable or that are modular with one or more I/O cards are different. When the IED comes from the factory, you do not know what the application will be – so you do not know the information model and therefore you cannot provide an icd file for an application running on an IED.

What you could do is to provide an icd file that specifies the communication capabilities (services) and the DataTypeTemplates with all LNTypes that can be instantiated in that IED.

Once it is decided which functions (and LNs) will be running on a particular IED (with one, two, ... or five I/O cards), then the IED Configurator (as a manufacturer-specific tool) can create the "final" ICD file for a particular function.

The icd must have exactly one IED section. I would put the LN instances

of LLN0 and LPHD in the IED section. The other (functional LNs) would be added by the IED Configurator later ... when the number of I/O cards etc are known and selected.

Posted by [Karlheinz Schwarz](#) at [2:24 AM](#) [0 comments](#) 

Labels: [61850](#), [applications](#), [configuration](#), [I/Os](#), [ICD](#), [IEC 61850](#), [SCL](#)

Sunday, May 8, 2011

Is the Protocol Stack for IEC 61850 important?

No and Yes! **No**, compared to the many other aspects covered by IEC 61850, the protocol issue of IEC 61850-8-1 (upper layers like MMS and transport layers ...) are relatively of minor importance. There are the two crucial areas defined in IEC 61850: Information Models and System Configuration Language. I usually put it that way: SCL, engineering and configuration is 51 per cent of the importance ... may be 52 now ...

There is no real need to discuss other protocols and mappings from the view point of importance.

Yes, the protocols are very crucial!! ... when it comes to the question how and how fast and for what cost can I get IEC 61850 information communicated? To **exchange even the value of a single bit position** of a digital input requires the **implementation of the various protocols** like MMS, Presentation, Session, RFC 1006, TCP/IP, ...

This was – and still is – in many cases a quite expensive and time consuming effort! Yes, the availability of the protocol software is very IMPORTANT!

The other day I received an email with the following: "Although we have a ... license, we wanted to get started with SystemCorp's stack. The reason was simple: some manufacturers came to us asking what to do to incorporate IEC 61850 to their products. When we told them about ..., what it costs, how big it's API is, etc, they got frightened and said that it wasn't worth by now. When we first saw SystemCorp's solution in your blog, we realized that it was an excellent product for companies that wanted to "explore" IEC 61850."

A lot of people have made similar statements during the last months.

Posted by [Karlheinz Schwarz](#) at [8:09 AM](#) [0 comments](#) 

Labels: [ACSI](#), [IEC 61850](#), [IEC61850Li](#), [mapping](#), [protocol](#), [SystemCorp](#)

Impact of User Application on the Conformance of an IEC 61850 IED

One of the latest conformance tests has shown quite interesting results. An IED developed by SystemCorp (Perth, Western Australia) was successfully tested by KEMA recently. The IED uses a Beck IPC Chip as the core component. The SystemCorp IEC 61850 software (PIS-10 Stack) is running on this Chip platform as an integrated part – encapsulated and thus a given component.

In a paper SystemCorp has published a table of 120 test cases and shown which tested Functions are integrated in the PIS-10 Stack (integrated on the Chip) and which Functions are in the User Application that impact the conformance test.

More than 75 per cent of the test cases are of the first category (integrated in the Stack software) and less than 25 per cent of the test cases are directly depending on the User Application.

It is likely that other IEDs with the same Beck Chip and the same integrated PIS-10 stack will pass the 91 test cases of the first category easily.

Click [HERE](#) to access the table [PDF].

Posted by [Karlheinz Schwarz](#) at [8:08 AM](#) [0 comments](#) 

Labels: [61850](#), [Beck Chip](#), [communication](#), [conformance test](#), [IEC 61850](#), [implementation](#)

THE END: INTERBUS Club now part of Profibus User Organization

Ethernet has become THE major solution for future field busses – as has been suggested more than 20 years ago. It took many years before enough users requested Ethernet based field busses.

Interbus is one of successful conventional field busses – in strong competition with Profibus and other solutions. Finally, Ethernet wins over Interbus and many other standard field busses. The Interbus Club released this: “Within users a strong change by the field bus technologies in the **direction of Ethernet** is to be recognized. Hence, the INTERCBUS club had promptly decided to set on ... **ethernet based standard.**”

Click [HERE](#) for more information on the end of the Interbus Club.

There are (too) many Ethernet based international field bus standards specified in IEC 61158.

On the other side, IEC 61850 has – from the very beginning – decided to use **native Ethernet** and ICP/IP as specified in IEC 61850-8-1. There is an IEC 61850-8-1, where is the IEC 61850-8-2? The mapping of the ACSI and the information models to Profibus FMS was intended to be published as 8-2. Fortunately it was decided very some 15 years ago (!) to rely on Ethernet, TCP/IP and MMS – and not on a field bus.

Posted by [Karlheinz Schwarz](#) at [7:18 AM](#) [0 comments](#) 

Labels: [61850](#), [communication](#), [fieldbus](#), [IEC 61158](#), [IEC 61850](#), [Interbus](#), [Profibus](#)

Thursday, April 28, 2011

Back on writing Blog postings

You may have wondered that I haven't posted information on this blog for some three weeks. The reason simply was this: I was traveling internationally conducting comprehensive seminars and hands-on trainings in Harare (Zimbabwe; attendees from 10 Southern African countries!!), near Birmingham (UK), near Zurich (Switzerland), and presenting IEC 61850 at a fair in Darmstadt (Germany).

And now getting prepared for the next training in Frankfurt (Germany) mid of next week. See next post.

Hope to see a few people of the readers there.

Posted by [Karlheinz Schwarz](#) at [11:11 AM](#) [1 comments](#)

Labels: [61850](#), [education](#), [IEC 61850](#), [seminar](#), [Training](#)

Final Call for IEC 61850 Seminar and Hands-on Training in Frankfurt on May 04-06, 2011

There are a few seats left for the upcoming 3 day IEC 61850/61400-25 Seminar/Hands-on Training (NettedAutomation):

Frankfurt (Germany)


04.-06. May 2011

Click [HERE](#) for the program and registration information.

I allow a discount for the remaining seats!!

Please contact us as soon as possible to get one of the few remaining seats.

Click [HERE](#) to send an email to get a special offer.

Posted by [Karlheinz Schwarz](#) at [11:03 AM](#) [0 comments](#) 

Labels: [education](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [SCADA](#), [seminar](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Thursday, April 28, 2011

Process and Factory Automation – And Electric Power Automation?

The Process and Factory/Manufacturing Automation domain is quite well developed since the nineties. Many communication solutions and standards have been developed since the MAP days in the eighties. The Automation of Electric Power Systems has been progressed independently of most other domain – maybe because of the fear of the danger of the high voltage!?

Usually there is very little exchange of information between the domain of Electric Power Automation and other areas. Also in the standardization world there is very little cooperation between these domains ... with a few exceptions: IEC 60870-6 TASE.2 and IEC 61850 (standards for Power Systems) are using a Manufacturing specific communication solution: Manufacturing Message Specification (MMS, ISO 9506). On the other side IEC 61850 is referring to the Redundancy standard developed for Factor Automation (IEC 62439 – developed in cooperation between experts from IEC TC 65 and TC 57).

More and more experts are understanding the need to exchange information between all three domains. In the future it will be quite crucial for the Process and Factory/Manufacturing Automation domain to get information from the Power Automation systems – in order to use the electric power more efficiently!

Fortunately there is an easy way to retrieve the information from the Power Automation to an other domain that uses power: IEC 61850.

At the ABB Power and Automation Conference in Orlando, "ARC analyst Barry Young said industry is the number one U.S. consumer of energy by end use sector, followed by transportation, residential and commercial entities.

Process heating (fired heaters) and machine drives are the two biggest energy consumers in the manufacturing sector, and represent the best areas for energy savings opportunity.

Savings as high as 10 percent can be realized with no major investment, said Young, but a major roadblock exists. "Automation and electrification are **separate islands**, and **operators have no view into the power side**. They cannot identify or take advantage of energy savings," he said. ...

For 49 percent of companies, energy is not part of active process control. "IEC 61850 is an Ethernet-based solution that provides **tight integration between automation and power systems**," said Young. "It is the **fieldbus for electrical [systems]**. Adoption, however, has been slow due to the learning curve." ... Hm, it is much more than a fieldbus!!

Click [HERE](#) for the report from the ABB conference.

It is easier to look into the Power Automation System (with a single solution: IEC 61850) than into the other systems (with the many many

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field busses in IEC 61158 ...).

Want to look into the Power Automation System? Just use a simple IEC 61850 DLL (Dynamic Link Library) and a very simple client software that uses the DLL ... and talk to an IEC 61850 compliant power protection or control device:

Click [HERE](#) to let YOUR Application speak IEC 61850 in hours.

Posted by [Karlheinz Schwarz](#) at [10:52 AM](#) [0 comments](#) 

Labels: [Automation](#), [communication](#), [control center](#), [distribution automation](#), [DLL](#), [electric power system](#), [Ethernet](#), [fieldbus](#), [IEC 61158](#), [IEC 61850](#), [MAP](#), [MMS](#), [Power Automation](#), [SCADA](#), [TASE.2](#)

Sunday, April 3, 2011

SEL Reduces Prices for their IEC 61850 Option by 60 percent

One crucial result of the standardization work is that prices of standard based solutions are lowered! A good proof of this expectation is the announced price reduction of IEC 61850 based communication for SEL protection and control IEDs:

SEL reduced the price for the IEC 61850 option by 60 (SIXTY!) percent !!

“Utilities in Brazil, Mexico, the United States, India, Vietnam, Namibia, and many other countries rely on SEL solutions with IEC 61850 technology to maximize their power systems’ reliability and safety,” said Erik Newman, SEL vice president of Sales and Customer Service. “We look forward to offering this new option price to our customers who choose IEC 61850 as a method of communication and integration.” IEC 61850 was created to be an internationally standardized method of communication and integration and to support systems built from multivendor intelligent electronic devices (IEDs) that are networked to perform protection, monitoring, automation, metering, and control.”

This is what the market expected in the MAP days (during the early nineties). The MAP (Manufacturing Automation Protocols) were just too early ... it took another 20 years to get here! It’s not too late – we are still at the beginning of the Journey IEC 61850 and IEC 61400-25.

Click [HERE](#) for the press release [PDF].

Click [HERE](#) for more information on IEC 61850 provided by SEL.

Read a paper published by Karlheinz Schwarz in November 1991 on the [Use of Ethernet instead of Token passing in the MAP 3.0 specification](#) [PDF, 720 KB] - at that time the author did not know about Gigabit Ethernet; and a paper published by Karlheinz Schwarz in March 1991 on the [Use of Ethernet as a Fieldbus](#) [PDF, 720 KB].

It just takes time – the waiting for the right standard solution for information exchange, modeling and configuration is over: IEC 61850 is here!

Posted by [Karlheinz Schwarz](#) at [9:53 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [SEL](#)

Friday, April 1, 2011

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► [2009](#) (162)

► [2008](#) (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

IEC 61850 at Smart Grid Symposium and Exhibition

NettedAutomation GmbH (Karlsruhe/Germany) will present the latest developments in products for IEC 61850 during the

Symposium and Exhibition - Power Distribution Systems of the Future:

Novel solutions of the information and communication technology as the backbone of Smart Distribution

12.-13. April 2011

darmstadtium
Wissenschafts- und Kongresszentrum
Schlossgraben 1
64283 Darmstadt
Germany

organized by
HEAG Südthessische Energie AG
NTB Technoservice
VDE

Click [HERE](#) for information on the event and registration:

What NettedAutomation GmbH will present at both 12:

- **Lite Stack implementation** for IEC 61850 and IEC 61400-25
- **IEC61850@CHIP** - THE most efficient way to let devices speak IEC 61850 and IEC 61400-25
- **IEC61850 DLL** - THE most efficient way to let PCs speak IEC 61850-25
- **SCL Configuration Tool** (System Configuration Language)
- **Ready to GO!** ruggedized devices like Gateways, RTUs, generic controller [programmable in IEC 61131-3 (CoDeSys and ISaGRAF) and C/C++], ...
- **Experience** and international trends in IEC 61850
- **Training material**

Objectives of the event:

- Exchange of experience between the European and German lighthouse projects.
- Information of the public, of vendors, grid operators and other stakeholders of the energy market, of universities and research institutes about the running lighthouse projects
- Discussion of the broad dissemination of the project results and how to overcome the existing barriers.

IEC Standards like IEC 61850 play a key role in the future Power Generation, Transmission and Distribution Systems. Several presentations and a workshop deal with THE Global accepted and used standard IEC 61850 in the context of Distribution Systems.

Posted by [Karlheinz Schwarz](#) at [11:04 AM](#) [0 comments](#) 

IEC 61850 Certificate issued

SystemCorp's IEC 61850 device has successfully been conformance tested. The SystemCorp device was based upon SystemCorp's independently developed IEC 61850 source code and was implemented on the Beck IPC Chip SC143.



Click [HERE](#) for a copy of the certificate [PDF, 1MB].

Posted by [Karlheinz Schwarz](#) at [12:09 AM](#) [0 comments](#) 

Labels: [Beck Chip](#), [certificate](#), [conformance test](#), [IEC 61850](#), [stack](#), [SystemCorp](#)

Wednesday, March 30, 2011

North America - IEC 61850 is riding the leading edge of progress

Progress of IEC 61850 has arrived in North America according to the March 2011 Newton-Evans Research report "Market Trends Digest, March 2011".

The report found out interesting figures, e.g., "Within the Substation, IEC 60870-5-103 was the most frequently used protocol (40%). IEC 61850 (31%) fell close to serial protocols Modbus (31%) and DNP3 (33%), **however, 24% indicated that they plan on implementing IEC 61850 within the substation by YE 2013. If that becomes the case, IEC 61850 will become the most used protocol by far.**"

Click [HERE](#) to download the report [PDF, 1 MB].

Posted by [Karlheinz Schwarz](#) at [10:32 PM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [North America](#), [Substation Automation](#), [USA](#)

IEC 61850 Training opportunities

NettedAutomation GmbH offers several public training opportunities in 2011.

Please find the current schedule for 2011:

Frankfurt (Germany)

04.-06. May 2011 [*****STILL SEATS AVAILABLE*****]
14.-16. September 2011

3 day IEC 61850/61400-25 Seminar/Hands-on Training
(NettedAutomation) with Measurement IED and free evaluation software
(DLL etc. fully functional - free to take home).

<http://nettedautomation.com/seminars/uca/sem.html#standard>

Toronto (ON, Canada)

10-13 May 2011

4 day IEC 61850 Seminar/Hands-on Training in cooperation with Kinectrics

<http://www.kinectrics.com/Training/Pages/IEC-61850-Hands-on-Training-Protection-Control-And-IEC61850.aspx>

Cincinnati (OH, USA)

21-24 June 2011

4 day IEC 61850 Seminar/Hands-on Training in cooperation with Kinectrics

<http://www.kinectrics.com/Training/Pages/IEC-61850-Hands-on-Training-Protection-Control-And-IEC61850.aspx>

Shanghai (China)

05. September 2011

1 day Developers Workshop for IEC 61850 similar to the successful event at Myong Ji University, Yongin (RP of Korea)

<http://blog.iec61850.com/2011/03/developers-workshop-for-iec-61850-at.html>

Contact us for details please.

Nashville (TN, USA) at Remote Conference

20.-21. September 2011


2 day Seminar (NettedAutomation) on Power System Communication covering IEC 61850, IEC 61400-25, DNP3, NIST Interoperability Roadmap, Smart Grids, ...

<http://nettedautomation.com/seminars/uca/sem.html#nash>

For further information and updates visit:

<http://nettedautomation.com/seminars/uca/sem.html#standard>

NettedAutomation is confident, that their experience and service would meet all your expectations! You would get first-hand, very comprehensive, vendor neutral and up-to-date knowledge, experience, and guidance; learn how to reach interoperability of devices. NettedAutomation has trained more than 2.300 experts from more than 60 countries from more than 500 companies – all over.

Posted by [Karlheinz Schwarz](#) at [12:38 PM](#) [0 comments](#) 

Labels: [61850](#), [DER](#), [education](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [Power Automation](#), [programming](#), [sampled value](#), [Smart Grid](#), [Substation Automation](#), [TASE.2 ICCP](#), [Training](#)

SystemCorp's IEC 61850 SCL ICD Designer available for Online Purchase

The "ICD Designer" is SystemCORP Embedded Technology's Intelligent Electronic Device (IED) Capability Description designer application. This ICD Designer application is used to define and edit substation configuration descriptions for IEC 61850 through a graphical user

interface to create an XML formatted file.

Correctly speaking, the "ICD Designer" (as a product name) is a tool that has many functions for creating "IID Documents" – "Instantiated IED Description". IIDs have been defined in edition 2 of IEC 61850-6 (SCL).

The tool supports also the instance specific binding of the model to the real world data points, e.g., referenced by DNP3 or 101/104 points. The tool uses an XML document with the TypeTemplates. Any extended model can easily be added to that XML document to define your own model. It is really that easy.

Click [HERE](#) for an example of the binding (fourth slide).

The full version of the ICD Designer is now available for online purchase.

Click [HERE](#) for more information on the product and how to order online.

Posted by [Karlheinz Schwarz](#) at [12:29 PM](#) [0 comments](#) 

Labels: [configuration](#), [ICD](#), [IEC 61400-25](#), [IEC61850](#), [IID](#), [mapping](#), [model designer](#), [model extensions](#), [SCL](#)

Conformance Certificate for SystemCorp's IEC 61850 Device using Stack PIS-10 on Beck IPC Chip

SystemCorp has implemented their stack software on the Beck IPC Chip SC143 in their IED "IEC 61850 WebCAN Substation Monitoring & Control System". The IED is a multifunctional monitoring and control system.

KEMA (Arnhem, Netherlands) tested the IEC 61850 conformance successfully:



Click [HERE](#) for a copy of the certificate [PDF, 1MB].

Test has been conducted according to the PICS, PIXIT, TICS, and MICS Documents that can be accessed through:

<http://www.systemcorp.com.au/component/content/article/24-user-manuals/63-iec-61850-pics-pixit-tics-mics.html>

Details of the IED can be found here:

<http://www.systemcorp.com.au/component/content/article/24/74-webcan-rtu-system-description.html>

This is a major step towards the widespread use of the IEC 61850 stack from SystemCorp for small devices. The IEC 61850 software and the IEC 61850 communication behavior is almost completely implemented on the Beck IPC Chip SC143. Products that use the same chip with the software used for the conformance test would - by default - pass most crucial parts of the IEC 61850 conformance test.

This allows a short time-to-market IED development for all devices that apply the Beck IPC Chip.

Please contact SystemCorp for more details.

A flyer on the Beck Chips can be found here:

<http://nettedautomation.com/download/IEC61850Li.pdf>

Posted by [Karlheinz Schwarz](#) at [12:01 PM](#) [0 comments](#) 

Labels: [61850](#), [certificate](#), [conformance test](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [PICS](#), [PIXIT](#), [RTU](#)

Saturday, March 19, 2011

GPS Time Synchronization - A Single Point of Failure?

The GPS time synchronization is one of the crucial underlying solutions for time synchronization in power system information sharing: in substations, between substation, and wide area applications (with or without applying IEC 61850).

A paper published by SEL discusses the issue of GPS time synchronization - and especially when it may become a single point of failure in a power system.

Click [HERE](#) for a paper that discusses the issue.

Posted by [Karlheinz Schwarz](#) at [1:30 AM](#) [0 comments](#) 

Labels: [GPS](#), [IEC 61850](#), [time stamp](#), [time synchronization](#)

IEC 61850 - Common Format for Event Data Exchange

Event data can be logged in an IED by a Log according to IEC 61850-7-2 (IEC 61850-8-1, MMS Journal). The Log can be queried by time (before, between, after). This query returns MMS messages.

Logged event data in an IEC 61850 IED could now additionally be retrieved by an XML file called "COMFEDE":

Common Format for Event Data Exchange (COMFEDE) for Power Systems (IEEE Std C37.239™-2010).

This file may optionally rely on the information models defined by IEC 61850 Logical Devices, Logical Nodes, DataObjects, DataAttributes. An example of a file is shown here:

```
<Entry entryId="4294967292" timeOfEntry="2011-03-11T14:38:13Z">
  <EntryData t="2011-03-11T14:38:12.423834Z">
    <DataRef>MyLogicalDevice/MyMMXU1.A</DataRef>
    <DA name="phsA.cVal.mag.f" val="1023" valType="xs:double"/>
  </EntryData>
</Entry>
```

```
<DA name="phsB.cVal.mag.f" val="1022" valueType="xs:double"/>

<DA name="phsC.cVal.mag.f" val="1019" valueType="xs:double"/>

</EntryData>
</Entry>
```

Even that standard is an IEEE standard, it could be understood as an extension of IEC 61850 - it extends the use of the information model, information exchange and system configuration language.

From a 40,000 ft point of view it is a kind of a SCSM (Specific Communication Service Mapping). I guess it is also easy in an IEC 61850 client to transform the ReadJournal response messages according to MMS into an COMFEDE file - it is the same payload carried.

Click [HERE](#) for more information.

Posted by [Karlheinz Schwarz](#) at [1:20 AM](#) [0 comments](#) 

Labels: [61850](#), [COMFEDE](#), [IEC 61850](#), [IEEE](#), [MMS](#), [XML](#)

Wednesday, March 16, 2011

President of German Federal Network Agency recommends IEC Standards for Smart Grids

Matthias Kurth, President of the German Federal Network Agency, is very supportive of IEC standards. In a short video he stated that "IEC can help put the innovative potential of industry on the right track **so that we don't have island solutions**: proprietary solutions that can hinder the growth of the market".

IEC can, according to Mr. Kurth, "help us to bring the different industry players together on **common platforms which are transparent, open, and which are the basis of the individual innovation** ... we need not to wait to renovate our own infrastructure [editor: meant is the energy sector] in Europe."

Click [HERE](#) to read the report and watch the video posted at the IEC website.

IEC has listed the crucial standards for Smart Grids in an Excel table. IEC 61850 seems to be understood as THE most crucial standard series for Smart Grids.

Click [HERE](#) for the Excel table.

Click [HERE](#) for the Smart Grid page.

Mr. Kurth is right in requesting **open standards** as basis of innovation. The key innovations in the energy market needed will be the **many SMART applications** that keep the energy supply at a high level of availability - IEC 61850 and other IEC standards can help to support this objective! The **easier it is to USE these standards** the faster we can reach smart(er) applications.

One innovation is the simple IEC 61850 API developed by SystemCorp (Perth, Australia). The API can be used by application programmers immediately to develop SMART innovations for the energy market.

Posted by [Karlheinz Schwarz](#) at [10:59 PM](#) [0 comments](#) 

Labels: [communication](#), [IEC](#), [Smart Grid](#), [standards](#), [sustainable interoperability](#)

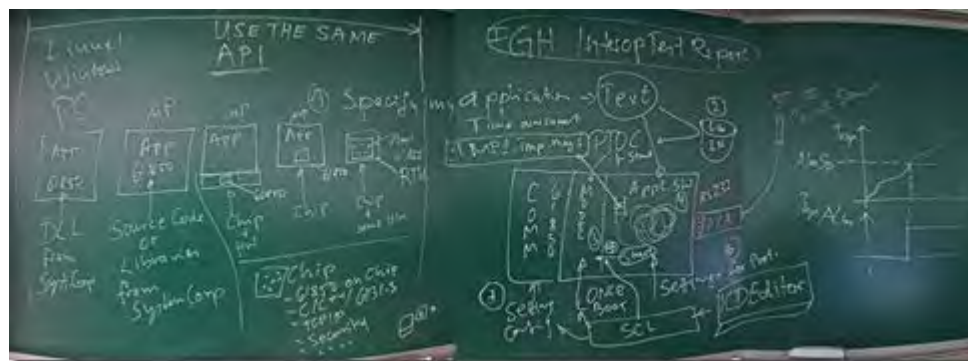
Developers Workshop for IEC 61850 at Myong Ji University, Yongin (RP of Korea) was successful

A successful Developers Workshop for IEC 61850 Client/Server and Publisher/Subscriber Applications was conducted at the Myong Ji University, Yongin/Korea, on 11 March 2011.

The interest was beyond expectations: 45 experts from all over of the RP of Korea attended the Workshop:



The attendees followed the instructions of Karlheinz Schwarz, who used the black board to explain the approach of IEC 61850 and the use of the simple API (Application Program Interface):



He explained the use of the API for different architectures (HW and SW) ... questions were discussed in English and Korean:



Professor Hyuk Soo Jang from the Myong Ji University (left) helped to explain the API in Korean.

The attendees used the PCs of the lab and partly their own notebooks to run the API evaluation software. They exercised to configure the IEC 61850 server and to check the effect of SCL file modifications ... a

great tool to work with.

After the workshop attendees told me that they have learned a lot about the standard, the stack software, the API, how easy it is to develop applications, and how to use the Beck Chip (with IEC 61850 @ Chip) in many different architectures. One crucial result was, that they figured out that the Beck Chip is a complete PC or PLC that can be used to implement applications (in C, C++ or IEC 61131-3) using IEC 61850 API. The Chip is much more than just a communication chip!!

The objective of the training was:

Students will learn how to use an API for IEC 61850 (IEC 61400-25) for Client, Server (C/S), Publisher, and Subscriber (P/S) Applications. The API provides an IEC 61850 Stack (included in a Windows DLL) that is used by application software written in C, C++ and C#. Prior to the event, students will receive the DLL and sample executable and source code for the applications. Students that bring their own Notebooks will be trained to modify and extend the application examples. After the training sessions students can continue to write their own application software.

Click [HERE](#) for the complete program of the workshop [pdf].

It is planned to repeat this workshop and provide more help for developers of IEC 61850 applications - the open and easy to use IEC 61850 platform is a crucial basis for the **fast-to-market innovations of sustainable interoperable applications** in the energy market.

It's never been easier or faster to get your applications speak IEC 61850.

Posted by [Karlheinz Schwarz](#) at [10:55 PM](#) [2 comments](#) 

Labels: [61850](#), [applications](#), [Beck](#), [Chip](#), [condition monitoring](#), [distribution automation](#), [education](#), [electric power system](#), [IEC 61850](#), [implementation](#), [interoperability](#), [Smart Grid](#), [tools](#)

IEC TC 57 to take action in Smart Grids

The IEC TC 57 has proposed a new work with the title "**System interfaces and communication protocol profiles** relevant for systems connected to the Smart Grid".

The ballot closes on May 09, 2011.

Click [HERE](#) for the proposal.

The proposal states: "In order to achieve **interoperable** interfacing between the components, the consistent, cost efficient and unambiguous **integration of the new domains** into the **IEC TC57** methods of energy management, architecture, **data models and protocols** is crucial."

The most prominent IEC TC 57 Data Models and Protocols are those defined in IEC 61850! New Domains are, e.g., Industry, Home and Building Energy Control Systems. My guess is that the various components in these domains have to communicate directly (interoperable) with IEDs in power systems. The Client/Server communication in IEC 61850 seems to be the most useful communication model applicable in the communication between power system IEDs and IEDs in the new domains. The application profile according to IEC 61850-8-1 requires just native TCP/IP !!

Since IP networks are (to be) installed everywhere, it is easy to apply

IEC 61850-8-1 without any change in most applications. Many existing IEDs like the [COM.TOMs from Beck IPC](#) and others could be used right away! They can be used as IEDs for monitoring and control in the new domains or they can be used as gateways between IEC 61850 and protocols in the new domains like Backnet, Profibus, Interbus, EtherCAT, CAN, Modbus, ...

This will accelerate the application of IEC 61850! ... in order to make systems more energy efficient and smarter by seamless:

- **System configuration** (IEC 61850-6),
- **Information** (IEC 61850-7-4xx, IEC 61400-25-2), and
- **Information exchange** (IEC 61850-7-2)
- **Communication protocol** (IEC 61850-8-1).

Posted by [Karlheinz Schwarz](#) at [6:25 AM](#) [0 comments](#) 

Labels: [Backnet](#), [building automation](#), [CAN](#), [EtherCAT](#), [IEC 61850](#), [Interbus](#), [interoperability](#), [Power Automation](#), [Profibus](#), [seamless](#), [Smart Grid](#)

What is the ACSI?

The ACSI is the "Abstract Communication Service Interface" defined in IEC 61850-7-2.

The ACSI was invented during a meeting of some experts that met here in Europe at the beginning of the project IEC 61850 (between 1995 and 1997). The reason was quite simple: We had TWO proposals for protocol profiles: (1) MMS TCP/IP and Ethernet (2) Profibus FMS. Each solution was supported by some 50 per cent of the members.

What to do now? I was deeply involved in the fieldbus standardization. We had so many fights since the late 80s ... which damaged the reputation of the standardization in the early 90s. I suggested NOT to fight in IEC 61850 but to define an abstract service model that could be mapped to MMS and to FMS. The first was specified in IEC 61850-8-1 and the second in IEC 61850-8-2. Even no official IEC draft has ever been published for IEC 61850-8-2.

Later we had a similar discussion in the project IEC 61400-25-4 in IEC TC 88 (Wind Turbines). We agreed to follow the approach of the abstract model of IEC 61850-7-2, to use the 8-1 MMS mapping, to add mappings for OPC XML DA, IEC 60870-5-101/104 and DNP3, and to define a concrete webservice for each abstract service of the ACSI.

The services of the ACSI and some explanation could be found here:

Click [HERE](#) for C/S and P/S
Click [HERE](#) for Data Acquisition
Click [HERE](#) for Webservices
Click [HERE](#) for MMS

By the way, the services in IEC 61850 are very general ... applicable almost everywhere!

My observation is, that (with some exceptions) ALL applications of IEC 61850 apply the MMS mapping ... that does not mean that everybody likes MMS ;-)

Most people using IEC 61850 do not care about MMS - and ALL should not care!

Posted by [Karlheinz Schwarz](#) at [4:16 AM](#) [0 comments](#) 

Labels: [61850](#), [ACSI](#), [fieldbus](#), [IEC 61850](#), [MMS](#), [webservice](#)

Thursday, March 10, 2011

Do you know what a PIXIT or a TICS is?

The conformance of devices with IEC 61850 has several aspects that are mainly specified in the following documents:

PICS	<i>Protocol Implementation Conformance Statement:</i> Which Communication services are supported ...	Click HERE for a complete example (all examples shown here are for A specific IED: RTU of SystemCorp); the stack software from SystemCorp offers more.
PIXIT	<i>Protocol Implementation Conformance Extra Information for Testing:</i> Restrictions and Limitations found in a device ...	Click HERE for a complete example
MICS	<i>Model Implementation Conformance Statement:</i> Models supported ...	Click HERE for a complete example
TICS	<i>Tissue Implementation Conformance Statement:</i> Which tissues have been implemented: www.tissue.iec61850.com	Click HERE for a complete example
SICS	<i>SCL Implementation Conformance Statement:</i> Which aspects of SCL have been implemented in a Tool	

Please ask your vendor of the IEDs or tools (you want to apply) for these documents. They provide you a good level of details you need to know when building multi-vendor systems.

Excerpt of a PICS:

3 ACSI Models conformance

Table 2 – ACSI models conformance statement

		Client	Server	Value/ Comments
M1	Logical Device	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M2	Logical Node	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M3	Data	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M4	Data Set	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M5	Substitution	<input type="checkbox"/>	<input type="checkbox"/>	
M6	Setting group control	<input type="checkbox"/>	<input type="checkbox"/>	
M7	Buffered Report Control	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M7-1	Sequence-numbered	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
M7-2	report-time-stamp	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Excerpt of a PIXIT:

2.1 (6.2.4.6) – PIXIT for Application Association Model

Description	Value/ Clarification
Maximum number of clients that can set-up a 2-party association simultaneously	16
TCP_ KEEPALIVE value	10 seconds
Lost connection detection time	20 seconds
Is authentication supported	N
What association parameters are necessary for successful association	Y Transport selector Y Session selector Y Presentation selector Y AP Title Y AE Qualifier
If association parameters are necessary for association, describe the correct values e.g.	Transport selector 0001 Session selector 0001 Presentation selector 00000001 AP Title 1,1,999,1,1 AE Qualifier 12
What is the maximum and minimum MMS PDU size	Max MMS PDU size: 16000bytes Min MMS PDU size: 2 bytes
What is the typical startup time after a power supply interrupt	40 sec

Excerpt of a MICS:

2 Logical Node List

The following table contains the list of logical nodes implemented in the device:

L: System Logical Nodes
LPHD (Physical device information)
LLN0 (Logical node zero)
G: Logical Nodes for Generic references
GGIO (Generic process I/O)
M: Logical Node for metering and measurement
MMXU(Measurement)

Excerpt of a TICS:

2 Mandatory IntOp TISSUES

Part	TISSUE Number	Description	Implement
8-1	116	GetNameList with empty response?	Y
	165	Improper Error Response for GetDataSetValues	Y
	183	GetNameList error handling	Y
7-4		None	
7-3	28	Definition of APC	Y
	54	Point def xVal, not cVal	Y
	55	Ineut = Ires ?	Y
	60	Services missing in tables	Y
	63	mag in CDC CMV	Y
	65	Deadband calculation of a Vector and trigger option	Y
	219	operTm in ACT	Y
	270	WYE and DEL rms values	Y

Excerpt of a SICS (Template from IEC 61850-6):

Table G.2 – System configurator conformance statement

		Mandatory/ optional	Value/ comments
ICD&IID import and usage		M	
S11	IED data model	M	
S12	Predefined data sets	M	
S13	Predefined control blocks	M	
S14	Support MustUnderstand concept (8.2)	M	
S15	Support SCL version ____ as input	C1	Version 2003 input is always mandatory
S16	Substation bay template with LN links, if it exists	O	
S17	Reuse already imported DataTypeTemplates for identical types	O	
S18	Keep attributes and elements of unknown XML name spaces outside Private elements for SCD export	O	
S19	Import single line layout coordinates defined in C.1	O	For own usage, or just for later export

For smooth system integration it is quite crucial to read and understand these documents!!

Posted by [Karlheinz Schwarz](#) at 4:41 AM 0 comments 

Labels: [61850](#), [ACSI](#), [communication](#), [conformance test](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [MMS](#), [PICS](#), [PIXIT](#), [RTU](#), [SystemCorp](#)

Tutorial of the 5 IEC 61850 Gurus in Sydney was very successful

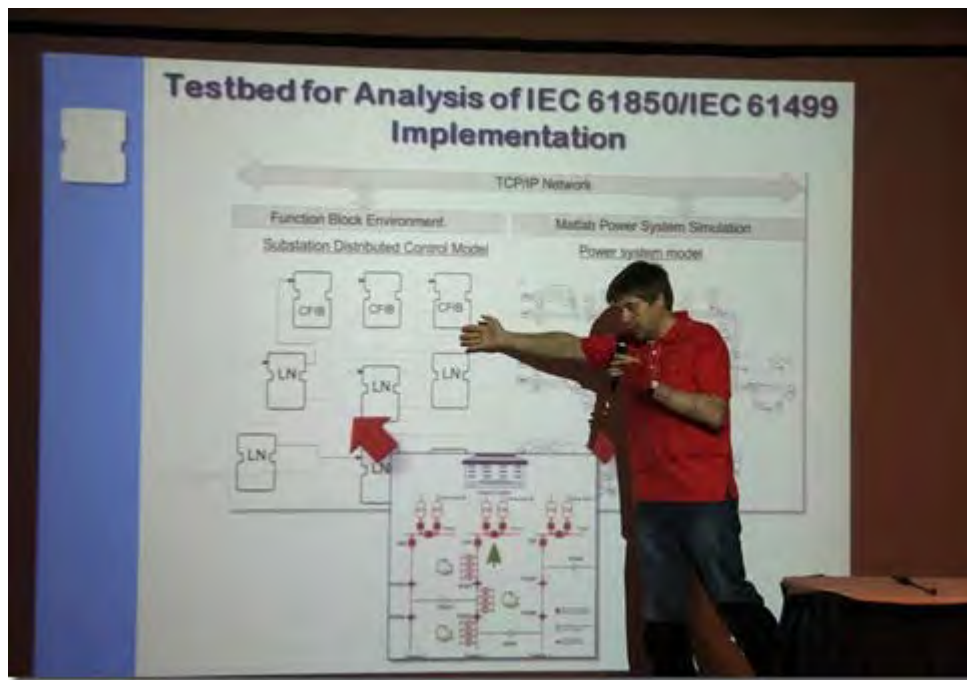
After the Meeting of the IEC TC 57 WG 10 (Core IEC 61850) in Noosa (Queensland, Australia) four IEC 61850 Gurus of the Working Group 10 went down to Sydney to meet another IEC 61850 Guru to conduct a 3 day Tutorial and hands-on Training on 07.-09. March 2011.

The tutorial was a great Success! **48 attendees from 15 Utilities (!!)** and 5 from 4 other companies attended the four half-day sessions in four parallel streams from Monday noon-time to Wednesday noon-time.

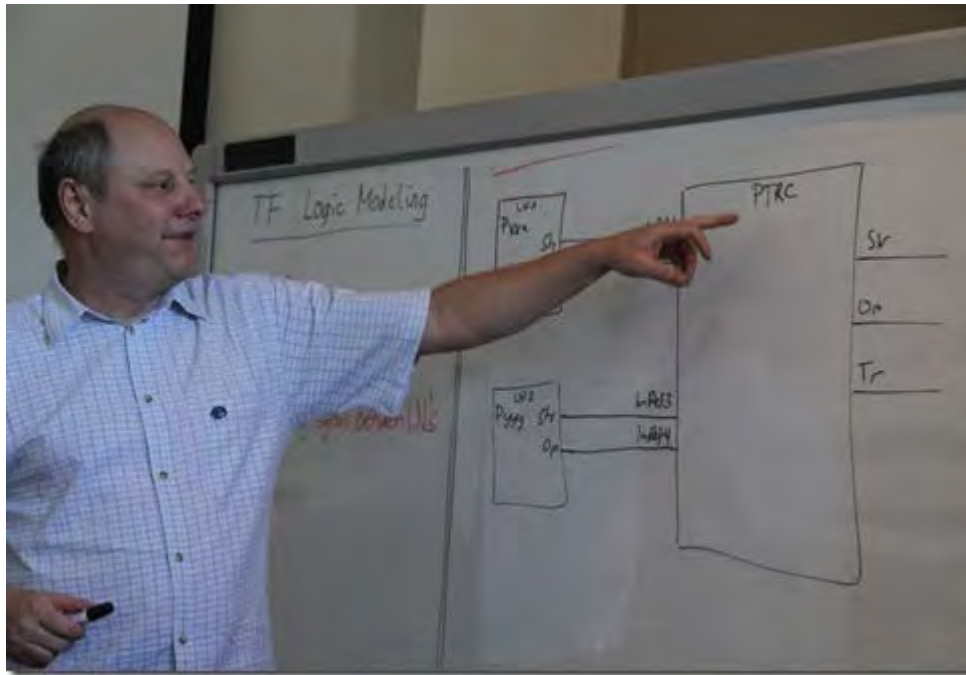
After this event it is likely that Australian utility engineers are ahead of the market - in most countries utility engineers are - more or less - watching the vendors commissioning and "turning on" TURN-KEY substation automation systems in their substations!! Usually - to my observation and experience - utility engineers have NO IDEA what they got delivered. Australian utilities are quite serious in getting deeply involved in specification, engineering, system integration, ...

More to come.

Some photos from the WG 10 meeting and from the event in Sydney:



Professor Valeriy Vyatkin (Auckland) presents IEC 61499 ...



Convenor of WG 10 (Christoph Brunner - one of the 5 IEC 61850 Gurus)



Alex Apostolov (another IEC 61850 Guru) discussing requirements for definition of Logic in IEC 61850



Reflections during the excursion in the Noosa River Everglades




The Gurus (Christoph and Alex) reflecting the quality of the Native

GOOSE ... Wine



The other 3 Gurus discuss and enjoy during the reception (from left):
Joerg Reuter, Rod Hughes and Karlheinz Schwarz

Posted by [Karlheinz Schwarz](#) at [4:31 AM](#) [0 comments](#) 

Labels: [Australia](#), [IEC 61850](#), [peopleware](#), [Substation Automation](#), [utilities](#)

IEC 61850 at Smart Grid Symposium and Exhibition

NettedAutomation GmbH (Karlsruhe/Germany) will present the latest developments in products for IEC 61850 during the

Symposium and Exhibition - Power Distribution Systems of the Future:

Novel solutions of the information and communication technology as the backbone of Smart Distribution

12.-13. April 2011

darmstadtium
Wissenschafts- und Kongresszentrum
Schlossgraben 1
64283 Darmstadt
Germany

organized by
HEAG Südthessische Energie AG
NTB Technoservice
VDE

Click [HERE](#) for information on the event and registration:

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Posted by [Karlheinz Schwarz](#) at 4:28 AM 0 comments 

Labels: [61850](#), [communication](#), [conference](#), [distribution](#), [distribution automation](#), [E-Energy](#), [E-Mobility](#), [embedded system](#), [IEC 61499](#), [IEC 61850](#), [implementation](#), [interoperability](#), [Power Automation](#), [Smart Grid](#)

Friday, March 4, 2011

IEC 61850 certificate for ABB's 800xA Automation System

ABB's 800xA Automation System has been successfully tested for compliance with IEC 61850 recently. Bringing the world of process and power automation together is more than just a "nice to have". It is key to cost saving.

"**The IEC 61850 standard** ... has lowered the investment barrier for customers to **integrate** the **process and power devices** on their plant floors. The demand for integrated process and power automation is growing in traditional markets that are **heavy energy users**, such as Oil and Gas, Power Generation, Pulp and Paper, Minerals and Metals industries.

By **integrating power and process systems** on the common 800xA platform, customers optimize the design and performance of their electrical and automation systems and see additional benefits in reduced maintenance, engineering and overall lifecycle costs. According to ARC, typical savings can result **in a 20% reduction** in CAPEX (capital expenditures) and OPEX (operating expenditures) by integrating these two, usually separate, automation infrastructures."

IEC 61850 is THE crucial "link" within power automation systems and **between** power automation systems and any other automation system - it is likely that it will impact the whole process automation world. Why? Because it meets many crucial requirements in the cooperation of automation and SCADA devices by defining **information objects** like "circuit Breaker, XCBR" or "electrical measurement of 3-phase system, MMXU", a **system configuration language** (SCL) and **information exchange services** (read/write, reporting and logging events, control, real-time exchange, file transfer, ...). And it's based on native protocols like Ethernet, TC/IP, MMS, ... Any device that has Ethernet and TC/IP connectivity could use IEC 61850.

Click [HERE](#) for the ABB press release.

Posted by [Karlheinz Schwarz](#) at 5:14 PM 0 comments 

Labels: [800xA](#), [ABB](#), [certificate](#), [electric power system](#), [IEC 61850](#), [Power Automation](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Tuesday, March 1, 2011

Let YOUR Application speak IEC 61850 in hours

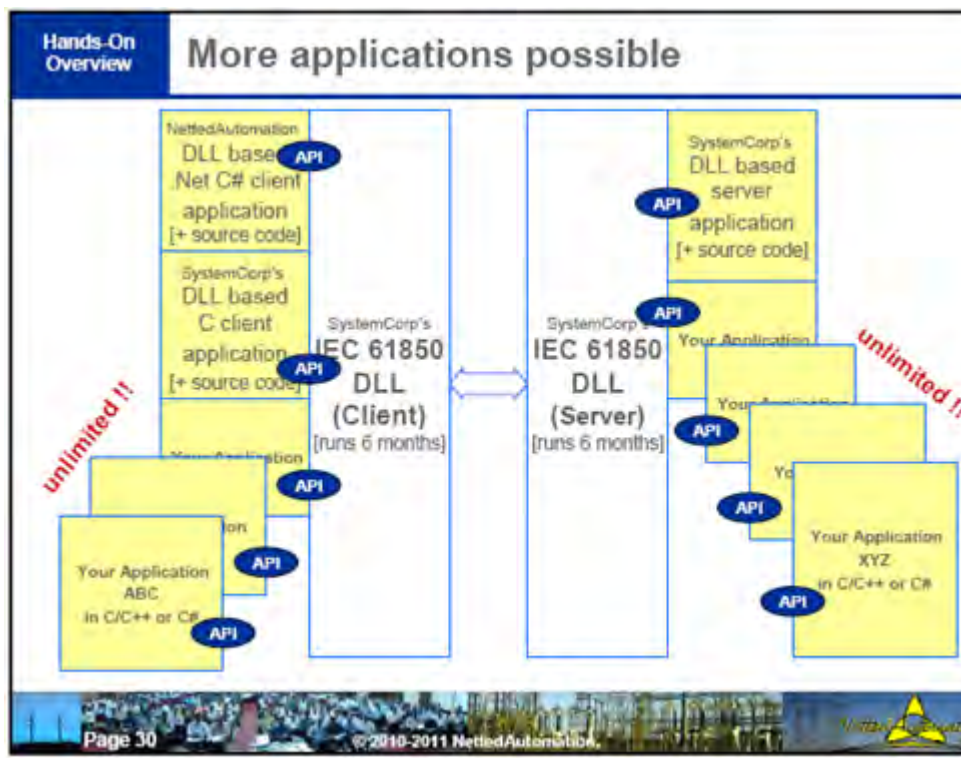
IEC 61850 has been implemented in hundreds of devices. The UCA Users Group lists some 181 certified devices with server functionality, 3 certified clients, and 2 Merging units (as per 2011-03-02; UCAIug Testing Quality Assurance Program).

Almost all of these devices provide a certain functionality like protection or control. Usually the devices do not provide a simple API (application program interface) that can easily be used by an application program written by a programmer. There is usually nor access to "IEC 6150 Stack". Some test tools may provide restricted access by manually entering values for a data attribute, or using a configurable simulation or providing a CSV (comma separated values) file for a profile. The evaluation licenses are usually quite restricted.

In contrast to this quite limited access to an API there is a free available server and client DLL (from SystemCorp) that runs for six (6) months. The DLL evaluation package comes with various client and server applications. The applications are provided in exe code and source code (C/C++ and C#). You have FULL control over the functionality YOU want to have for your client and server application.

Click [HERE](#) for details.

Any application YOU write could easily speak IEC 61850:



Subscribe To IEC 61850 News

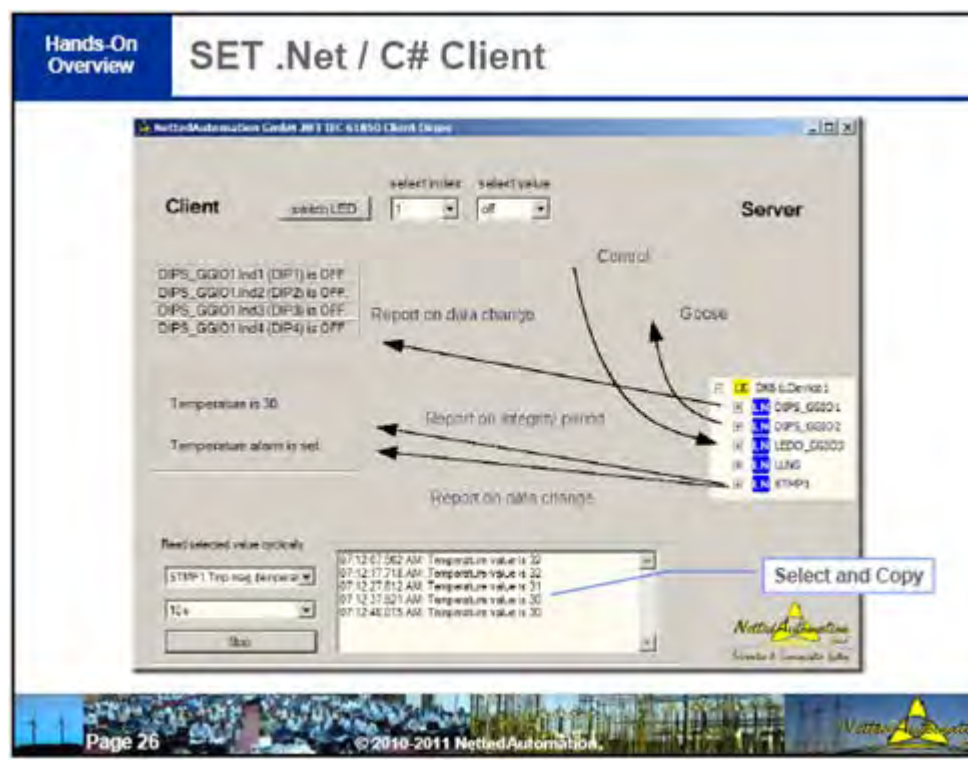
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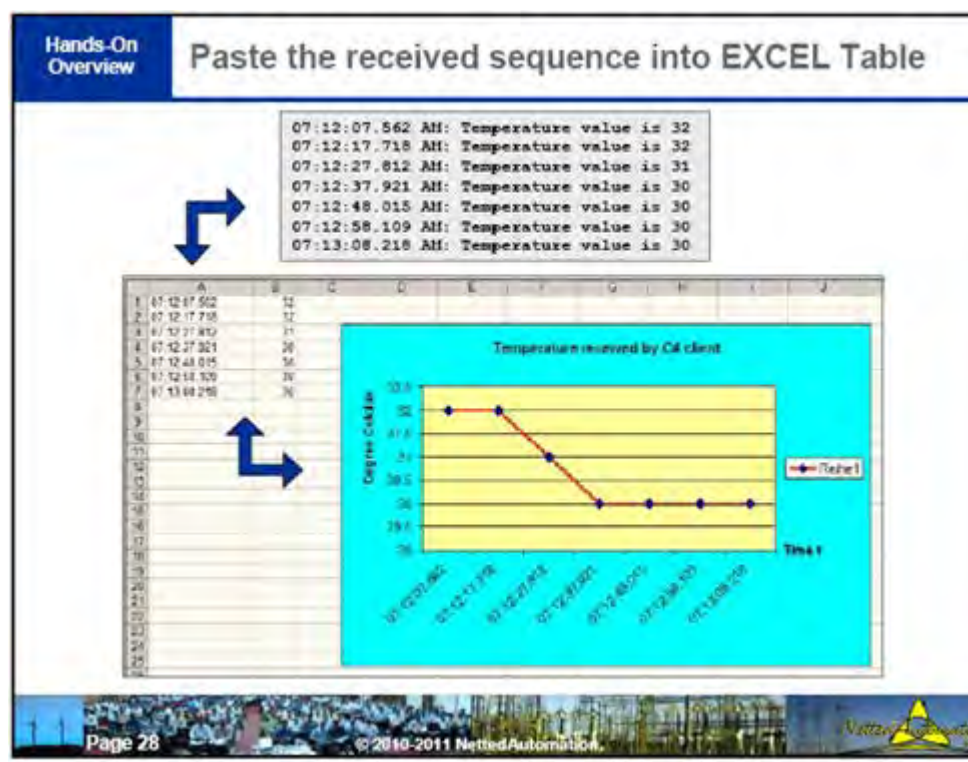
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The following example shows the .Net / C# client application provided by NettedAutomation GmbH. The received sequence of values can easily be copied and pasted:



e.g., pasted into an Excel table and converted to a diagram:



Whatever you need - JUST program it ... or link the client and server applications to **your real applications** ... which may also be masters to any communication slaves like DNP.3, IEC 60870-5-101/103/104, Modbus, Profibus, CAN, ... This way you can easily and fast build your own GATEWAY. Just link the DNP.3 or 104 points to the DLL by YOUR IEC 61850 server application that is bound to corresponding Model. See next figure:

[President of German Federal Network Agency recomme...](#)

[Developers Workshop for IEC 61850 at Myong Ji Univ...](#)

[IEC TC 57 to take action in Smart Grids](#)

[What is the ACSI?](#)

[Do you know what a PIXIT or a TICS is?](#)

[Tutorial of the 5 IEC 61850 Gurus in Sydney was ve...](#)

[IEC 61850 at Smart Grid Symposium and Exhibition](#)

[IEC 61850 certificate for ABB's 800xA Automation S...](#)

[Let YOUR Application speak IEC 61850 in hours](#)

[Triangle Microworks has very comprehensive IEC 618...](#)

► February (16)

► January (8)

► 2010 (153)

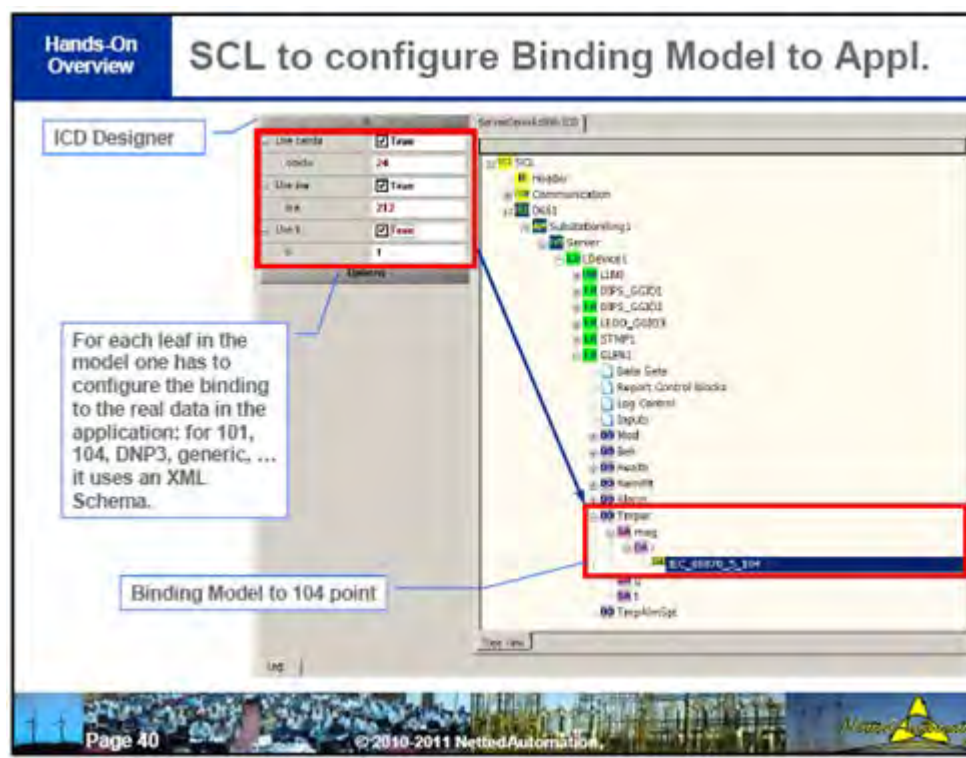
► 2009 (162)

► 2008 (82)

Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)



It is that easy. Just give it a try.

By the way, the API (and the underlying IEC 61850 stack) is also available on the [embedded controller from Beck IPC](#) for simple and FAST TO MARKET applications. All you program in C/C++ on a PC could be done on the Chip platform ... the Chip also supports IEC 61131-3 (CoDeSys) and soon ISaGRAF.

[NettedAutomation offers public and in-house training courses](#) using a comprehensive set of crucial evaluation tools - including the one shown here.

Posted by [Karlheinz Schwarz](#) at 4:19 PM 0 comments

Labels: [applications](#), [CAN](#), [communication](#), [cost saving](#), [Data concentrator](#), [DLL](#), [DNP3](#), [Evaluation](#), [Gateway](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [ISaGRAF](#), [merging unit](#), [peopleware](#), [programming](#), [SCADA](#), [Smart Grid](#), [smart metering](#)

Triangle Microworks has very comprehensive IEC 61850 Test Tools

The 61850 Test Harness (one big package) has been divided in to three separate products, functionally extended and renamed to **IEC 61850 Test Suite**:

Hammer - IEC 61850 CLIENT to test IEC 61850 & 60870-6 servers; and validate GOOSE, Report, Log, Control, and File Services.

Anvil - IEC 61850 SERVER to test IEC 61850 & 60870-6 clients; provides GOOSE, Report, Log, Control, and File Services; and generate simulation data automatically, manually, or table driven.

SCL Forge - Substation Configuration Language (SCL) editor.

Click [HERE](#) for downloading a 21 day test license.

Enjoy.

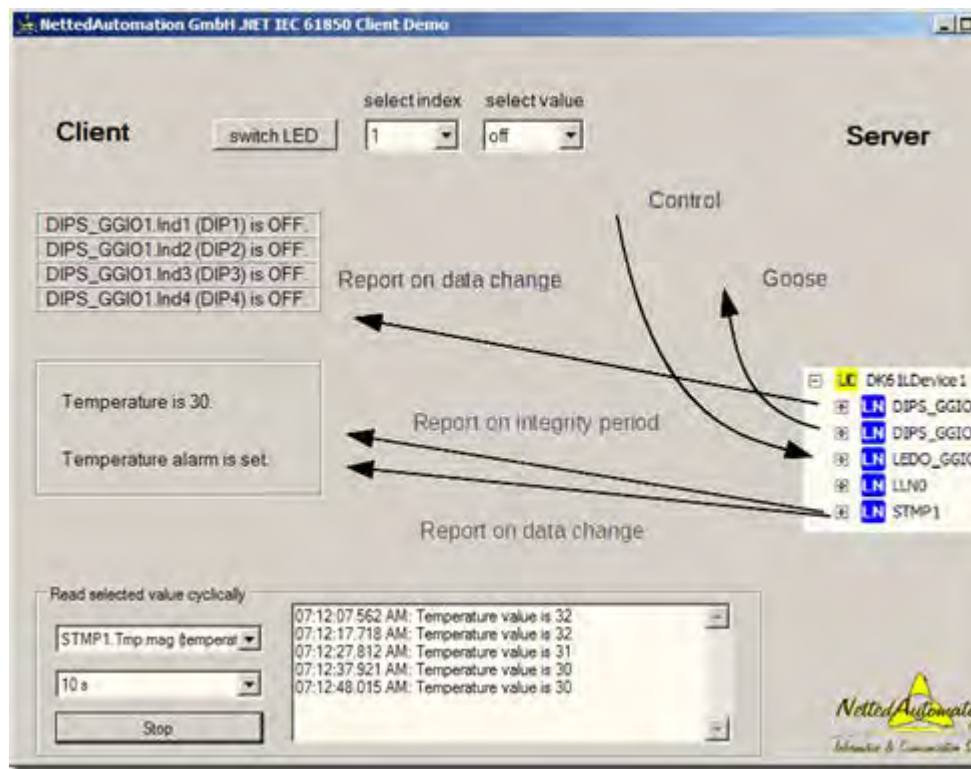
Posted by [Karlheinz Schwarz](#) at 1:56 PM 0 comments 

Labels: [IEC 61850](#), [testing](#), [tools](#)

Wednesday, February 23, 2011

Extended C# Client Application for IEC 61850 Evaluation Kit based on DLL

NettedAutomation has updated the C# Client application (GUI) of the [IEC 61850 Evaluation Kit \(DLL\)](#); the server is still the same. The new GUI supports polling values, e.g., the temperature, status or alarms, from the server provided earlier:



The API allows manual copy and paste (just select the range of values and copy them) as well as storing the values in a database, Excel sheet, or ...

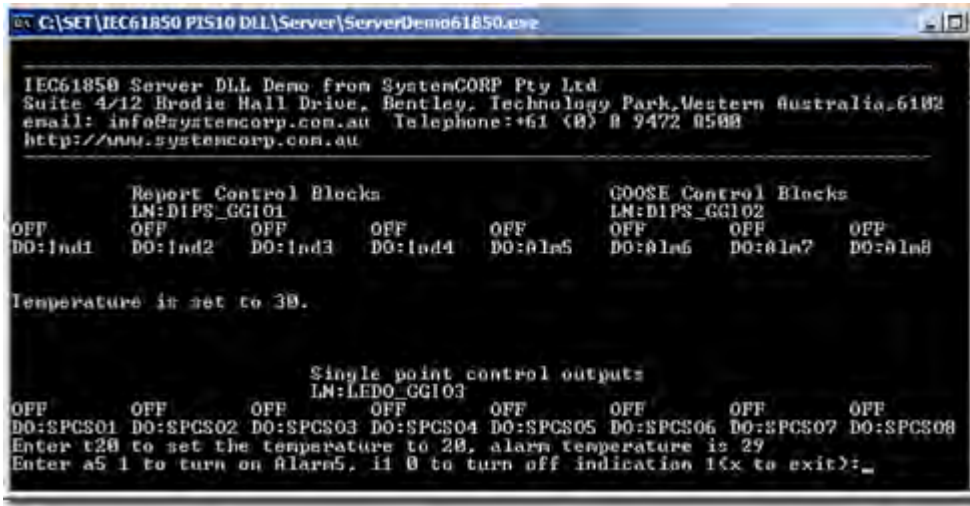
Values copied and pasted:

```
07:12:07.562 AM: Temperature value is 32
07:12:17.718 AM: Temperature value is 32
07:12:27.812 AM: Temperature value is 31
07:12:37.921 AM: Temperature value is 30
07:12:48.015 AM: Temperature value is 30
07:12:58.109 AM: Temperature value is 30
07:13:08.218 AM: Temperature value is 30
...
```

Different polling rates can be selected.

Note that this GUI comes as **executable program** and in **source code** (.Net project)! You can use the example and modify as you want ... it is just so easy to use the IEC 61850 Client API ...configured by an SCL file.

The server console (very easy to run and use!) from the existing Kit looks like this: Changes entered, e.g., t29 changes the temp value to 29 in the server ... this is sent to the client and polled by the client ...



Click [HERE](#) to download the new C# client application (exe and source code). You will be asked to enter your Email and Password -> "Sign in ...". OR if you **don't have an account** or **forgot your password**: Just enter your Email (required) in the middle of the form and click at "I agree with ...". You will immediately receive a new or your current password:

Download area (of NettedAutomation) for the requested files

If you already have an account please enter your email address and your password

Email

Password

Sign in...

Please enter your email address to create an account or if you have forgotten your password

You will receive your password immediately via email

Email (required)

Mr. Mrs.

First Name

Family Name

Company

Street

ZIP City

Country

Homepage

Disclaimer

I agree with the disclaimer - continue

Please find the three (3) updated files as shown here:

<http://blog.iec61850.com/search?updated-max=2011-03-04T17:14:00-08:00&max-results=18>[28.01.2012 08:41:13]


[UPDATED] Readme (III) -- IEC 61850/61400-25 FREE Evaluation/Starter Kit using a DLL [Updated 2011-02-23]	4KB	23.02.2011
<small>SystemCorp (Perth, Australia) and NettedAutomation offer an IEC 61850/61400-25 DLL (Dynamic Link Library) and three Application examples using the DLL: server and client app in C, client app in C#, see below</small>		
[EXE/SOURCE CODE: Simple Server and Client -- IEC 61850/61400-25 FREE Evaluation/Starter Kit using a DLL: Server and Client]	4975KB	02.09.2010
<small>IEC 61850 DLL + Server and Client Console Applications in C (exe files); C-Source code of client and server Applications included</small>		
[UPDATED] EXE: Simple DotNet Client GUI -- IEC 61850/61400-25 FREE Evaluation/Starter Kit using a DLL: Client [Updated/extended 2011-02-23]	1074KB	23.02.2011
<small>Client application in C# (exe files)</small>		
[UPDATED] SOURCE CODE: Simple DotNet Client GUI -- IEC 61850/61400-25 FREE Evaluation/Starter Kit using a DLL: Client [Updated/extended 2011-02-23]	1158KB	23.02.2011
<small>C# Source code of client application; Visual Studio 2008 project</small>		

The exe code can be used as soon as you have the corresponding server from the server running (see figure above: EXE/SOURCE CODE: Simple Server and Client -- IEC 61850/61400-25 FREE Evaluation/Starter Kit using a DLL: Server and Client).

Click [HERE](#) for a list of supported Server services that is almost completely implemented in the DLL ; the Client (same DLL) provides complementary services.

Enjoy the extended C# application.

Note that the **same API** is provided by the **IEC61850@CHIP** from Beck (see next post).

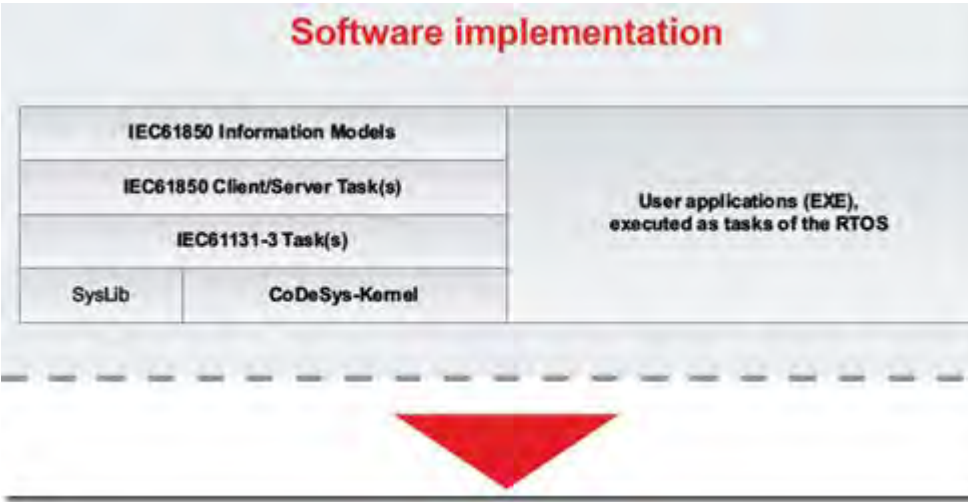
Posted by [Karlheinz Schwarz](#) at 4:47 AM 2 comments 

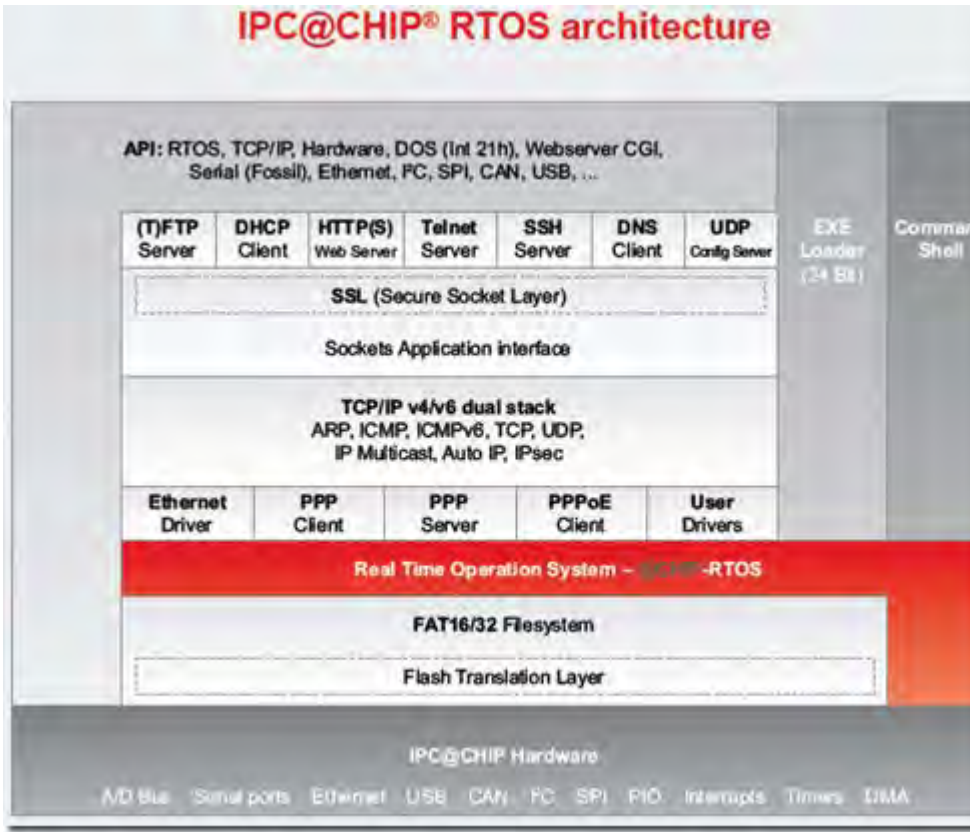
Labels: [61850](#), [API](#), [applications](#), [DER](#), [DLL](#), [Evaluation](#), [IEC 61400-25](#), [IEC 61850](#), [PICS](#), [wind power](#)

Tuesday, February 22, 2011

IEC61850@CHIP - Flyer

A new flyer from Beck IPC, SystemCorp and NettedAutomation explains the architecture of the IEC61850@CHIP. The platform is very powerful, offering a lot of integrated functions, modules, and services like TCP/IP, SSL, IPsec, HTTP(S) server, IEC 61850, CAN Bus, IEC 61131-3, ...









SC2x
Flexible, simple
and powerful



SC1x3
Maximum functional
in a minimum of space



SC2x3
Maximum performance for demanding automation tasks

Additional components like the following ones are available for EASY integration ... because the integration is already done by Beck IPC:



More to come

Click [HERE](#) for the flyer [pdf, 0.9 MB].

Posted by [Karlheinz Schwarz](#) at [10:05 PM](#) [0 comments](#)

Labels: [61850](#), [Beck](#), [CAN](#), [Chip](#), [DER](#), [embedded system](#), [Feldbus](#), [Gateway](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61850](#), [Power Automation](#), [security](#), [TCP/IP](#)

Monday, February 21, 2011

IEC 61850 - Reduces Time to Configure System

It has been said again and again, that the crucial benefit of IEC 61850 is the configuration of IEDs and Systems. Several publications have reported on this issue. E.g., Ralph Mackiewicz, SISCO Inc., reports the following small Co-op experience [see slide 27]:

- Substation Modernization Pilot did 2 substations
- DNP3.0 over TCP and UDP
- UCA2.0 (subset of IEC61850)
- Time to get DNP3 relay configured and communicating: ~ **8 hours**
- Time to get UCA/IEC61850 relay configured and communicating: **20 minutes**
- **\$325K Cost Savings for overall deployment**

Click [HERE](#) for the complete presentation [pdf]

Posted by [Karlheinz Schwarz](#) at [4:58 AM](#) [0 comments](#)

Labels: [61850](#), [configuration](#), [cost saving](#), [DNP3](#), [IEC 61850](#), [implementation](#)

Friday, February 18, 2011

Are Standards changing too fast?

There is are many SCADA users that think standards are changing too fast. I guess this is true for the many interface standards for sensors and actuators (the so-called fieldbusses and sensor interfaces). Lets

have a look on the most crucial communication standards used in IEC 61850 and IEC 61400-25:

Layer 7	MMS (ISO 9506)	some 20 years; likely to stay unchanged
Layer 5-6	ISO Presentation and Session	some 20 years
Layer 4	TCP	some 30 years; likely to stay for a long time
Layer 3	IP	some 30 years v4; likely that v6 will stay for decades
Layer 2	Ethernet	basics: 30 years

One crucial is that wide area monitoring seems to be build on top of TCP/IP - all over. There is no difference in the many different solutions from the transport layer viewpoint. **IEC 61850-8-1 (mapping to MMS) is stable since UCA 2.0 (mid of the 90's)**. RTU protocols like DNP3 or IEC 60870-5-101 **have changed** from serial links to TCP/IP - became more convergent to IEC 61850!! Guess these protocols will be extended to become convergent at model and configuration levels.

When it comes to the application layers, there seems to be mainly ONE standard profile stable: The profile shown above - which is QUITE STABLE.

There were (and are still) many people criticizing that the communication protocols in IEC 61850 are not following new developments faster (e.g., in the application of webservices)! Most people like what we have. When discussing webservices, the question is: **Which one??** There is not an "old" solution like MMS that is around for 20 years. What is discussed is: use IEC 61400-25-2 dedicated webservices, use OPC UA webservices or use DPWS, or ... Reaching consensus in the selection of webservices may take some time. In the meantime we have the stable stack in IEC 61850-8-1. That is what I call: **Sustainable Interoperability**.

Posted by [Karlheinz Schwarz](#) at [8:49 PM](#) [0 comments](#) 

Labels: [DNP3](#), [Feldbus](#), [IEC 60870-5-101](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-8-1](#), [interoperability](#), [ipv4](#), [ipv6](#), [MMS](#), [OPC](#), [standards](#)

Does IEC 61850 require special Ethernet Switches?

NO and Yes! It depends which services you are looking for. The communication profiles for client/server and GOOSE messaging are defined in IEC 61850-8-1.

The services and protocols for client/server communication are defined in the "TCP/IP T-Profile":

Transport	ISO Transport on top of TCP	RFC 1006	
Internet Control Message Protocol (ICMP)	RFC 792		
Transmission Control Protocol (TCP)	RFC 793		
Network	Internet Protocol	RFC 791	
	An Ethernet Address Resolution Protocol (ARP)	RFC 826	
Link Redundancy	Parallel Redundancy Protocol and High Availability Seamless Ring	IEC 62439-3	
Rapid Spanning Tree Protocol (RSTP)	IEEE 802.1D		
DataLink	Standard for the transmission of IP datagrams over Ethernet networks	RFC 894	
	Carrier Sense Multiple Access with collision detection (CSMA/CD)	ISO/IEC 8802-3:2001	

This table shows that the mandatory services and protocols are "standard" Ethernet ... you may purchase in a shop round the corner. There is no need for a special Switch etc.

In case you want to run GOOSE (or sampled values) messages, this requires IEEE [802.1Q](#) (VLAN and Priority Tagging):

DataLink: Priority Tagging/ VLAN IEEE 802.1Q (mandatory)

Ethernet Switches for rugged applications in substations have also to conform to IEC 61850-3 (EMC, EMI, Temp range, ...).

For applications outside substations you may use "standard" Ethernet switches.

Posted by [Karlheinz Schwarz](#) at 7:42 AM 0 comments 

Labels: [Ethernet](#), [IEC 61850](#), [IEC 61850-3](#), [IEC 61850-8-1](#), [real-time](#), [redundancy](#), [TCP/IP](#)

Wednesday, February 16, 2011

How to Secure the Smart Grid Network Infrastructure?

Andrew K. Wright, Paul Kalv, and Rodrick Sibery have published an excellent paper with the title "Interoperability and Security for Converged Smart Grid Networks".

The conclude: " While modern computing and technologies are now widely used throughout control centers and utility enterprise environments, **field communications equipment largely uses outdated technologies**. By deploying a converged smart grid network, utilities like ... can modernize their communications infrastructure, deploy new applications such as AMI and Distribution Automation, and **adopt an architecture that is based on standards and supports interoperability based on Internet Protocol. Interoperability** will allow them to replace individual subsystems that become out of date as technology evolves, without requiring forklift upgrades. **Converged smart grid networks** will require strong logical separation of traffic to ensure security of smart grid applications, and this will be best provided by a defense-in-depth architecture that considers security across all layers of the IP stack."

Click [HERE](#) for downloading the excellent paper [pdf, 1.5MB]

Recall the following statement I posted the other day "NAMUR expects that this clear statement and the requirements formulated will enable all

those involved in the standardisation process to work together constructively with a view to achieving a **converged** [added by Karlheinz - Wireless Fieldbus] **standard**."

Click [HERE](#) for the discussion of the Wireless Fieldbus (NAMUR, ...).

From the view point of information models, configuration Language, information exchange services and (IP-based) protocols we have reached a **very high level of convergence** with IEC 61850 - including the security measures as defined in IEC 62351.

Posted by [Karlheinz Schwarz](#) at [1:46 AM](#) [0 comments](#) 

Labels: [communication](#), [Critical Infrastructure Protection](#), [Cyber Security](#), [IEC 61850](#), [IEC 62351](#), [security](#), [Smart Grid](#), [TCP](#), [TCP/IP](#)

Tuesday, February 15, 2011

SCADA Systems Benefit from IEC 61850 - Test it on your own

Survalent Technology (MISSISSAUGA, ON), reported the completion of the Princes' Islands **IEC 61850 based SCADA system** project for Ayedas Energy Distribution Company that serves more than 1.8 million customers on the Asian side of Istanbul (one of Turkey's largest utilities).

"The project was implemented using IEC 61850 protocol for electrical substation automation, and communicates with 47 SEL protection relays."

""Being able to run our SmartHMI software on the SEL 3354 platform allows customers to take advantage of the features of IEC 61850," states Bijana Dimitrievska, General Manager, Survalent Europe. "IEC 61850 allows protection and control functionality in the substation to be modeled into different logical nodes, and grouped under different logical devices. **This saves considerable time in implementing new protection devices because you do not have to map device points to SCADA points as in the case of DNP protocol.**""

Click [HERE](#) for the complete news release.

Click [HERE](#) for an example of a typical logical node (MMXU) for electrical characteristics (current, voltages, frequency, active power, ...).

Following you find a **brief tutorial** explaining why you could save "considerable time in implementing new devcies".

You can specify a typical LN MMXU type for your project and re-use this type in any protection or control device. A new protection device added in the future will provide the same model!! There is no need for new points mappings. The LN type could formally specified in an SCL DataTypeTemplate (IEC 61850-6).

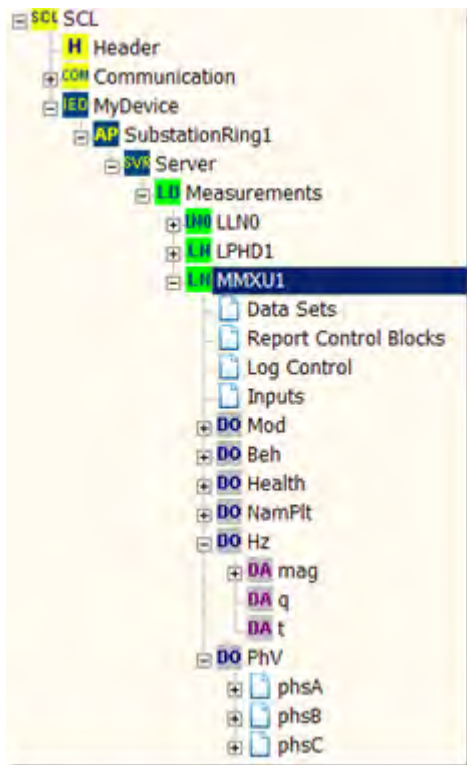
Here is a special DataTypeTemplate (I just designed for this post) with phase voltages (PhV) and frequency (Hz) only: InType="MyMMXU-Type_0" (see below):

```
<IED type="RTUType" manufacturer="SystemCORP Pty Ltd" configVersion="1.0" name="MyDevice">
  <Services/>
  <AccessPoint name="SubstationRing1">
    <Server timeout="30">
      <Authentication/>
      <LD inst="Measurements" desc="">
        <LN0 lnClass="LLNO" inst="" lnType="LLNO_1"/>
        <LN lnClass="LPHD" inst="1" prefix="" lnType="LPHD_1"/>
        <LN lnClass="MMXU" inst="1" prefix="" lnType="MyMMXU-Type_0"/>
      </LD>
    </Server>
  </AccessPoint>
</IED>
<DataTypeTemplates>
  ...
  <LNNodeType lnClass="MMXU" id="MyMMXU-Type_0">
    <DO name="Mod" type="ENC_1"/>
    <DO name="Beh" type="ENS_0"/>
    <DO name="Health" type="ENS_0"/>
    <DO name="NamPit" type="LPL_0"/>
    <DO name="Hz" type="MV_0"/>
    <DO name="PhV" type="WYE_0"/>
  </LNNodeType>
</DataTypeTemplates>
```

The logical device "Measurements" uses one or more instances of this InType:

<LN lnClass="MMXU" inst="1" prefix="" lnType="MyMMXU-Type_0"/>

representing MMXU1 (the first instance). The hierarchical model looks like this:



The same LnType can be used for devices from any vendor ... from a SCADA point of view all measurements (Hz and PhV) of all devices have the same structure and names. The values have to be mapped internally in the devices to the real data values of the devices' applications (encapsulated/hidden).

A SCADA system would need mainly to know the IP address. The LD names and LN instances could be figured out by retrieving the self-description from the device. In our example the device would respond: I am a device that contains one LD "Measurements" with a LN "Measurements"; the LN has a DataObject "Hz" and a DataObject "PhV" with "phsA", "phsB" and "phsC".

Or the SCADA system just reads the SCL file to get the model. The SCL document of the model of the IED can be used to simulate this device

...

The IEC 61850 Evaluation Kit provided by SystemCorp could be used to easily implement this (or any other) model, create a server and a client running under Windows. And use the services: GetDaaObjecValues, Reporting, GOOSE ... It is just that easy.

If you want to expose emulated or real voltage values through IEC 61850 you have just to emulate them in your server application or bind them to real values you have on your PC. The application software of the kit comes in exe and source code ... you can start right away to get your data exposed in IEC 61850. For six months FREE evaluation. The kit has two clients (C and C#) and a server (C).

Click [HERE](#) for a link to download the evaluation kit. Enjoy!

Click [HERE](#) for a comprehensive set of slides on the IEC 61850 Evaluation Kit with step by step explanation on how to use the various tools [pdf, 2 MB]

Posted by [Karlheinz Schwarz](#) at 8:31 PM 0 comments 

Labels: [configuration](#), [control center](#), [Data concentrator](#), [DNP3](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [logical node](#), [model extensions](#), [monitoring](#), [SCADA](#), [starter kit](#)

Shell seems to like IEC 61850 - for Good Reasons

Shell run an assessment of ABB's System 800xA with IEC 61850 capability. In a recent note it has been reported that

"ABB's System 800xA performed very well in wide range of simulated operating conditions during our assessment," commented Audun Gjerde from Shell Global Solutions. "We found that it can integrate multiple systems and processes, while maintaining a high level of system security and process safety."

Shell's evaluation noted several strengths for System 800xA, including its ability to **integrate process and power automation on a single platform with related integration and control of IEC 61850 devices**. This capability further enhances System 800xA's fully integrated power management capability, and the ability to remotely access and control switchgear. This capability reduces commissioning time, while allowing for faster online modifications during operation."

Click [HERE](#) for the report.

Click [HERE](#) for a comprehensive brochure on the 800xA ... with explanations on the benefit of IEC 61850 like:

"IEC 61850 defines **interoperable function** blocks which communicate over a network **with other functions regardless on which suppliers' device they are implementing**. System 800xA's **IEC 61850 communications module is a key** addition to AC 800M communications that enables users to finally **optimize the use of their electrical subsystems within a facility relative to the power utilization required by the process manufacturing needs in real time**."

The interoperability (**ONE protocol stack for client/server** and **ONE for real-time information exchange publisher/subscriber**) between devices from different suppliers is one of the crucial benefits of IEC 61850.

The brochure states on the many fieldbusses:

"System 800xA not only provides **freedom of choice** of fieldbus protocol, but of Foundation Fieldbus networks as well."

There are too many choices - the fieldbus standards are far away from a [convergent solution](#).

Posted by [Karlheinz Schwarz](#) at [12:35 AM](#) [0 comments](#) 

Labels: [ABB](#), [Automation](#), [communication](#), [fieldbus](#), [IEC 61850](#), [Power Automation](#), [process control](#), [Substation](#), [Substation Automation](#)

Sunday, February 13, 2011

IEC 61850 Test Tools for SCADA Applications

The other day I was asked for some guidance in the availability of IEC 61850 test tools for SCADA applications. Here is what I have responded (extended in this blog).

First of all, there are dedicated test tools for protection and control testing of the real-time application behavior (from Omicron, Megger, ...)

I guess you are looking non-real-time application issues. To my knowledge, there are no test tools available for SCADA functions that could run test sequences automatically. What I have so far recommend to experts is to develop their own application test tool that exactly provides what they need.

What you may need for your application test (for non-real-time functions) is to test the information exchange between a SCADA IEC 61850 client and an IEC 61850 IED server (protection, control, ...). This would comprise mainly the following tests:

1. Connect client to the server
2. Browse the model of IED
3. Read status and measurements and store the values in a client test application
4. Control outputs from/to a client/server test application
5. Reporting control and receive reports and store the values in a client test application
6. GOOSE control and sending/receiving GOOSE messages and store the values in a subscriber test application

The most known browser software is the IEDScout from Omicron. This can run tests 1 and 2. It would allow you to do a lot of manually tests for tests 3-6.

I guess what you need is a client that has an IEC 61850 API that allows your client and server Test Application to generate and receive messages automatically - in the order you want.

I would recommend to evaluate the IEC 61850 DLL from SystemCorp (Perth, Western Australia). The evaluation kit comes with two simple client applications (including application source code). You could easily extend the client application to implement a test application that could run your test cases automatically.

The evaluation kit is briefly introduced in the following presentation (from my seminars):

Click [HERE](#) to download the presentation [pdf, 2 MB]

The complete evaluation kit be downloaded form the following page:

<http://nettedautomation.com/iec61850li/dll/index.html>

I guess this is the most efficient way!

This kit also allows to build a server ... in order to test your SCADA application.

The kit runs for six months for free. The DLL could be purchased from SystemCorp later for a reasonable price.

NettedAutomation is developing more client and server applications using the DLL - additional applications will be announced on this block.

Posted by [Karlheinz Schwarz](#) at [8:20 PM](#) [0 comments](#) 

Labels: [61850](#), [applications](#), [DLL](#), [download](#), [Evaluation](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [SCADA](#), [test set](#), [testing](#), [Training](#)

Five IEC 61850 Gurus Conduct Tutorial in Sydney, March 07-09

The comprehensive Tutorial with five world renown professionals is **filling up very fast - to get a seat register NOW**. The IEC 61850 Tutorial is scheduled for Sydney (Australia), 7-9 March 2011.



Click [HERE](#) for the program and other details [pdf].

Click [HERE](#) for the registration form [word].

Click [HERE](#) for additional events ... all over.

NettedAutomation will provide an Evaluation Kit for IEC 61850 clients/server and publisher/subscriber - DLL that runs under Windows. The kit can be used after installation for six months.

By the way, Karlheinz Schwarz is a member of IEC TC 57 WG 10, 17, 18, 19 and IEC TC 88 PT 25, ... he received the [IEC 1906 Award for his engagement](#) in bringing IEC 61850 to the wind power industry.

Posted by [Karlheinz Schwarz](#) at 7:47 PM 0 comments 

Labels: [hands-on Training](#), [IEC 61850](#), [IEC61850Li](#), [IED](#), [MMS](#), [peopleware](#), [programming](#), [SCADA](#), [Smart Grid](#), [Training](#)

Friday, February 11, 2011

Wireless Sensor Networks: Users Want ONE and ONLY ONE Standard

Some 20 (!) years after the publication of the first field bus standards, the acceptance of field busses in the process industry is still behind expectations! The current IEC Field Bus Standards comprise about 100 (!) parts - specifying some 50 solutions under one Standard number:

IEC 61158. No wonder that the users are still looking for a convergent solution.

The German Association [NAMUR](#) (representing some 120 users and vendors involved in process automation) has published a very strong requirement document on the convergence of wireless sensor networks: NE 133 "Wireless Sensor Networks - Requirements for the convergence of existing standards" ("Wireless Sensor Netzwerke: Anforderungen an die Konvergenz der verfügbaren Standards")

NAMUR requires to get coexistence, interoperability and Interchangeability for wireless based technologies.

The press release states that NAMUR is **expecting to get ONE International Wireless Standard** for the process automation domain. ("Die NAMUR erwartet, dass diese klare Meinungsäußerung und die formulierten Anforderungen alle am Standardisierungsprozess Beteiligten zu einer konstruktiven Zusammenarbeit mit dem Ziel **eines konvergierten Standards** bringt." / "NAMUR expects that this clear statement and the requirements formulated will enable all those involved in the standardisation process to work together constructively with a view to achieving **a converged standard**.")

Click [HERE](#) for some details listed in the press release of the annual conference of NAMUR (Nov 2010) [pdf, German].

Click [HERE](#) for the abstract (Zusammenfassung) of NE 133. [Word, de/en]

Click [HERE](#) for the **order form to order a free of charge copy of the requirements document NE 133** [order form, de/en] ... you will get a free copy sent to your email address.

Click [HERE](#) for a list of IEC 61158 standards (Edition 2).

The far too many IEC standardized protocol stacks of the Field Busses (comprising some 12.000 pages) are causing still a lot of headaches and pain.

IEC 61850 provides **JUST ONE Client/Server** and **two Publisher/Subscriber** protocol stack solutions - This is what the Utility domain appreciates very much all over! Many vendors of industrial automation systems have already or will soon implement IEC 61850 - especially for their need to communicate over TCP/IP.

The Protocol stack defined in IEC 61850-8-1 using ISO 9506 (MMS) is not the crucial focus of IEC 61850 at all - BUT when it comes to **interoperability** at device level, then this is very crucial! IEC 61850 has more than protocols: **information models and a configuration language** ...

Posted by [Karlheinz Schwarz](#) at [4:41 AM](#) [0 comments](#) 

Labels: [de](#), [en](#), [exchangeability](#), [Feldbus](#), [IEC 61158](#), [IEC61850](#), [implementation](#), [interoperability](#), [MMS](#), [process control](#), [TCP](#)

Wednesday, February 9, 2011

Working in Australia: IEC 61850 Engineer Wanted

Sinclair Knight Merz (SKM) is looking for a Global Substation Automation Specialist with a "**deep knowledge in the IEC61850** standard protocol suite". You may be interested to work in Australia.

Click [HERE](#) to apply online to this position.

Posted by [Karlheinz Schwarz](#) at 6:07 AM 0 comments 

Labels: [Australia](#), [IEC 61850](#), [Substation Automation](#)

Friday, February 4, 2011

DistribuTech 2011 was a big Success for IEC 61850

The 2 1/2 day DistribuTech 2011 Exhibition in San Diego (USA, CA) from 01.02.-03.02.20011 was a big show of IEC 61850 software, devices, components and training services.

Many experts from all over came to visit the booth 2822 of SystemCorp - many more visitors stopped at the booth than SystemCorp expected.

The experience of the Exhibition is: IEC 61850 IS A CRUCIAL ISSUE in the North American market - and all over!! No Question: IEC 61850 picks-up very fast! During 2011 you will see a big push for IEC 61850 and IEC 61400-25!

The booth presented the following products many people were looking for:

- IEC 61850 stack software (source code, libraries, Windows DLL) from [SystemCorp](#)
- Tools, Gateways (DNP2, 101/104, Modbus, ...) from SystemCorp
- IEC 61850 at Chips from [Beck IPC](#)
- IEC 61850 in small devices (gateways, bay controller, general purpose IEDs, ...) from Beck IPC
- Consultancy services, education and hands-on training from NettedAutomation



SystemCorp Booth at DistribuTech 2011 in San Diego



... Booth setting-up



... Booth waiting for visitors



... a happy expert ... after receiving his Beck Chip Development Kit DK61




... Questions?



... Yes ... Aha, now I understand ... it is that simple, fast to market and powerful!

Click [HERE](#) for more information on the software ... DLL, tools, ...

Posted by [Karlheinz Schwarz](#) at [10:11 AM](#) [0 comments](#) 

Labels: [Beck](#), [DNP3](#), [education](#), [embedded system](#), [IEC 61850](#), [implementation](#), [lite](#), [NettedAutomation](#), [seminar](#), [SystemCorp](#)

Solar Integration System with IEC 61850 Connectivity

Sunverge optimizes the value of solar power by leveraging the practical advantages of distributed generation and energy storage. Their cost-effective energy management system captures solar energy and stores it for use when it's needed most, thereby shifting electrical loads, flattening peak electricity demand and maximizing return on renewable energy investments. With an innovative grid-tied model that fully integrates the latest in lithium-ion energy storage, **an open standards data processing gateway leveraging IEC 61850 and NIST-SGIP interoperability protocols** and a unique hybrid inverter/converter, Sunverge aligns the goals of residential consumers, commercial and industrial customers and electricity utilities to help solve the energy problems of today and tomorrow.

Click [HERE](#) for more information [pdf]

Posted by [Karlheinz Schwarz](#) at [7:20 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [photo voltaic](#), [PV](#), [Smart Grid](#), [storage](#)

IPv4 address pool is empty - what to do?

As of 3 February 2011, the central pool of available IPv4 addresses

managed by the Internet Assigned Numbers Authority (IANA) is empty.

It means that the central pool of available IPv4 addresses managed by the IANA (www.iana.org/numbers) is empty. As of February 2011, most of the four billion IPv4 addresses available have been allocated for use or reserved for a specific technical purpose.

It is recommended to change to IPv6 in the near future.

Click [HERE](#) for more information [pdf].

One of the first IEC 61850 products that is able to support IPv4 and IPv6 is the [Beck Chip](#) - even it is not yet required in IEC 61850-8-1 Edition 2 FDIS.

Posted by [Karlheinz Schwarz](#) at 5:56 AM 0 comments 

Labels: [IEC 61850](#), [ipv4](#), [ipv6](#)

IEC 61850-8-1 Editon2 available for FDIS Ballot

The next parts out for FDIS (Final Draft International Standard) ballot are:

IEC 61850-8-1 Ed.2:

Communication networks and systems for power utility automation -
Part 8-1: Specific Communication Service Mapping (SCSM) - Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3

Ballot closes: 2011-04-08

IEC 61850-4 Ed.2:

Communication networks and systems for power utility automation -
Part 4: System and project management

Ballot closes: 2011-03-18

The most crucial changes in IEC 61850-8-1 Edition 2 compared to the Edition 1 are:

- support of Gigabit Ethernet
- link layer redundancy
- extension of the length of the object reference: ObjectReference maps to a variable length MMS visible string with a maximum length of 129 octets.
- extension of the reason for inclusion type for comprehensive logging
- mapping of the tracking services
- a second mapping of the objectReference when used in the tracking services, or as linking
- extension of the AdditionalCause enumeration
- simulation of GOOSE telegram
- fixed-length encoded GOOSE message
- removal of the SCL Control Block
- mappings of ACSI service error codes and ISO 9506 error codes have changed. One change that should be noted is the change in usage of object-undefined. The object-undefined code has been replaced by object-non-existent in many responses.

Posted by [Karlheinz Schwarz](#) at 5:23 AM 0 comments 

Labels: [61850](#), [IEC 61850](#), [mapping](#), [MMS](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Thursday, January 27, 2011

NettedAutomation and Kinectrics offer IEC 61850 training in USA and Canada (May/June 2011)

Kinectrics and NettedAutomation will be running two IEC 61850 Seminar/Hands-on Training:

1. **Toronto**, Canada - Week of **May 9th, 2011** at Kinectrics IEC 61850 labs
2. **Cincinnati**, Ohio - Week of **June 20th, 2011** in their U.S. Facility

To inquire more about the May and June Hands-on training sessions, email, Cherie Ferrari, Manager of Training at training@kinectrics.com

These will be presented with expert Karlheinz Schwarz, leader in 61850 technology and applications and featuring the BECK chip - 61850 on a chip. He will be assisted by Dr. Jian-Cheng (J.C.) Tan, Kinectrics expert in IEC 61850 Interoperability of Multi-vendor Devices and Systems.

Posted by [Karlheinz Schwarz](#) at [5:13 PM](#) [0 comments](#) 

Labels: [Beck](#), [distribution automation](#), [IEC 61850](#), [IEC61850](#), [Training](#)

Monday, January 24, 2011

What are Client/Server and Publisher/Subscriber in IEC 61850?

The terms Client/Server (C/S) and Publisher/Subscriber (P/S) in IEC 61850 are describing (communication) roles a real device may have. A device can play any of the four roles - even at the same time.

From an information flow point of view (independent of C/S and P/S) there are different levels of relations: (#1) the Application Layer Protocol or communication view (see first slide); (#2) the system view as seen from an IEC 61850-6 (SCL - System Configuration Language) point of view (see second slide).

(#1) First slide: A server exposes the Data (in a LD/LN) that can be accessed by the client over a TCP/IP connection - may be over Ethernet. Or the client will receive event-driven reports from the server over TCP/IP (Ethernet). This is a 1:1 connection at protocol level. A server may communicate with many clients (one TCP/IP connection between each client and server). The connection is opened by the client. Note: a real device could play both roles - in MMS an association (connection) allows both devices to play both roles (this is not yet used in IEC 61850)!

The slide also shows the publisher and subscriber. The publisher sends multicast messages that are picked-up by subscribers. The subscriber is (at communication level) NOT subscribing to the subscriber. The

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[NettedAutomation and Kinectrics offer IEC 61850 t...](#)

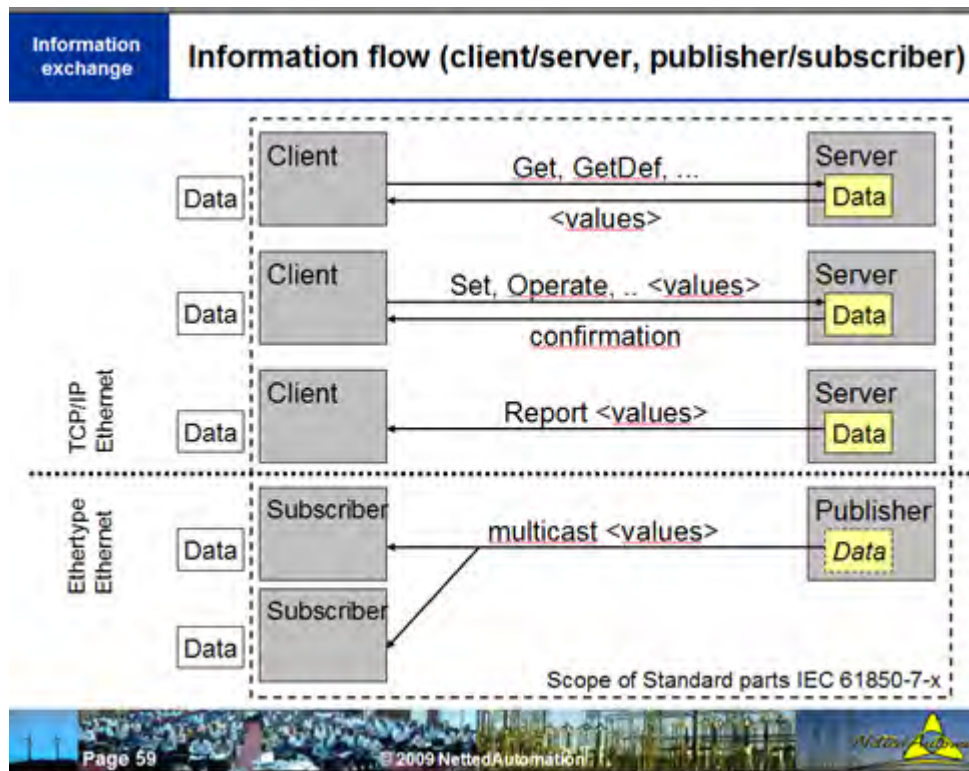
[What are Client/Server and Publisher/Subscriber in...](#)

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[What does "IEC 61850 Lite" mean?](#)

[IEC 61850 in the Backbone of Smart Distribution](#)

message is just sent and any device that has a subscriber role picks-up the messages it wants to receive. Each multicast message has an identification (let's say number 277). The publisher does NOT know who is receiving the messages. This is like picking-up a newspaper at the red traffic light in the morning. You may also subscribe to the publishing house to get the newspaper delivered to your home every morning - this is the real publishing/subscribing).



[Applications of IEC 61850 in Europe and all over](#)

[Growth of Substation Automation with IEC 61850](#)

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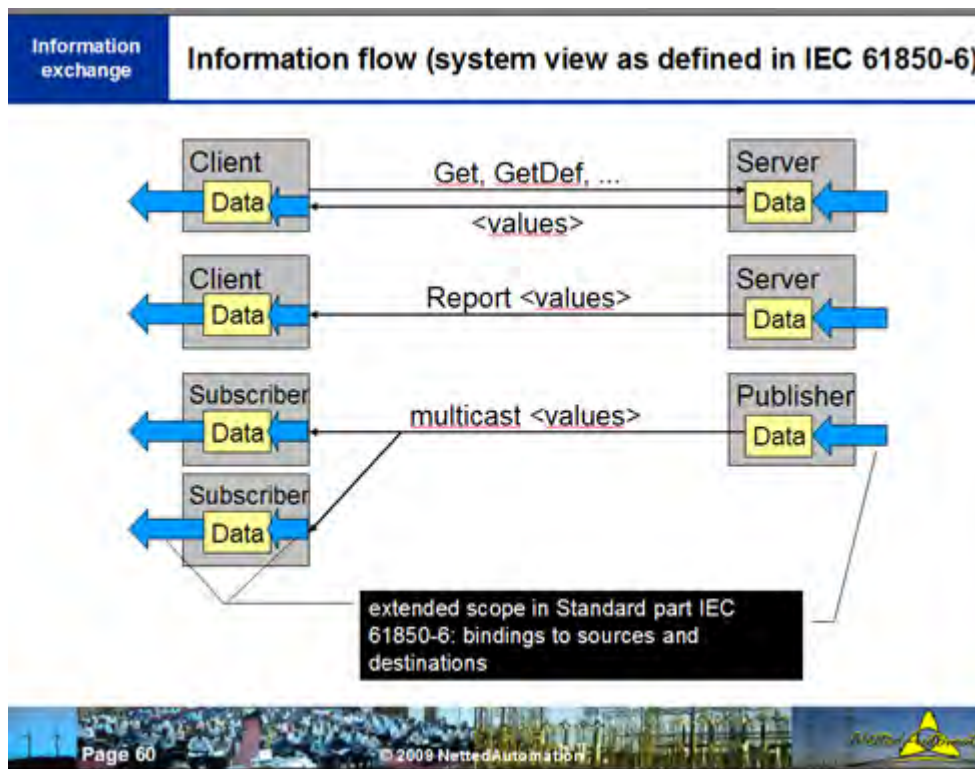
- 2010 (153)
- 2009 (162)
- 2008 (82)

Contributors

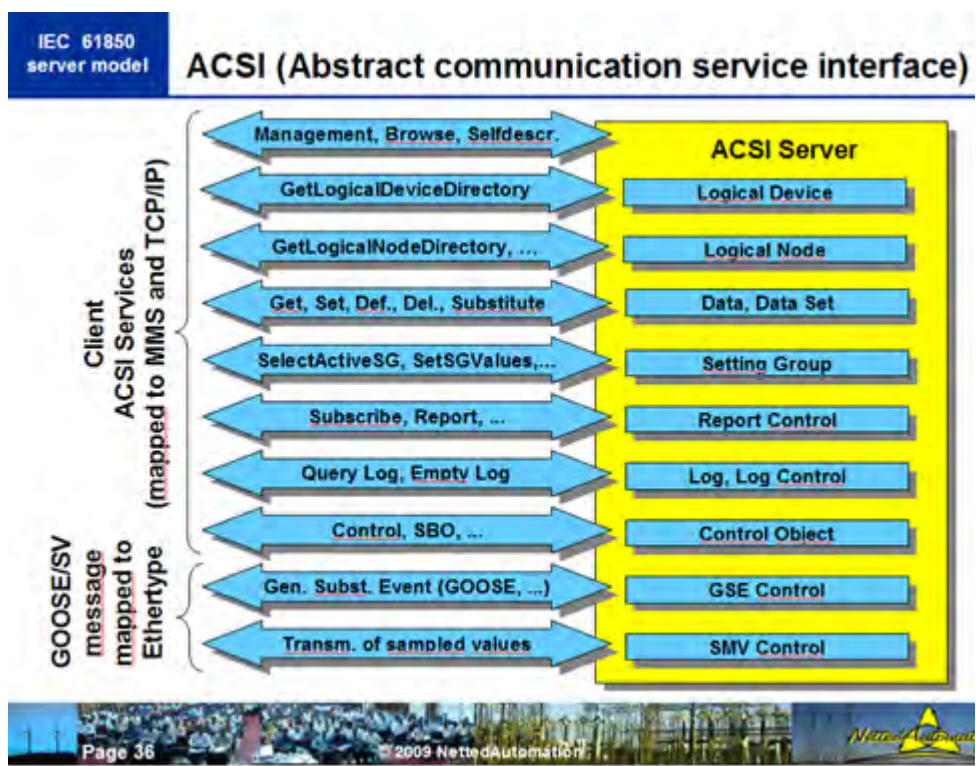
[Karlheinz Schwarz](#)
[Michael Schwarz](#)

A device that has a Server can model Data (in LD/LN), e.g. status of a circuit breaker. This Data can be used for publishing values (by a DataSet and a Control block). Strictly speaking: a Publisher does not expose a data model. This is done by a server. The publishing service makes use of a server (explicitly or implicitly). Explicitly means: data - dataset - control block - message. Implicitly means: message - you don't see the model; it may be defined in SCL only.

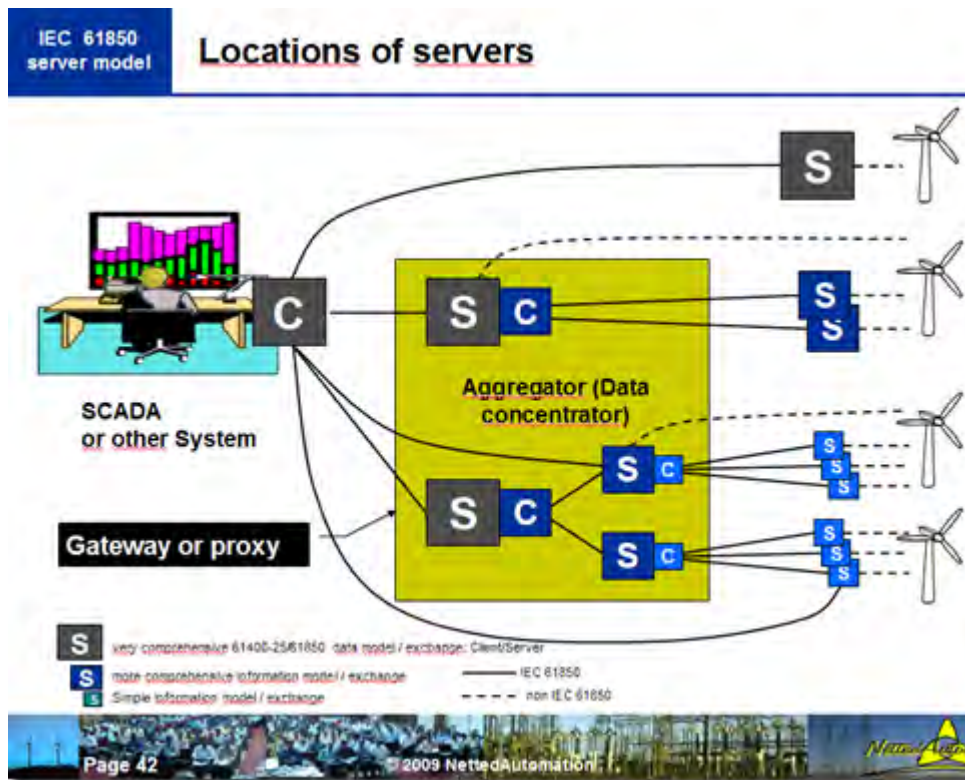
(#2) From a SCL (system) point of view we can model the flow of information from a source (right), through a server/publisher, message, client/server, ... to a sink (see next slide). In SCL we are describing the information exchange between a Data in logical nodes - clients/servers are not in the main focus. SCL provides - in my words - the wiring plan of a whole system (from a source to a sink).



The services defined in IEC 61850 ACSI are listed in the third slide:



The last slide shows that clients and servers can be cascaded ... this is outside the protocols - but can be specified with SCL! SCL is a VERY powerful specification language!!



Examples of these cascaded relations are presented and discussed during the hands-on training courses of NettedAutomation ... and much more.

Summary: each device implementing all four roles defined in IEC 61850 can communicate with each other device as a client, server, publisher, and subscriber.

Posted by [Karlheinz Schwarz](#) at 1:34 PM 0 comments

Labels: [ACSI](#), [charging station](#), [Ethernet](#), [Gateway](#), [hands-on Training](#), [IEC 61850](#), [IEC 61850-6](#), [Training](#)

Friday, January 21, 2011

Experts of the USE61400-25 Users Group for IEC 61400-25 met in Fredericia (Denmark)

Many experts of the Wind Power Users Group "USE61400-25" for IEC 61400-25 (IEC 61850) met in Fredericia (Denmark) on Monday (2011-01-17) to report and discuss experiences with the application of IEC 61400-25/61850 for Wind Turbines. **28 experts** (!) from

ABB, AREVA Wind, Bachmann Electronic, DONG Energy
ENERCON, Ingeteam Technology, KEMA, Kenersys,
Mita-Teknik, Natcon7, NettedAutomation,
RE Power Systems AG, Siemens Wind Power,
Vattenfall, Vestas

met and shared the very positive experiences with the standards ... and discussed issues that need modifications and corrections.

<http://use61400-25.com>

Most of these experts met with IEC TC 57 WG 17 (DER) on Tuesday (2011-01-18): 39 people had been in the meeting on Tuesday to share their experiences on Wind Power and DER. WG 17 met until 2011-01-21.

Posted by [Karlheinz Schwarz](#) at [10:32 PM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [Users Group](#), [wind power](#)

What does "IEC 61850 Lite" mean?

IEC 61850 is a suite of standards. Implementations usually provide a subset of the various aspects of the many parts (IEC 61850-7-2, 7-3, 7-4, 8-1, 6, ...). There is a document in IEC 61850-7-2 that is used to list the service models and services supported by an implementation (PICS - Protocol Implementation Conformance Statement). The PICS give a good overview about the communication services.

There have been several discussions on specifying a minimum list of these PICS and name it "IEC 61850 Lite". Currently I do not see if there will ever be such a specification, because we have a variety of markets that would need different "Lite" specs. Most programmers (I have talked to the recent years) that want to integrate IEC 61850 software into their application are looking for a "lite" API (Application Program Interface) - for an easy and fast integration into their applications.

This was one of the crucial ideas SystemCorp (Perth, Western Australia, www.systemcorp.com.au) had when they started to implement a "lite" implementation. "Lite" means a - more or less - FULL set of services BUT an easy to use API accompanied by a SCL Design tool that supports designing ICD/CID documents that can directly be used to configure the information model and bind the model to the application program. The resulted easy to use package has gained a huge interest in the market all over.

The crucial issue is to help people to get started within hours and days - not weeks and months. There is a evaluation package available that can be used on Windows. This package comes with a DLL (IEC 61850 software) and a server application (including C source code of application) and two client applications (including C and C# source code of application). You can run the evaluation right away - it is useable for 6 months.

Here is the link to find more details and how to get the kit:
<http://nettedautomation.com/iec61850li/dll/index.html>

The feedback from several of the more than 1,000 users of the evaluation kits shows that this seems to be a "lite" solution many had been looking for. The software runs on other platforms as well.

One interesting platform is the Beck IEC61850@CHIP - to get a very "lite" implementation:
<http://nettedautomation.com/iec61850li/index.html#beck>

I will be at the DistribuTech 2011 (San Diego, Febr 01-03) at booth 2822. Here you can see what a specific "Lite implementation" looks like. Come by for a visit.

Posted by [Karlheinz Schwarz](#) at [10:25 PM](#) [0 comments](#) 

Labels: [API](#), [applications](#), [Beck](#), [download](#), [IEC 61850](#), [lite](#), [SCADA](#), [seminar](#), [Smart Grid](#), [Training](#)

Sunday, January 9, 2011

IEC 61850 in the Backbone of Smart Distribution

Symposium in Darmstadt (Germany), 12th -14th April 2011

"Novel Information and Communication technologies as the back bone for Smart Distribution" has the task to bring together the 12 project teams for a public exchange of experience and to consider solutions and results.

Objective of the Symposium: Exchange of experience between the European and German lighthouse projects.

- Information of the public, of vendors, grid operators and other stakeholders of the energy market, of universities and research institutes about the running lighthouse projects.
- Discussion of the broad dissemination of the project results and how to overcome the existing barriers.

Some key presentations will be on the implementation and application of IEC 61850.

Click [HERE](#) for the full program [pdf]

Posted by [Karlheinz Schwarz](#) at 9:15 PM 0 comments 

Labels: [E-Energy](#), [IEC 61850](#), [Smart Grid](#)

Wednesday, January 5, 2011

Applications of IEC 61850 in Europe and all over

The year 2011 started with some questions I received from an employee of a big distribution company:

1. How is the implementation of IEC 61850 here in Europe especially in German Utility Company?
2. Are there lots of substation using this IEC 61850?
3. Are there lots of success stories from utility companies around the world using this IEC 61850?
4. Will the standard IEC 61850 do lots of revisions (editions) again in the years to come?

Here is my answer [slightly revised]:

I am happy to assist you in the domain of a very new standard composed of some quite "old" standards. The various components of IEC 61850 are:

- Ethernet -> some 30 years old
- TCP/IP -> some 30 years old
- MMS -> some 25 years old
- XML -> some 15 years old
- Information Modeling -> some 25 years old

The crucial new thing is, that we have composed a comprehensive standard with many different aspects ... building a SYSTEM. This is more than a new communication protocol ...

Ok, here are my answers to your specific questions:

1. How is the implementation of IEC 61850 here in Europe especially in German Utility Company?

<KHS>

IEC 61850 is used in many utilities and many production sites like power plants, petrochemical plants, factories, ... usually turnkey substation automation systems from one vendor.

There is no question to use it or not - if there is a question then it is

this issue: How to specify what utilities want and how to use the standards (in some details).

</KHS>

2. Are there lots of substation using this IEC 61850?

<KHS>

Yes, the figures I have: more than 3000 worldwide.

I have a list of SICAM PAS-projects with IEC 61850. They list **433** projects with IEC 61850 (updated October 2010).

</KHS>

3. Are there lots of success stories from utility companies around the world using this IEC 61850?

<KHS>

Yes. Most stories are very positive. There are mainly issues with the question: What do utilities expect??!?

Utilities have to get more deeply involved in the specification of the requirements. Or they may get something they did not expect ... too much or too less ...

I have been invited many times to help utility engineers to understand what their company has ordered and what was commissioned. Often the engineers have no clue what they got - even after the substation automation systems were in operation!!

IEC 61850 is not IEC 61850 !!

In order to get what your utility want, your utility has to understand the big impact of IEC 61850 on almost everything !!! Then the people have to tell the vendor/system integrator what they want AND what they DO NOT what!!

This requires well educated utility experts ... that is usually the problem.

</KHS>

4. Will the standard IEC 61850 do lots of revisions (editions) again in the years to come?

<KHS>

No! There is little impact from new documents to be expected - the base technology is very stable, tested and in operation.

</KHS>

I highly recommend to you and your utility to receive education - this is the most crucial issue today!

The recent Newton-Evans study figured out:


"Utility manpower shortages continue to negatively impact the ability of technology supplier companies to engage utilities for other than short-term requirements. However, third party engineering and integration service firms have recently made significant strides in winning substation automation-related business, from planning to design to construction and installation."

Click [HERE](#) for the news report on the study.

This is exactly what I have learned for years: There is a **lack of smart people** to deal with the future technologies in power systems. So, we have to wait until the next generation of engineers arrives: people that will use what is advanced and available and that can be downloaded from the Web ... like the IEC 61850 Windows DLL evaluation Kit to get first results within hours ...

Click [HERE](#) for the IEC 61850 Windows DLL.

Click [HERE](#) for some discussion on the education of utility experts.

Posted by [Karlheinz Schwarz](#) at [2:00 AM](#) [1 comments](#) 

Labels: [education](#), [electric power system](#), [IEC 61850](#), [implementation](#), [Power Automation](#), [Substation](#), [Substation Automation](#)

Growth of Substation Automation with IEC 61850

There seems to be an ongoing interest in doing market studies in order to figure out what will be the technologies applied in power system automation in the next years or decades. One of the latest is the following report:

"The World Market for Substation Automation and Integration Programs in Electric Utilities: 2011-2013." by Newton-Evans Research Company

Click [HERE](#) for a brief news information found on the Newton-Evans website.

Click [HERE](#) for some details from the report from Business Wire.

The number of systems installed in the electrical power delivery systems is much bigger than what these kind of studies show. The news reports: "Respondents indicated a total of **1,567 transmission substations** and **5,154 distribution substations** in operation as of the 4th quarter of 2010. These represent a 9% sample of U.S. and Canadian combined totals of transmission voltage substations and nearly 10% of all distribution voltage substations."

The power market is a global market - the potential market for IEC 61850 is global as well! The numbers of applications is in the Millions! Check what Enel reported during the recent first European IEEE Smart Grid conference in Gothenburg (Sweden): Enel owns over 0.4 MILLION MV/LV Substations! HV and MV network are remotely operated, more than 0.1 MILLION MV substations remote controlled ... There is a potential of 0.3 MILLION LV substations where IEC 61850 one way or the other may be used in the next decade.

One of Enel's project deals with even more potential use cases of IEC 61850:

Active Control of Distributed Energy Resources (DER) connected to the Medium Voltage network: The project will deal with:

- Realizing an advanced control system
- Implementing an "always on" and standard-based communication solution connecting all the relevant nodes in the network, including DER locations.
- Implementing Voltage Control (at all nodes) and Power Flow Control in the MV network.

Click [HERE](#) for the complete presentation by Enel.

Take, for example, the number of PV inverter manufactured monthly by one vendor: SMA (Germany):

"On the reporting date, SMA had a maximum annual production capacity of approx. **11 GW** worldwide. This corresponds to a doubling in annual production capacity in comparison to the end of 2009. Owing to the better availability of electronic components, SMA was able to utilize almost fully its existing production capacities in the **third quarter of 2010** with an inverter output sold of nearly **2.6 GW**. In the first nine months, SMA sold inverter output of 5,738 MW in total" ... I guess this means some **500.000 PV Inverters** from one manufacturer (assuming average inverter of 20 kW) !!

Click [HERE](#) for the SMA news report.

Taking the monitoring, control and automation needs reported by Enel (above) into account means: there is a **potential global market of MILLIONS of devices per year that need "standard-based communication"**. IEC 61850 has almost everything needed.

In this light we have to look at what Newton-Evans figured out:

"Of 5,154 distribution substations in operation at participating utilities, nearly 36% were reported to be without any automation. Just over one-half (52%) of these distribution substations were classified as Stage 1 sites (having some IEDs, RTUs, and two-way communications). About 12% were reported to be "fully automated.""

When we talk about **"standard-based communication"**, we have to use a **wide-angle lens** - not a zoom lens to focus on some substations in the U.S. There are definitely a lot more of opportunities globally!

There is a bright future for IEC 61850!

Posted by [Karlheinz Schwarz](#) at [1:46 AM](#) [0 comments](#) 

Labels: [active power control](#), [Automation](#), [communication](#), [condition monitoring](#), [control](#), [DER](#), [distribution](#), [distribution automation](#), [electric power system](#), [IEC 61850](#), [interoperability](#), [medium voltage](#), [Power Automation](#), [Transmission Grid](#)

Tuesday, January 4, 2011

IEC 61850 Training Opportunities in 2011

We hope you had a smooth start into 2011. This year we will see a lot more applications of IEC 61850 on all voltage levels: high, medium and low voltage.

NettedAutomation has trained more than 2,200 experts from more than 500 companies and more than 60 countries. Thanks to all that have chosen these services.

Please find the updated list of opportunities for public events in 2011:

Sydney (Australia), 07.-09. March 2011 2 day IEC 61850 Training by 5 Gurus	Details
Frankfurt (Germany) 3 day IEC 61850/61400-25 Seminar/Hands-on Training (NettedAutomation) with Measurement IED and several demo software (fully functional)	04.-06. May 2011 14.-16. September 2011
Nashville (TN, USA), Remote Conference, 20.-21. September 2011 2 day Seminar (NettedAutomation) on Power System Communication covering IEC 61850, IEC 61400-25, DNP3, NIST Interoperability Roadmap, Smart Grids, ...	Details (preliminary)

Note that most training courses are conducted as in-house events - the most effective way to get what you need.

Posted by [Karlheinz Schwarz](#) at [12:04 AM](#) [1 comments](#) 

Labels: [education](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [seminar](#), [Training](#)

Friday, December 31, 2010

Greetings from (C)old Germany

As 2010 comes to a close, I want to say "Thank You!" for visiting the IEC 61850 Blog. We wish you and your family a happy, healthy and prosperous New Year 2011.

I look forward to serving you with a lot of news during the next year - there will be a lot to be reported in 2011.

Best Regards,
Karlheinz

Early morning winter impressions in our backyard ... the palm tree is protected by some lights - we hope that it will survive:



A very cold morning ... the fish pond is frozen ... the sun is very low:



We have more snow as usual ... even here in the Rhine river valley we have a lot.

... and some greetings from my IEC 61850 dolls explaining the modeling approach of IEC 61850 and IEC 61400-25:

An IED contains a Logical Device ...



... a Logical Device contains a Logical Node, a Logical Node contains a DataObject, a DataObject contains ...



To access the specific DataObject ("Tmp", Temperature Value) you have

to "open" an IED ("MyDevice" at, e.g., 198.168.178.99), open a Logical Device ("MyLD"), open a Logical Node ("STMP1") and get the "Tmp.mag.i"

Any question?

Posted by [Karlheinz Schwarz](#) at 4:54 AM 4 comments 

Labels: [IEC 61850](#), [logical node](#), [Object model](#)

Thursday, December 30, 2010

Some applications of SCL (IEC 61850-6)

The System Configuration Language serves many applications in substations and in distributed automation in general. Often people are a little bit confused ... they read here and there - but do not get the full story.

The following list is intended to help people to find a way to get a better understanding:

1. To understand SCL (System Configuration Language) I recommend to read/study IEC 61850-6 Edition 2.

2. There are many applications of SCL files (some may not be found in any standard):

- System design → single line diagram (re-useable designs in library)
- IED development → IED capabilities
- System engineering → System configuration (re-useable config.)
- IED configuration/parameterization → running IEDs
- Documentation → provides view of system
- Plausibility/verification → check if system is able to run
- Self description of IEDs → Retrieve IED section from IED
- Validation of Device content → Check model against standard
- Simulate I/Os of IEDs for testing → Fieldbus driven remote I/O
- Simulate IEDs → Generate virtual IEDs on computer from SCL file
- Message interpretation → Use SCL file to get semantic of the model
- ...

One or the other tool is needed for all of these applications. Some tools are available, other tools are under development ... the good thing is: the files are all written in ASCII-Code !! so that your 16 year old son or daughter can write simple but powerful tools by just searching and comparing TEXT !!

Example: It is easy to check if for every control block in an Input section (Sink) there is an IED with exactly that control block (Source) ... and so on.

3. SCL is not complex - it is very comprehensive. I have conducted many seminars and training sessions on IEC 61850 ... SCL is very crucial to understand ... SCL is 51 per cent of the standard in the long run ... in my opinion.

4. The blue sky is the limit of the use of SCL.

5. Today's implementations of IEDs and Tools is quite limited ... but wait ...

6. A two-page overview of IEC 61850 can be found here:
http://nettedautomation.com/standardization/IEC_TC57/WG10-

[12/iec61850/What-is-IEC61850.pdf](#)

I wish you and your family a healthy and happy new year.

Posted by [Karlheinz Schwarz](#) at [11:21 PM](#) [0 comments](#) 

Labels: [configuration](#), [IEC 61850](#), [IEC 61850-6](#), [SCL](#)

Thursday, December 23, 2010

IEC 61850 provides a lot for the Smart Electrification

The recently published IEC white paper :

Coping with the Energy Challenge

The IEC's role from 2010 to 2030

Smart electrification – The key to energy efficiency

discusses the need of standards! No surprise, or?

Click [HERE](#) to download the white paper [pdf, 1,9 MB]

The paper concludes on page 51:

"The standards should cover connection (especially of fluctuating sources), stability, "intelligence" (required functions of the IT applications controlling the grid), and minimum systemic efficiency as well as how to measure it. Aspects to deal with include balancing **demand and generation, power quality, harmonic current emissions, voltage flicker, voltage fluctuation and islanding prevention**. The standards should allow for the necessary differences in approach and choices made in different countries; thus some of the resulting publications may be non-normative.

In order to facilitate implementation, the MSB [IEC Market Strategy Board] further recommends the IEC and cooperating organizations to **organize a public symposium on what the necessary standards and other IEC publications on the "smart grid" should contain.**"

The paper states at very beginning:

"As the first IEC President, Lord Kelvin, always said: **"If you cannot measure it, you cannot improve it!"**. This statement is especially true here: without measurement you can't credibly demonstrate energy efficiency improvements. The IEC provides and will continue to provide many of the **measuring standards** that are the basis for benchmarking, energy audits and compliance assessments."

The edition 2 of IEC 61850-7-4 (Information models) covers already many models **of these measurements**:

5.10 Logical nodes for metering and measurement LN Group: M

5.10.2 LN: Environmental information Name: MENV

5.10.3 LN: Flicker measurement name Name: MFLK

5.10.4 LN: Harmonics or interharmonics Name: MHAI

5.10.5 LN: Non-phase-related harmonics or interharmonics Name: MHAN

5.10.6 LN: Hydrological information Name: MHYD

5.10.7 LN: DC measurement Name: MMDC

5.10.8 LN: Meteorological information Name: MMET

5.10.9 LN: Metering Name: MMTN

5.10.10 LN: Metering Name: MMTR

5.10.11 LN: Non-phase-related measurement Name: MMXN

5.10.12 LN: Measurement Name: [MMXU](#)

5.10.13 LN: Sequence and imbalance Name: MSQI

5.10.14 LN: Metering statistics Name: MSTA

5.12 Logical nodes for power quality events LN Group: Q

5.12.2 LN: Frequency variation Name: QFVR

5.12.3 LN: Current transient Name: QITR

5.12.4 LN: Current unbalance variation Name: QIUB

5.12.5 LN: Voltage transient Name: QVTR


5.12.6 LN: Voltage unbalance variation Name: QVUB

5.12.7 LN: Voltage variation Name: QVVR

Click [HERE](#) for the preview of IEC 61850-7-4 (first 20 pages) to see the complete list of Logical Nodes defined.

If there is any (measurement) information found in real electrical system not yet modeled and standardized, you can define extension according to well defined extension rules in IEC 61850-7-1 (name space concept).

There is no need to define another series of (information models and information exchange) standards for electrical grids.

Posted by [Karlheinz Schwarz](#) at [9:54 PM](#) [0 comments](#) 

Labels: [Automation](#), [IEC 61850](#), [Information Model](#), [low voltage](#), [measurements](#), [medium voltage](#), [model extensions](#), [models](#), [monitoring](#), [NIST Roadmap](#), [Power Automation](#), [Smart Grid](#)

IEC 61850-7-3 published as International Standard

The second edition of IEC 61850-7-3 Ed.2 has been published early December 2010:

Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes

The second edition replaces the first edition, published in 2003.

The second edition:

- defines new common data classes used for new standards defining object models for other domains based on IEC 61850 and for the representation of statistical and historical data, and
- provides clarifications and corrections to the first edition of IEC 61850-7-3.

Click [HERE](#) for the preview of the standard (first 20 pages).

Posted by [Karlheinz Schwarz](#) at [9:29 PM](#) [0 comments](#) 

Labels: [Edition 2](#), [IEC 61850](#), [IEC 61850 edition 2](#), [model extensions](#), [models](#)

IEC's role from 2010 to 2030 - And IEC 61850

As 2010 comes to a close, I want to say "Thank You!" for visiting my blog.

We wish you and your family a happy, healthy and prosperous New Year 2011.

I look forward to providing useful information on IEC 61850 and related standards ... like the following:

While the big organizations are looking for the next 20 years to convert electrical grids to make them smarter, we (several working groups within IEC) are already working on it.

An IEC white paper discusses the need of standards:

Coping with the Energy Challenge
The IEC's role from 2010 to 2030
Smart electrification – The key to energy efficiency

Click [HERE](#) to download the white paper [pdf, 1,9 MB]

The white paper recommends "IEC, in close cooperation with CIGRÉ, NIST and other relevant organizations, to **develop** rapidly a full and detailed set of standards giving minimal performance rules and a full set of options for the operation of grids. This should be conceived as a part of the set of standards needed by "smart grids".

I guess that we **have crucial parts of the "set of standards" already** in use for some time: IEC 61850. IEC 61850 is definitely part of the future of a smarter grid !! Also in 2010 I have not seen any competing solution! IEC 61850 is a unique standard.

In 2010 I have seen a lot of requirements from the low voltage application domain (power distribution) in utility grids and in many other areas like buildings and factories.

One major step towards a broader use of IEC 61850 is the publication of the simple and very efficient free "Evaluation and Starter Kit for IEC 61850". The Kit has been downloaded several times per day ...

Click [HERE](#) for more information.

Posted by [Karlheinz Schwarz](#) at 9:17 PM 0 comments 

Labels: [61850](#), [Automation](#), [communication](#), [IEC 61850](#), [low voltage](#), [NIST Roadmap](#), [Power Automation](#), [Smart Grid](#), [standards](#)

Saturday, December 11, 2010

VDE fordert zügigen Ausbau der Stromnetze

Laut einer Pressemitteilung des VDE haben Experten der Energiebranche in Mannheim die **Roadmap** für den Umbau der deutschen Stromnetze diskutiert. Mittlerweile gehört es zur Pflichtübung aller möglichen Organisationen eine Roadmap für den Einzug der Informations- und Kommunikationstechnik in die Energieverteilung zu erstellen. Längst bevor die ersten Normungs-Roadmaps erschienen, war die wichtigste Norm bereits veröffentlicht und im Einsatz.

Laut obiger Diskussion in Mannheim, "erfolgt die Aufrüstung zum Smart Grid im Wesentlichen durch Einbau und Nutzung von **Sensoren** und **Aktoren** sowie **Informationstechnologie**, um möglichst viele Informationen über den Zustand zu erhalten, also den Beobachtungs- und Steuerungsgrad deutlich zu steigern. Um zu einem smarten Verteilungsnetz zu kommen, werden die **Ortsnetzstationen im ersten Schritt mit Mess- und Kommunikationseinrichtungen ausgerüstet.**"

Das gilt für die Energieversorgung in allen Regionen dieser Erde, in öffentlichen Netzen, in Gebäuden, Fabriken und anderen Liegenschaften - und für alle Spannungsebenen! Während an vielen Ort gerade begonnen wird, eine Normungs-Roadmap für die Kommunikations- und Informationstechniken zu erarbeiten - **fahren viele bereits** auf einer gut ausgebauten Autobahn für die Energieversorgung: **Auf dem Highway "Route 61850".**

IEC 61850 ist DIE internationale Norm für die (elektrische) Energieversorgung!

Hier [KLICKEN](#), um zur VDE-Pressemitteilung zu gelangen.

Posted by [Karlheinz Schwarz](#) at [7:04 PM](#) [0 comments](#) 

Labels: [de](#), [IEC 61850](#), [monitoring](#), [SCADA](#), [sensoren](#), [Smart Grid](#), [Substation](#), [Substation Automation](#)

NERC - Supports IEC 61850 to keep the Transmission and Distribution Grid reliable

NERC (North American Reliability Corporation) has just published an interesting comprehensive analysis of the impact of Smart Grids on the reliability of the transmission grids:

Reliability Considerations from Integration of Smart Grid December 2010

The report recommends that the **interoperability of devices and systems** is one of the crucial issues in future electric power systems - including industrial sites and buildings. There is obviously one standard that supports the interoperability to a high extend on all voltage levels: **IEC 61850**.

On page 82 the report states: "An important example of why smart grid standards need to recognize the interoperability between equipments used in **transmission and distribution**, is the requirement of mapping of Distributed Network Protocol 3 (DNP3) with IEC 61850. **DNP3 is the legacy communication protocol** that is followed for large volume data exchanges between equipment. **However, IEC 61850 is recognized to be a better standard suited for smart grid communications.** To bridge the gap between the legacy DNP3 protocols and the newer IEC 61850, a mapping is required when exchanging certain data types. The goal is to ensure that data are seamlessly transported between devices regardless of their adopted communication standards. DNP3 has recently been adopted in IEEE Standard 1815. An IEEE standard and an SGIP PAP working group are currently supporting the mapping effort between IEC 61850 and the IEEE 1815/DNP3 standards."

Click [HERE](#) to download the full NERC report.

Posted by [Karlheinz Schwarz](#) at [4:40 PM](#) [0 comments](#) 

Labels: [Critical Infrastructure Protection](#), [distribution](#), [distribution automation](#), [DNP3](#), [IEC 61850](#), [NIST](#), [Transmission Grid](#)

Wednesday, December 1, 2010

Normungs-Roadmap für E-Mobilität und IEC 61850

Über die Webseite des DIN (Berlin) wurde am 30.11.2010 die "Deutsche Normungs-Roadmap Elektromobilität" veröffentlicht:

Die deutsche Normungs-Roadmap
Elektromobilität – Version 1
Version 1 - 30. November 2010

Die Normungs-Roadmap referenziert auch die Normenreihe IEC 61850 als Bestandteil der zukünftigen Ladeinfrastruktur! Das war zu erwarten, weil in diesem Kontext beispielsweise auch das drei-phasige Drehstromnetz eine Rolle spielt, das bereits seit Jahren in einem Standard-Modell definiert ist: [MMXU nach IEC 61850-7-4](#).

Als engagierter Normer (seit 25 Jahren) sehe ich mit den Smart(er)-Grid-Aktivitäten eine große Chance für die Normung!! Ich hoffe, dass alle betroffenen Kreise in Deutschland die **bereits BESTEHENDEN** Normen anwenden, und nicht - wie im Bereich der industriellen Feldbusnormung - in die Vielfalt verfallen!!

„Wir streben eine weltweite Normung an, um möglichst viele Synergien von nationalen und internationalen Konzepten zu erreichen – vor allem auch im Sinne des Kunden“, sagt Michael Dick in der Pressemitteilung zur Roadmap. Liegt hier der Schwerpunkt auf "weltweite Normung" oder "**EINE** weltweite Normung"?

Das ist ein lobenswertes Ziel! Die EINE Norm ist mit IEC 61850 für den Bereich der Ladeinfrastruktur im Wesentlichen bereits erreicht. Alle grundlegenden Teile der Normenreihe IEC 61850 und IEC 61400-25 sind seit mehreren Jahren bereits International Standard. Diese Normen sind zum guten Teil ohne Änderungen anwendbar!

Klicken Sie [HIER](#) zur Pressenotiz mit dem Link zur Normungs-Roadmap.

Posted by [Karlheinz Schwarz](#) at [11:02 PM](#) [0 comments](#) 

Labels: [de](#), [E-Mobility](#), [electric power system](#), [electric vehicles](#), [Feldbus](#), [IEC 61850](#), [Power Automation](#), [Roadmap](#)

Sunday, November 21, 2010

Cost for IEC 61850 versus DNP3 or IEC 60870-5-104

Very often people ask me: "What is the cost for implementing of the **protocols** IEC 61850, DNP3 and IEC 60870-5-104? Isn't DNP3 cheaper?". First of all, IEC 61850 is much more than another protocol! IEC 61850 comprises communication services and protocols for SCADA and REAL-TIME applications. It offers metadata in the devices and self-description services, many information models and a very crucial System Configuration Language.


IEC 61850
in brief

What are the differences?

IEC 61850	DNP3, IEC 60870-5-104, Fieldbus, ...
<ul style="list-style-type: none">■ Information models■ Configuration language■ Abstract Services■ Communication protocols<ul style="list-style-type: none">– TCP/IP based SCADA [Polling, spontaneous messages (events, reporting), logging, control, ...]– Real-time (GOOSE, SMV)– Selfdescription	<ul style="list-style-type: none">■ Communication protocol<ul style="list-style-type: none">– TCP/IP based SCADA [Polling, spontaneous messages (events), control, ...]

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If we compare the SCADA services and protocols, we can expect that the efforts to implement one or the other communication protocol is

more or less the same - when we implement a subset in IEC 61850 that is functionally equivalent to DNP3 and 104.


The other features of IEC 61850 (Real-time services and protocols, self-description services, many information models, and System Configuration Language) are NOT defined in DNP3 and 104. So, what does it mean to state that it is easier and cheaper to implement DNP3 and 104 than IEC 61850? If we want compare them, we should state exactly, what we compare!

If we compare just the **underlying services and protocols**: all three solutions require TCP/IP, ... -> no real difference!

Lets look at the messaging: All three require to encode and decode a variety of messages and sequences ... may be slightly different.

The basic data types like Double-Point, Status, Time-Stamp, Quality, ... are more or less the same.

What else do we want to compare? The other features are defined in IEC 61850 only. Comparison means: **IEC 61850 HAS them - the others don't HAVE them. That's it.**

Posted by [Karlheinz Schwarz](#) at [11:49 PM](#) [0 comments](#) 

Labels: [DNP3](#), [embedded system](#), [GOOSE](#), [IEC 60870-5-104](#), [IEC 61850](#), [implementation](#), [sampled value](#)

SCL - For Substations or Systems?

The official title of IEC 61850-6:2009 Edition 2 (SCL) is:


Communication networks and systems for power utility automation –
Part 6: Configuration description language for communication in
electrical
substations related to IEDs

What does SCL stand for: "Substation Configuration Language" or "System Configuration Language"?

The official Abbreviation in the Edition 2 of part 6 is as follows:

SCL = "System Configuration description Language"

Except the substation section all other sections and definitions can be used for any application domain: hydro power, DER, wind power, power quality, SCADA, ...

Posted by [Karlheinz Schwarz](#) at [11:12 PM](#) [1 comments](#) 

Labels: [configuration](#), [Edition 2](#), [IEC 61850](#), [IEC 61850 edition 2](#), [SCL](#)

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News on IEC 61850 and related Standards


Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Sunday, November 21, 2010

CISCO to deliver IP Communication Infrastructure including Substations

EnergyAustralia selected Cisco's Connected Grid solution to build the core of its smart grid infrastructure with greater security, reliability, and operational efficiency, while complying with regulatory mandates and industry standards such as **IEC 61850** and supporting new energy supply sources.

Click [HERE](#) for the news.


Posted by [Karlheinz Schwarz](#) at [11:02 PM](#) [0 comments](#) 

Labels: [applications](#), [Australia](#), [Cisco](#), [communication](#), [electric power system](#), [IEC 61850](#), [Power Automation](#)

IEC 61850 Timestamp to overflow in 2038?

In 61850-7-2 Edition 1 the definition of TimeStamp.SecondSinceEpoch is an INT32, which represents seconds since 1/1/1970. This will overflow in **2038**, at which time equipment now being developed will be in use.

The Timestamp type in IEC 61850-7-2 Edition 2 is INT32U. The timestamp will not overflow until 2106.

Posted by [Karlheinz Schwarz](#) at [10:16 PM](#) [0 comments](#) 

Labels: [ACSI](#), [IEC 61850](#), [IEC 61850 edition 2](#), [implementation](#)

Saturday, November 13, 2010

IEC 61850 also for industrial applications?!

Karlheinz Schwarz (SCC) presented IEC 61850 to some 50 experts from the industrial automation domain at the KommA Colloquium in Lemgo (Germany) on Thursday (2010-11-11): 1. Jahreskolloquium „Kommunikation in der Automation ([KommA 2010](#))“ Centrum Industrial IT (CIIT)

The title and paper are in German: "IEC 61850 nur für Schaltanlagen und Smart Grids – oder Kernmodell für die Automatisierung?"

Click [HERE](#) for the slides presented (almost all of the 32 slides are in **English**).

The presentation showed that IEC 61850 has been developed by experts from the electric power domain - especially substation engineers (protection, control, asset management, ...). The standard defines by

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the end of 2010 **many information models that are applicable in any application domain**. Example: the Logical Node STMP (Supervision of Temperature, according to IEC 61850-7-4 Ed2). The following excerpts of the presentation show the LN STMP and the implemented subset - check out the [Evaluation/Starter Kit](#) and the [Beck IPC IEC61850@Chip](#) that use this and other LNs.

IEC 61850
für Smart Grids
und ...?

Model (Standard) – IEC 61850-7-4/7-3

LN: STMP.Tmp.mag.i

LN: STMP.Tmp.mag.i

LN: STMP.Tmp.mag.i

GetDataValues

Domain/NV & Read

Read Protocol

Message-Schema

Basic Encoding

Layer 6 and 5

Layer 1 to 4 (TCP)

Read Messages

STMP class			
Data object name	Common data class		Expla
LNName	instMag	AnalogueValue	MX
Data objects	mag	AnalogueValue	MX dchg
Descriptions	range	ENUMERATED	MX dchg
	q	Quality	MX ucchg
EEName	t	TimeStamp	MX

Status information

EEHealth	ENS	External equipment health
Alm	SPS	Temperature alarm level reached
Trp	SPS	Temperature trip level reached

Measured and metered values

Tmp	MV	Temperature
-----	----	-------------

Controls

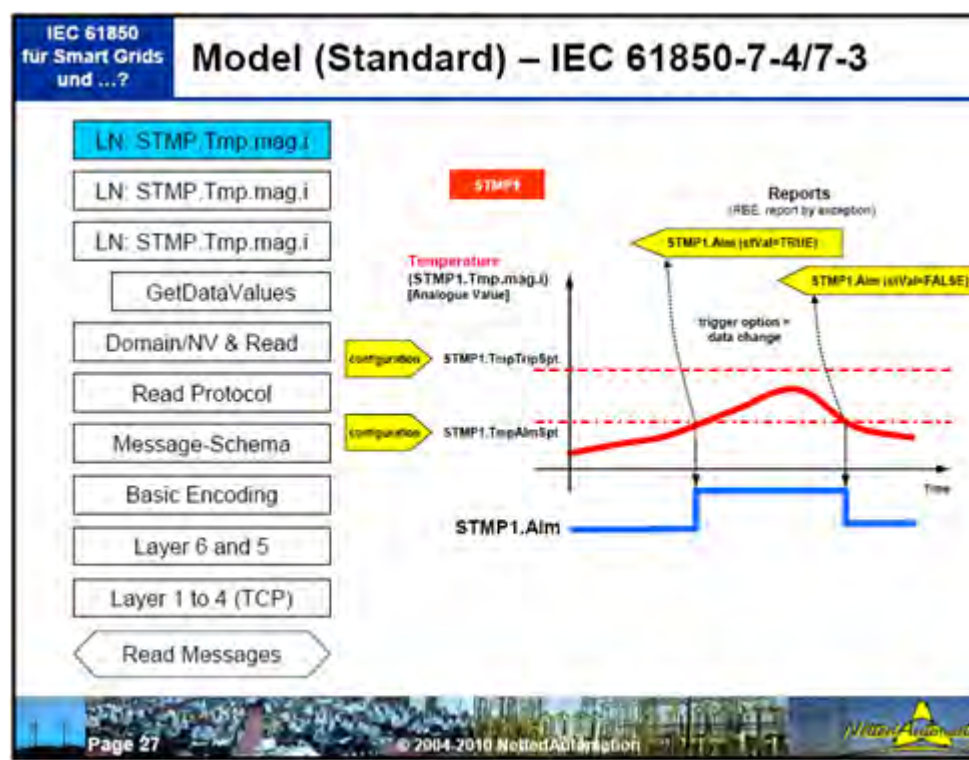
OpCntRs	INC	Resettable operation counter
---------	-----	------------------------------

Settings

TmpAlmSpt	ASG	Temperature alarm level set-point
TmpTrpSpt	ASG	Temperature trip level set-point

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The information model offers a build-in supervision functionality. The STMP1.Alm (Alarm) is spontaneously sent to a dedicated client (HMI, SCADA, Gateway, ...) as soon as the TMP value reaches the TmpAlmSpt (Alarm Setpoint Value - configured, programmed or set by a communication service):



The information model and its binding to the real application is

- July (17)
- June (12)
- May (7)
- April (8)
- March (9)
- February (10)
- January (12)
- 2009 (162)
- 2008 (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Tuesday, November 9, 2010

IEC 61850-4 CDV for Edition 2 has been accepted

A further part of IEC 61850 has been approved as FDIS Edition 2:

IEC 61850-4 Ed.2.0: Communication networks and systems for power utility automation - Part 4: System and project management

The CDV ballot closed last Friday (2010-11-05).

All votes were positive.

Posted by [Karlheinz Schwarz](#) at 8:54 PM 0 comments 

Labels: [Edition 2](#), [IEC 61850](#), [Substation](#), [Substation Automation](#)


IEC 61850-7-3 Edition 2 approved

Another part of IEC 61850 has been approved as Edition 2:

IEC 61850-7-3 Ed.2: Communication networks and systems for power utility automation - Part 7-3: Basic communication structure - Common data classes

The FDIS ballot closed last Friday (2010-11-05).

All votes were positive.

Posted by [Karlheinz Schwarz](#) at 8:50 PM 0 comments 

Labels: [Edition 2](#), [IEC 61850](#), [Information Model](#), [interoperability](#), [standards](#)


Free Cyber Security Training

Several Cyber-Security Training courses are now available on the TEEX Domestic Preparedness Campus. This DHS/FEMA Certified Cyber-Security Training is designed to ensure that the privacy, reliability, and integrity of the information systems that power our global economy remain intact and secure.

The 10 courses are offered through three discipline-specific tracks targeting everyday non-technical computer users, technical IT professionals, and business managers and professionals.

These courses are offered at no cost and students earn a DHS/FEMA Certificate of completion along with Continuing Education Units (CEU) at the completion of each course.

Click [HERE](#) for more information and how to use the material.

Posted by [Karlheinz Schwarz](#) at 8:41 PM 0 comments 

Labels: [Critical Infrastructure Protection](#), [security](#), [Training](#)

Tuesday, November 2, 2010

One day "Getting Started Event" on IEC 61850 in

Orlando and San Diego end of January 2011

NettedAutomation GmbH (Karlsruhe, Germany) is offering a one day "Getting Started Event" on IEC 61850 and related standards. The program comprises the **basics of Edition 1 and 2**, an overview on **global acceptance and use** of the standard, and presentation one of the **most efficient and easy to use stack software** developed by [SystemCorp](#) in Perth (Western Australia).

Dates and Locations:

- **Friday, 28. January 2011** in Orlando (Florida)
- **Monday, 31. January 2011** in San Diego (California) - just prior to the DistribuTECH 2011

Attendance Fee:

- **US\$ 295** (including course material, evaluation software, food and beverages).

Students will learn what the standard is all about and **how to use** the free **of charge fully functional evaluation stack software (DLL)** for implementing IEC 61850 client/server and publisher/subscriber under Windows. Various application examples written in C, C++ and C# (executable and source code) will be provided to the attendees. This is the FASTEST, EASIEST, and CHEAPEST way to get your devices' data modeled and right away communicated with IEC 61850.

This event is recommended for every person that is interested in IEC 61850 and IEC 61400-25 ... one way or the other. There is no pre-knowledge needed.

IEC 61850 is **THE** International Standard series for information modeling, information exchange and system configuration to support Smart(er) Automation. Smart(er) Automation comprises application domain like Power Generation, Power Transmission, Power Distribution, Factory Automation, Building Automation, and many other domains.

The new title of IEC 61850 (Communication networks and systems **for power utility automation**) is definitely wider than the old (Communication networks and systems **in substations**). IEC does not allow to use the right title that would really describe its application domain: Communication networks and systems **for automation**.

All basic concepts of IEC 61850 (and IEC 61400-25) are applicable in any automation system:

- **native Ethernet** for real-time information exchange (GOOSE) and client/server communication,
- **TCP/IP** including **transport layer security** for client/server,
- application messaging according to MMS (**Manufacturing** Message Specification, ISO 9506),
- **XML** for describing **information objects** and **system configuration**,
- many common information objects and functions like "Temperature Supervision", "PID loop control", "device nameplate", etc

Tentative program:

09:30 – 09:45	Welcome, roll call of attendees, expectations
09:45 – 10:45	Introduction into information modeling, models, information exchange and protocols, configuration language SCL ... IEC 61850 and IEC 61400-25
10:45 – 11:00	Coffee break
11:00 – 11:15	The role of the standards in the U.S. NIST SGIP (Sm


	Grid Interoperability Panel)
11:15 - 12:00	Implementations and global market penetration of IEC 61850 and IEC 61400-25
12:00 - 13:00	Lunch break
13:00 - 14:30	Presentation of SystemCorp's IEC 61850 Stack PIS-1 IEC 61850 DLL running under Windows, integration of the stack on an embedded controller, SCL tools, network analyzers, etc
14:30 - 14:45	Coffee break
14:45 - 16:00	How to model and interface your application data with the PIS-10 stack API? Sample source code in C, C++ and C# (.Net) will be presented and discussed. Application Source code will be provided on a CD ROM
16:00 - 17:00	Question & Answer Session
17:00	End of the event

The event will be conducted by Mr. Karlheinz Schwarz. He has trained more than 2.200 people, from more than 50 countries and more than 400 companies since 2004 - all over. Recent training sessions: Frankfurt (DE), Sydney (AU), Montreal (CAN), Dallas (US), Gothenburg (SE), Manila (Phil), Stockholm (SE).

Tap the reach experience of Mr. Schwarz. After the event you or your programmer can continue to use the evaluation software for your real applications!

If you are interested to attend, please let us know. I look forward to seeing you in Orlando or San Diego. Visit [SystemCorp and NettedAutomation at the DistribuTECH 2011](#) (San Diego).

Click [HERE](#) to contact us for more information on the "Getting Started Events" in Orlando and San Diego.

Posted by [Karlheinz Schwarz](#) at [11:04 PM](#) [0 comments](#) 

Labels: [applications](#), [Automation](#), [communication](#), [configuration](#), [DER](#), [distribution automation](#), [DNP3](#), [Edition 2](#), [Edition1](#), [electric power system](#), [engineering](#), [IEC 61400-25](#), [IEC 61850](#), [peopleware](#), [SCADA](#), [security](#), [Smart Grid](#)

Thursday, October 28, 2010

System Control & Supervision - and Peopleware

The Washington Post reported on October 23, 2010, that the **lack of training** could cause very severe situations in the energy transmission and distribution systems. The recent event of the San Bruno gas pipeline burst (that killed several people) has "**speed up adoption of a rule** to ensure that workers doing similar jobs at companies across the country **are well-trained ...**".

"**If somebody is not trained**, it could be very dangerous. If they don't properly respond to an alarm situation, it can cause an explosion. It can

cause leaks. The damage could be very large."

"Although pipeline companies **boast an impressive array of technology**, he said, at many such firms, "there **is a lack of recognition that people have to operate that equipment.**"

My experience after training of more than 2.000 people from more than 500 companies and more than 50 countries with regard to advanced

communication and information systems using IEC 61850 is this: **There is a very huge lack of recognition that people have to design, engineer, commission, operate, diagnose, and maintain these comprehensive and complex systems in substations and many other applications. More often I see the following: Utilities purchase turnkey systems - without having their own technical people (from the field with many years experience in the power system) consulted or trained to work with the new technology. One year later when the warranty is finished, they have to take over the full responsibility for the whole system! Good luck!**

Impact of IEC 61850 on System Engineering, Tools, Peopleware and the Role of the System Integrator: more on that issue in a [[paper](#)] and on [[slides](#)]

Click [HERE](#) for the full report in the Washington Post.

Posted by [Karlheinz Schwarz](#) at [3:14 PM](#) [0 comments](#) 

Labels: [Automation](#), [Critical Infrastructure Protection](#), [education](#), [IEC 61850](#), [maintenance](#), [process control](#), [Substation Automation](#), [Training](#), [utilities](#), [workforce](#)


Monday, October 25, 2010

Beck IPC - Workshop IEC 61850 (IEC 61400-25) und Programmierung des Beck Chip für IEC61850-Anwendungen

Die Schulung findet am 10.-11. November 2010 in Pohlheim bei Gießen statt. Sie vermittelt die wichtigsten Schritte zur schnellen und kostengünstigen Implementierung von IEC 61850 und IEC 61400-25 konformen Geräten und Systemen basierend auf dem Beck IPC@Chip.

[Was ist der Beck Chip?](#)

Click [HIER](#) für mehr Informationen zum Workshop.

Posted by [Karlheinz Schwarz](#) at [2:32 AM](#) [0 comments](#) 

Labels: [Automation](#), [Beck](#), [education](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [SCADA](#), [Smart Grid](#), [Substation Automation](#), [Training](#), [wind power](#)

Friday, October 22, 2010

IEC 61850-7-410 and IEC 61850-7-510 are out for comments

The CDV (Committee Draft for Vote) of IEC 61850-7-410 Ed.2:

Communication networks and systems for power utility automation -
Part 7-410: **Hydroelectric power plants - Communication for monitoring and control**

is out for official comments and voting until 2010-03-11. Contact your TC 57 National Committee for a copy for comments.

A **companion document** has also been published yesterday:

Draft IEC TR 61850-7-510:

Communication networks and systems for power utility automation -
Part 7-510: Hydroelectric power plants - **Modeling concepts and guidelines** (developed by WG 18: Hydropower plants, communication

for monitoring and control).

The publication of IEC 61850-7-410 introduces the general modeling concepts of IEC 61850 to hydroelectric power plants. This Technical Report is intended to provide explanations on how to use the Logical Nodes defined in IEC 61850-7-410 as well as other documents in the IEC 61850 series to model complex control functions in power plants.

Contact your TC 57 National Committee for a copy for comments.

Posted by [Karlheinz Schwarz](#) at [9:20 PM](#) [0 comments](#) 

Labels: [Automation](#), [hydro power](#), [IEC 61850](#), [models](#), [monitoring](#)

IEC 61850-6 SCL (System Configuration Language) in Operation

One of the most crucial aspects of IEC 61850 is defined in part 6 "Configuration description language for communication in electrical substations related to IEDs". The abbreviation is SCL; SCL stands for "System Configuration Language". One example of a system is a Substation. But it could be any automation system. IEC did not support the request to change "Substation" in the title to "System".

An increasing number of vendors is understanding the impact of SCL on the configuration of a single IED (Intelligent Electronic Device) but also of a whole system. In my training courses I usually say that SCL represents 51 per cent of the importance of the standard ;-)

Invensys uses a SCL tool to configure their SCADA system.

Click [HERE](#) to read a brief description what SCL does for their SCADA system.

Posted by [Karlheinz Schwarz](#) at [9:03 PM](#) [2 comments](#) 

Labels: [Automation](#), [configuration](#), [IEC 61850](#), [SCADA](#), [SCL](#), [Smart Grid](#)

Thursday, October 21, 2010

Siemens uses Trilliant for IEC 61850 based Smart Grids - ABB invests in Trilliant

Trilliant Incorporated and Siemens Energy, Inc., announced product **interoperability for integrating distribution automation** solutions for utility customers. Available immediately, Trilliant's SecureMesh™ WAN, a **Smart Grid communication solution** for distribution networking, is interoperable with Siemens' SIPROTEC® Compact line/feeder protection devices.

Trilliant's SecureMesh WAN provides low latency communications required of **distribution automation protocols including DNP3, IEC 61850, and Modbus**. It supports low latency peer-to-peer generic object oriented substation event (**GOOSE**) messaging !!! **GOOSE all over!** This Fall is a good time for GOOSE ... ;-)

Trilliant raises \$106 Million of Capital: Investor Growth Capital, VantagePoint, **ABB**, and **GE** invest in Trilliant

When winds of change blow, some build walls, others build windmills -
or **Invest in Interoperable IEC 61850 Communication**

Infrastructures. And you!?

Click [HERE](#) for the press release for the cooperation Trilliant/Siemens.
Click [HERE](#) for the press release on ABB's investment in Trilliant.

Posted by [Karlheinz Schwarz](#) at [6:27 AM](#) [0 comments](#) 

Labels: [ABB](#), [distribution automation](#), [DNP3](#), [GOOSE](#), [IEC 61850](#), [interoperability](#), [Siemens](#), [Smart Grid](#)

Saturday, October 16, 2010

Honeywell offers RTU with IEC 61850

Honeywell RTUs are IEC 61850 compliant. According to Honeywell this reduces time and engineering to complete a project, reduces wires, enhances security and simplifies system structures.

Click [HERE](#) to download a technical specification [pdf, 1.5 MB]

Posted by [Karlheinz Schwarz](#) at [3:32 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [RTU](#)

IEC 61400-25-6 has been Approved as International Standard

The 6th part of **IEC 61400-25 has been approved** as International Standard on October 15, 2010. The final draft (FDIS) has been approved by **100 per cent** of the IEC TC 88 national committees. The Standard will be published in some weeks.

IEC 61400-25-6 Ed.1: Wind Turbines - Part 25-6: Communications for monitoring and control of wind power plants - Logical node classes and data classes for condition monitoring

The new International Standard defines new information models.

Click [HERE](#) for the preview of the FDIS.

Posted by [Karlheinz Schwarz](#) at [3:14 AM](#) [0 comments](#) 


Labels: [condition monitoring](#), [IEC 61400-25-6](#), [IEC 61850](#)

ISaGRAF Supports IEC 61499 and IEC 61850

ISaGRAF has released the version 6 of their Workbench.

The company's flagship product ISaGRAF is fully compliant with both **IEC 61499 and IEC 61131** industrial standards and can be used to build a variety of automation products including embedded μ controllers, PAC, PLC, DCS, RTU, CNC, Motion Controllers and Safety Systems. Supporting **IEC 61850** ... ISaGRAF sustains a high level of standardization, integration and communication within modern automation systems, resulting in high-end, real-time open control systems with crash-proof reliability, powerful performance and flexibility.

Click [HERE](#) to visit the Newsletter at ISaGRAF.

Posted by [Karlheinz Schwarz](#) at [1:57 AM](#) [0 comments](#) 

Labels: [Automation](#), [IEC 61499](#), [IEC 61850](#), [real-time](#), [RTU](#)


Thursday, October 14, 2010

IEC 61850 in Australia - Some up-to-date Information

The Australiasien Power Technologies Magazine "Transmission & Distribution" published a couple for brief papers on IEC 61850 in the latest issue (05/2010). The following papers are contained:

- What Is IEC 61850?
- Collaborative Engineering within Electrical Utilities
- Relay Application with IEC 61850 GOOSE Messages
- Scalable IEC 61850 Software Stack ([Need Evaluation Software?](#))
- IEC 61850-9-2LE Process Bus Interface ([more information](#))
- Digital Instrument Transformers with 9-2LE Interface

Please [CLICK](#) here to read the magazine.

Posted by [Karlheinz Schwarz](#) at [5:57 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [IEC 61850-9-2](#), [process bus](#), [sampled value](#), [Smart Grid](#)

Tuesday, October 12, 2010

Customers talk Much to Vendors - Less to Standardization Groups

The IEEE PES Power & Energy Magazine stated recently "in my view" that "At a recent stakeholder workshop on **smart grid interoperability standards** sponsored by the National Institute of Standards and Technology (NISIST), the **electric utility industry** accounted for **less than 15% of the total attendance**. If the industry continues to be severely underrepresented as the process moves to the various standards development organizations, the utility industry will have little say over the final standards as they are developed without its significant input. ... For all of these reasons, it is critical that electric utility knowledge and vision are a part of the standard setting process."

On the other hand Dr. Lemmer (Siemens Power Automation) stated at the CIGRE in Paris event end of August 2010 with regard to innovation that "our customers tell us where we are going" ([see video at 05:35 minutes](#)).

I hope that more utility domain experts will get involved - one was or the other - in the future standardization work. Especially in IEC TC 58 and related groups. As well as in the various "users groups" - that are in fact "vendors groups". Dear Utility Domain expert, you are welcome to join one or the other group ... which also brings you around to see many airports ... and meet a lot of Smart People!

Click [HERE](#) for the full text of the "time to speak up! get involved in developing smart grid standards".

Posted by [Karlheinz Schwarz](#) at [11:49 PM](#) [1 comments](#) 

Labels: [IEEE](#), [NIST](#), [standards](#), [utilities](#)

SISCO's AX-S4 MMS is now AX-S4 61850

AX-S4 61850 ("Access for 61850" - former: "Access for MMS") is a complete IEC 61850 interface for host applications supporting OPC on the Microsoft Windows platform. AX-S4 61850 supports both IEC 61850 client and server to interface with Windows applications supporting OPC and/or DDE interfaces.

Even the name of the product has changed, inside there is the same IEC 61850 SCSM (Specific Communication Service Mapping - IEC 61850-8-1) to [MMS \(Manufacturing Message Specification - ISO 9506\)](#).

Click [HERE](#) to read more about the AX-S4 61850 ("Access for 61850").

Posted by [Karlheinz Schwarz](#) at [9:45 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [implementation](#), [MMS](#), [SISCO](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Tuesday, October 12, 2010


Siemens talks about IEC 61850 at the CIGRE 2010

Dr. Englert from Siemens Energy Automation talks about the success story of IEC 61850 at the CIGRE 2010. According to his statement Siemens has sold more than 100.000 IEC 61850 compliant IEDs running in more than 1.000 systems; and IEC 61850 is THE solution that is requested in almost all tenders.

Two interesting videos are online - worth to watch.

Click [HERE](#) to see and listen to Dr. Englert (Siemens Energy Automation) on IE 61850.

Click [HERE](#) to see and listen to Dr. Lemmer (Siemens Energy Automation) on SIPROTEC IEDs .

Posted by [Karlheinz Schwarz](#) at [7:04 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [interoperability](#), [protection](#), [Relays](#), [Siemens](#)

Monday, October 11, 2010

Final Call: IEC 61850 Hands-on Training with Protection Relays and other IEDs in Stockholm, 2-5 November 2010

NIST has recommended to FERC that IEC 61850 is among the first set of six crucial International Standards for Smart Grids. The upcoming IEC 61850 Hands-on Training in Stockholm, 2-5 November 2010 conducted by STRI and NettedAutomation is **THE** opportunity to learn more about this Standard and how vendors have implemented the various parts of the standard. The course is also applicable for those people that are interested in IEC 61400-25 (Wind Power Extensions of IEC 61850). The lessons presented are also applicable for any other application domain like factory or process automation or building automation.

We will intensively use the FREE IEC 61850 DLL Evaluation Kit. You will get copies of the Evaluation Kit for the training - if you do not yet have them.

There are still seats available - Get two seats for the price of one seat!

Click [HERE](#) to check the program etc.

Posted by [Karlheinz Schwarz](#) at [11:57 AM](#) [0 comments](#) 

Labels: [education](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [IEDScout](#), [interoperability](#), [NIST](#), [NIST Roadmap](#), [Smart Grid](#)

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Panel Session on IEC 61850/61400-25 at first European IEEE PES Smart Grid Conference in Gothenburg (Sweden)

Panels are technical sessions to **exchange experience** and to discuss around an actual topic. Prominent speakers have been invited to speak at the panel sessions. The presentations are followed by a panel discussion involving, comments and discussion from the audience.

The first Panel Session of the conference in Gothenburg (Sweden) on 2010-10-11 was titled **"Standards for Smart Grid"** chaired by Lars Nordström, Royal Institute of Technology, Sweden

Session summary:

ICT is a core component in the smart electricity networks of the future. Implementing the Smart Grids requires integration of distributed control systems at different levels across the power industry. This requires that information from different domains such as markets, control, automation and load management can be shared seamlessly. For this cause, standardized interfaces and information models is a very important building block for the Smart grid. In the panel session, a broad overview of existing standardization efforts, including IEC, IEEE and NIST initiatives as well as their area of application are described. In addition more in-depth studies of specific implementations using the main standards, specifically the IEC 61850, are presented.

Invited speeches were:

- "Standards for interoperability make the grids smart", Lars Nordström, Royal Institute of Technology, Sweden
- **"IEC 61850 Lite Implementation - Low cost micro controller chip with IEC 61850 (IEC 61400-25) and IEC 61131-3"**, Karlheinz Schwarz, Netted Automation, Germany
- "Results from Surveys on Smart Grid Standardization Initiatives", Mathias Uslar, OFFiS, Germany
- "A case study on Multi-agent Interoperability in IEC 61850 Environments", Arshad Saleem, Technical University of Denmark, Denmark

Click [HERE](#) to download the presentation "IEC 61850 Lite Implementation" [pdf, 700 KB]

Posted by [Karlheinz Schwarz](#) at [11:41 AM](#) [0 comments](#) 

Labels: [embedded system](#), [IEC 61131-3](#), [IEC 61850](#), [IEC61850Li](#), [implementation](#), [interoperability](#), [NIST](#), [Smart Grid](#)

Sunday, October 10, 2010

Slides of IEC 61850/61400-25 Workshop at Hydro Quebec (Canada) available for Download

NettedAutomation GmbH successfully conducted a one day Workshop on IEC 61850 IEC 61400-25 at Hydro Quebec in Montreal (Canada) on Thursday, September 30, 2010

Some feedback:

"Thank you for the opportunity you provided to Canadian experts. I received good comments from attendees and surely, this will help the 61850 cause."

"It was a pleasure meeting you in Montreal. Your workshop made 61850 real for most of us. And I am looking forward to build an installation based on the protocol. As discussed, we are planning to upgrade two of

[Customers talk Much to Vendors - Less to Standardi...](#)

[SISCO's AX-S4 MMS is now AX-S4 61850](#)

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Contributors

our substations on the campus to be fully compliant with IEC 61850."

Click [HERE](#) to download the set of the 100+ slides presented [pdf, 3 MB]. *If you **have an account** please use your email address and password. If you don't, just enter your email address and you will immediately receive an email with the password.*

Posted by [Karlheinz Schwarz](#) at 9:16 PM 0 comments 

Labels: [communication](#), [embedded system](#), [IEC 61400-25](#), [IEC 61850](#), [IEC61850Li](#), [NIST Roadmap](#), [peopleware](#), [Power Automation](#), [Smart Grid](#)

Saturday, October 9, 2010

NIST recommends IEC 61850 and other IEC TC 57 Standards for Regulation

The US Commerce Department's National Institute of Standards and Technology (NIST) has recommended the Federal Energy Regulatory Commission (FERC) that five "foundational" sets of IEC TC 57 standards for smart grid interoperability and cyber security should be considered by federal and state energy regulators.

- **IEC 61970 and IEC 61968:** Provide a Common Information Model (CIM) necessary for exchanges of data between devices and networks, primarily in the transmission (IEC 61970) and distribution (IEC 61968) domains.
- **IEC 61850:** Facilitates substation automation and communication as well as interoperability through a common data format.
- **IEC 60870-6:** Facilitates exchanges of information between control centers.
- **IEC 62351:** Addresses the cyber security of the communication protocols defined by the preceding IEC standards.

These standards are identified because they are **essential to uniform and interoperable communication systems throughout the grid and will accommodate the evolution of the grid and the integration of new technologies**. They focus on the information models and protocols important to efficient and reliable grid operations.

This is a big step forward in the use of these standard series! More to come.

The power utility domain all over has decided to use these standards. In 2010 I have seen a lot of interest in the general automation domain (**factory and process automation**) to check if IEC 61850 could be used to replace the myriads of field busses. IEC 61850 could be used instead of the 30+ Ethernet based field busses - and IEC 61850 has to offer much more than any of these field busses. IEC 60870-6 and IEC 61850 rely on MMS (Manufacturing Message Specification) as the messaging standard developed in the late 80s during the MAP 3.0 project (Manufacturing Automation Protocols). Field busses haven been understood since the 90s to be used instead of MAP 3.0. With IEC 60870-6 and IEC 61850 we see that the basic concepts and solutions of MAP 3.0 are back in operation - first in the power utility domain and soon in factories and other domains.

Click [HERE](#) to download the letter from NIST to FERC [pdf]

Posted by [Karlheinz Schwarz](#) at 12:57 AM 0 comments 

Labels: [electric power system](#), [fieldbus](#), [IEC 60870-6](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC 62351](#), [MMS](#), [NIST](#), [NIST Roadmap](#), [Smart Grid](#), [Substation](#), [Substation Automation](#), [TASE.2 ICCP](#)

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

Tuesday, October 5, 2010

Seats available for Two Day IEC 61850 Training in Dallas (TX)

A two-day special seminar and training on IEC 61850, IEC 61400-25 and DNP3 will be conducted by Karlheinz Schwarz (Editor of IEC 61850, IEC 61400-25, member of NIST PAP16, ...) at:

Remote 2010 Conference & Expo
October 19-20, 2010 - Dallas, Texas

Who should attend? All experts that are looking for a real standardized method to model and exchange information from any process application domain (power systems, factories, process control, ...). If you are tired of the discussions which one of the 100+ field busses to use: come by and learn that **you can now easily implement and use a TRUE International standard (IEC 61850) that uses message standards on TCP/IP and standard Ethernet - no special Ethernet needed!**

You will get the latest in the NIST SGIP development and in the international standardization world of IEC, IEEE, ...

You will receive a CD ROM with some 500 MB of useful information on standards, products, tools, and demo software. You will also learn what the IEC 61850 Lite implementation Starter Kit is all about ... and you will get a copy of the Evaluation / Starter Kit.

Click [HERE](#) for a description of the Evaluation / Starter Kit.

There are still seats available. See you there soon.

Click [HERE](#) for more information.

Click [HERE](#) to contact me if you need more information on the program and what you would get.

Posted by [Karlheinz Schwarz](#) at [7:37 PM](#) [0 comments](#) 

Labels: [education](#), [fieldbus](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [IEC61850Li](#), [interoperability](#), [Power Automation](#), [starter kit](#)

Understanding IEC 61850 Concepts, Basics and Solutions is Crucial for Smart(er) Grids

There is still a lack of understanding of IEC 61850 concepts, basics and solutions. During a September 30th **IEC 61850 Workshop** at Hydro Quebec in Montreal (Canada) 20+ participants from Canada, USA, Japan, Denmark, South Korea, and Germany received a bunch of useful information with regard to IEC 61850.

Here is some feedback from attendees:

"Thank you for the opportunity you provided to Canadian experts. I received good comments from attendees and surely, this will help the 61850 cause."

"It was a pleasure meeting you in Montreal. Your workshop made 61850 real for most of us. And I am looking forward to build an installation based on the protocol. As discussed, we are planning to upgrade two of our substations on the campus to be fully compliant with IEC 61850."

Click [HERE](#) to contact me if you are interested in the course material I have provided at the workshop. Please let me know what your needs are.

Posted by [Karlheinz Schwarz](#) at [7:19 PM](#) [0 comments](#) 

Labels: [DER](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [IEC61850Li](#), [interoperability](#), [peopleware](#), [Smart Grid](#)

Monday, October 4, 2010


NIST SGIP Provides Useful Information About IEC 61850

The latest information on IEC 61850 provided by SGIP (Smart Grid Interoperability Panel) is a summary of the background of IEC 61850 - quite interesting information.

The contents provided:

- Identification and Affiliation
- Level of Standardization
- Areas of Use
- Relationship to Other Standards or Specifications
- Dept of Energy Smart Grid Characteristics
- Priority Areas Previously Mentioned by FERC and NIST
- Openness
- Support, Conformance, Certification and Testing
- Functional Description of the Standard
- Architectural Principles

Click [HERE](#) to download the 12 page document.

Posted by [Karlheinz Schwarz](#) at [8:18 PM](#) [0 comments](#) 

Labels: [conformance test](#), [IEC 61850](#), [IEC 62351](#), [interoperability](#), [NIST](#), [Smart Grid](#), [standards](#)

Tuesday, September 21, 2010

Utility Grid Communication Network in Electric Vehicle Charging Infrastructure takes IEC 61850 into Account

The IEC TC 69 (Electric road vehicles and electric industrial trucks) has proposed a new project to define "Utility grid communication network in electric vehicle charging infrastructure" - 69/176/NP. The New work proposal refers to IEC 61850 as standard that should be considered as base standard. It could be assumed that IEC 61850 has already a lot of definitions that can be re-used by the experts that will define this standard. It is likely that IEC 61850-7-420 has already many information models defined for that application.

Voting is open between 2010-09-17 and 2010-12-17

Click [HERE](#) for a the official IEC announcement. Contact your national body to get a copy of the proposal.

Posted by [Karlheinz Schwarz](#) at [5:42 AM](#) [0 comments](#) 

Labels: [batteries](#), [charging station](#), [Extensions](#), [IEC 61850](#), [IEC 61850-7-420](#), [Power Automation](#), [Smart Grid](#)

Free One Day Workshop on IEC 61850 (IEC 61400-25) in Montreal

A free Workshop on IEC 61850 (IEC 61400-25) will be conducted in Montreal (Canada) next week:

Thursday, September 30, 2010; 8:30 a.m. – 3:00 p.m.


The Workshop will take place at Hydro-Québec head office in Montreal.

The workshop will be an open presentation and discussion of crucial aspects of the standard IEC 61850 and especially of IEC 61850-7-420; a demonstration of the latest development of the "IEC61850@CHIP" and first experiences with the small platform especially for PV systems will be given.

08:30 – 09:00	Welcome, roll call of attendees, expectations
09:00 – 09:30	The standardization organizations (IEC TC 57, IEEE, TC 88, ...)
09:30 – 10:30	Introduction into information modeling, models, information exchange, configuration language (IEC 61850-7-x and IEC 61400-25)
10:30 – 10:50	Coffee break
10:50 – 11:30	Implementations and market penetration of IEC 61850
11:30 – 12:30	Presentation of SystemCorp's IEC 61850 Stack PIS-1 integration of the stack on Beck IPC Chip, and demonstration of Development Kit DK61 (HW and SW) and IEC 61850 DLL running on PCs
12:30 – 13:30	Lunch (invited by H-Q)
13:30 – 15:00	Question & Answer Session
15:00	End of workshop

There are a very few seats left.

If you are interested to attend, please let me know as soon as possible (latest by Friday, 24 September 2010) - schwarz@scc-online.de

Posted by [Karlheinz Schwarz](#) at 4:47 AM 0 comments 

Labels: [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [interoperability](#), [peopleware](#), [seminar](#), [Smart Grid](#), [starter kit](#), [Substation Automation](#), [Transmission Grid](#), [wind power](#)

Monday, September 20, 2010

High-pressure system called "Karlheinz" brings warm temperatures

While low pressure system "Joleen" has been pushing **cool, wet weather** into the country from Scandinavia, a high-pressure system called **"Karlheinz"** is moving up from the south with **warmer temperatures**. "That means for the next few days there will be dry and especially warm weather during the day in central Europe, which naturally means us too," **Temperatures could reach up to 25 degrees Celsius in the Upper Rhine region** (like in Karlsruhe - the home town of Karlheinz Schwarz, Expert on IEC 61850).

Karlheinz (Schwarz) brings good weather and good news on IEC 61850 to you ;-)

Click [HERE](#) for the full weather report.

Posted by [Karlheinz Schwarz](#) at [11:26 PM](#) [0 comments](#) 

Labels: [IEC 61850](#)

Update on IEC 61850 Hands-on Training with Multivendor IEDs in Stockholm, 2-5 November 2010

STRI and NettedAutomation offer a 4-day comprehensive Seminar and Hands-on Training providing both theory and practice on the application of IEC 61850 in a substation (and IEC 61400-25 in wind power plants) by following the planning, specification, design and engineering process. Based on real applications and multivendor test installation we follow the engineering process all the way through configuration and testing. The 4 day Comprehensive System Integration Course to be held in Stockholm (Sweden) on 2-5th of November 2010 consists of:

- **Module 1** gives an independent and detailed presentation of the IEC 61850 standard and demonstration of STRI multivendor interoperability training and test system.
- **Module 2** presents the Substation Configuration Language and use of a vendor independent tool, to demonstrate specification of IEC 61850 systems.
- **Module 3** presents possible functional allocations and architectures for typical substation automation systems. How should one apply IEC 61850 reporting and GOOSE messaging for protection and control schemes? How to configure Ethernet Networks and test IEC 61850 systems?
- **Module 4** is divided in two parallel workshops. Module 4a – covers engineering of a small interoperable IEC 61850 system with protection and control devices from ABB, Areva and Siemens. Module 4b focuses instead on SCADA and gateway engineering.

Just a few seats left - check for availability soon.

Click [HERE](#) for the updated Program and Registration information.

Posted by [Karlheinz Schwarz](#) at [10:46 AM](#) [0 comments](#) 

Labels: [Automation](#), [education](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [Power Automation](#), [SCADA](#), [SCL](#), [Substation Automation](#)

Thursday, September 16, 2010

The Best Corporate Brochure on IEC 61850 ever seen

ABB has published the other day the **Best Brochure on IEC 61850** I have ever seen! The 60+ page Corporate Technical Journal presents the strategy, vision, and experience of ABB. The Brochure contains the following topics:

- IEC 61850: The new approach
- Products for the standard
- Verification and validation
- Case studies of IEC 61850

This Journal is absolutely worth to read!

Click [HERE](#) to download the Journal [pdf, 2.9 MB].

Posted by [Karlheinz Schwarz](#) at [4:52 AM](#) [0 comments](#) 

Labels: [800xA](#), [ABB](#), [GOOSE](#), [IEC 61850](#), [Power Automation](#), [Smart Grid](#), [Substation Automation](#)

Sunday, September 12, 2010

Interoperability and Replacement of an IED by another one

The other day somebody from the user community posted a comment on this blog. The issue discussed is on Interoperability and Replacement of an IEC 61850 compliant IED by another one:

"That is exactly what we users want: not just be able to have different IEDs from (possibly) different vendors cooperating in our substations, but also be able to **replace an IED by another one** that is **functionally equivalent** (or superior, or maybe just similar, this being the utility's internal issue) regardless of what the other system components are, **and in the easiest possible way.**"

First of all, the Replacement of an IEC 61850 compliant IED mainly depends on the **implementation** of the standard (which subsets, ..., restrictions) and on the **configuration of the system**.

Replacement could be very easy but also be a bit complicated. One example shows the impact of the implementation (restriction) and one shows the impact of the configuration.

Restricted implementation: Suppose that an IED A (to be replaced) has 10 Logical Devices to model the application. IED B (to replace IED A) has only the possibility to support five (5) Logical Devices; the restriction is done during the design of the IED.

The system engineer has configured the IEDs and the **information flow** between them, e.g., the flow from IED A to other IEDs. The designed information flow between IED A and other IEDs is like a **Contract**. This contract says that IED A has 10 LDs and underlying LNs and DataObjects. The LD name are used to designate the DataObjects; the LN-Reference contains the LD-Name. A DataSet could have members from all 10 LDs (this could be "written" in the contract).

If the IED B has only five (5) LDs then the designation of the DataObjects will likely be different - it requires a modified Contract! The Clients (Subscriber) have to take these changes of the designation into account. This may require a re-configuration of the Clients (Subscriber).

Click [HERE](#) for a PIXIT document providing some information about an IED, e.g. restriction of GOOSE messages that can be sent (≤ 16) ...

Don' forget: Everything is limited!!

Configuration of the system: Even if IED A and IED B have the same signal designations (same model) it could be that the "old contract" defines a flow as follows: the information to be reported or goosed is defined in a very big DataSet (e.g, of 100+ members). IED B may only support DataSets with a maximum of 50 members. As a consequence the "contract" has to be modified to create two (or more) DataSets and two or more ControlBlocks. The Clients (Subscriber) have to take this into account.

The **"easiest possible way"** means to apply the same "contract" (flow configuration) for IED A and IED B. If IEDs would be quite flexible with regard to the "contracts" then a replacement would be quite easy.

By the way, the question, which "contract" we could write depends on the vendors' implementations and the way how people configure

systems, BUT not on the standard!

The utility requirement could be modified as follows: "to **replace an IED by another one** that is **functionally equivalent** (or superior, or maybe just similar, this being the utility's internal issue) **AND that uses the same "Contract" of the information flow between the two IEDs**, regardless of what the other system components are."

Posted by [Karlheinz Schwarz](#) at [11:14 AM](#) [4 comments](#) 

Labels: [configuration](#), [engineering](#), [IEC 61850](#), [interchangeability](#), [interoperability](#), [maintenance](#), [PIXIT](#)

Friday, September 10, 2010

ABB's Entry Points for IEC 61850 related Information

ABB has posted a huge source of information about IEC 61850 and applications in Substations all over. It's a nice starting point to see what they are doing with regard to IEC 61850.

Click [HERE](#) or [HERE](#) for two ABB web pages with many good explanations and links to useful papers and other documents.

Posted by [Karlheinz Schwarz](#) at [11:05 PM](#) [0 comments](#) 

Labels: [ABB](#), [IEC 61850](#), [Power Automation](#)

GOOSER - Prüfungen von Anlagen mit GOOSE-Nachrichten

Ein echtes universelles IEC 61850-Prüf-Interface ist verfügbar. Der Gooser von Megger verbindet konventionelle Relais-Prüfgeräte mit IEC 61850 basierten Systemen. Der "Gooser" wird also eine echte Alternative zu aufwendigen, neuen Schutz-Prüfsysteme mit integrierter IEC-61850-Schnittstelle gesehen.

Click [HIER](#) zum Download einer aktuellen Veröffentlichung über den GOOSER in der np.

Posted by [Karlheinz Schwarz](#) at [12:15 PM](#) [0 comments](#) 

Labels: [GOOSE](#), [IEC 61850](#), [protection](#), [Relays](#), [testing](#)

FREE IEC 61850/61400-25 DLL - One Download per Hour

The FREE IEC 61850/61400-25 Evaluation/Starter Kit is now available for download since August 31, 2010. The kit provides a DLL for simple IEC 61850 Client, Server, Publisher, and Subscriber Applications running on a PC under Windows.

In average **one kit has been downloaded per hour since then!** This DLL and its API seems to be one of the crucial Highlights of Standardized Information Models, Information Exchange Methods, and Configuration Language! It brings you the Best **after** the holiday season (in many countries in the northern hemisphere - or **before** in the southern).

You simply can't get it for less - Its's FREE.

DO NOT Click [HERE](#) if you want to keep going with your legacy solution.

Posted by [Karlheinz Schwarz](#) at [11:44 AM](#) [0 comments](#) 

Labels: [Automation](#), [communication](#), [DLL](#), [download](#), [embedded system](#), [Evaluation](#), [IEC 61400-25](#), [IEC 61850](#), [IEC61850Li](#), [Windows](#)

Phoenix Contact is Hiring a Software Developer with IEC 61850 Experience

Phoenix Contact is hiring a Software Developer for Embedded Systems with IEC 61850 experience!
Good Luck!

Click [HERE](#) for the job offering [German].

Posted by [Karlheinz Schwarz](#) at [11:11 AM](#) [0 comments](#) 

Labels: [electric power system](#), [IEC 61850](#), [Phoenix Contact](#), [Power Automation](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Friday, September 10, 2010

Automation goes Power: Phoenix Contact starts Road Show "Energy Management"

Electric Power systems are on the radar screen of companies that - traditionally - did their business in the factories. One of the well known German companies is **Phoenix Contact**. What are these companies looking for? More revenue? Very likely.

During the last 20 years there was very little automation in the power industry influenced by factory automation vendors and their solutions. This will change in a fast pace: One of the leading experts (Roland Bent, CEO of **Phoenix Contact**) stated during the VDI Congress that the market for automation systems in the utility domain (electric power, water, ..., clean and green technologies) will be three times bigger in 2030 than today's factory automation. Wow.

Click [HERE](#) for some more details ... what they are looking for ...

Click [HERE](#) to read the announcement for an Energy Management Road Show [German].

Posted by [Karlheinz Schwarz](#) at [11:03 AM](#) [0 comments](#) 

Labels: [Phoenix Contact](#), [Power Automation](#), [Power Plants](#), [process control](#)

Thursday, September 9, 2010

Substation Automation Handbook

The electrical Grid is about to be transformed into a Smart(er) Grid. The most crucial aspect is still (and I hope for ever) the **electrical system** - a system of generators, wires, transformers, switches, etc bound together by some laws. Substations are important elements in the system. For all people that need to understand the challenge of the automation of electrical systems should read the

The **Substation Automation Handbook** written by *Dr. Klaus-Peter Brand, Volker Lohmann, Dr. Wolfgang Wimmer*

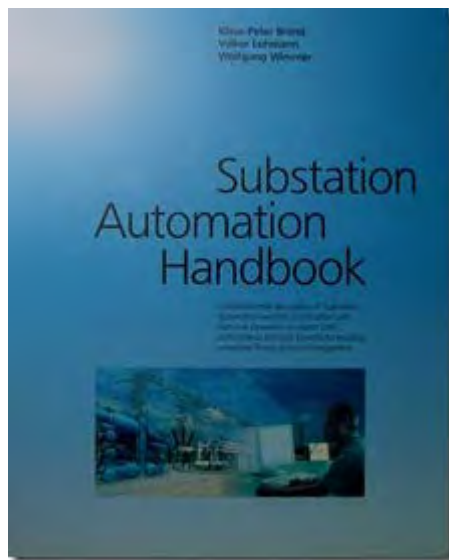
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This book is a comprehensive description of Substation Automation and the coordination with Network Operation to obtain both performance and cost benefits by enabling enhanced Power System Management ... **including the new standard IEC 61850.**

Over the past decade the electricity supply industry has been subjected to dramatic changes. World-wide the trend is to restructure vertically integrated utilities catering for generation, transmission and distributions into smaller "unbundled" companies. The new plant owners are pushed to minimize costs through greater utilization of assets. The book helps to understand the needed solutions to get there.

Click [HERE](#) to read more about the book and how to order it.

Posted by [Karlheinz Schwarz](#) at [10:53 PM](#) [1 comments](#) 

Labels: [electric power system](#), [IEC 61850](#), [Substation Automation](#)

Wednesday, September 8, 2010

IEC61850@CHIP - Forum for API usage open

Beck IPC has opened a Forum for the IEC 61850 Stack API. What to do if the client does not start? What if ...?

Click [HERE](#) to proceed to the IEC 61850 Forum at the website of Beck IPC

Posted by [Karlheinz Schwarz](#) at [9:15 PM](#) [0 comments](#) 

Labels: [API](#), [Beck](#), [IEC 61850](#)

Special Course on Key Standards for Smart Grids in Dallas (TX): IEC 61850, IEC 61400-25 and DNP3

A two-day special seminar and training on IEC 61850, IEC 61400-25 and DNP3 will be conducted by Karlheinz Schwarz (Editor of IEC 61850, IEC 61400-25, member of NIST PAP16, ...) at:

Remote 2010 Conference & Expo
October 19-20, 2010 - Dallas, Texas

In this comprehensive 2-day workshop students learn the fundamental

[FREE IEC 61850/61400-25 DLL - One Download per Hou...](#)

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[Automation goes Power: Phoenix Contact starts Road...](#)

[Substation Automation Handbook](#)

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concepts and vision of the NIST Smart Grid activities and of the IEC 61850 standard series. Students compare well known solutions like DNP3 and the new OPC UA with IEC 61850 (IEC 61400-25, Wind Turbines) and discuss the strength each method offers. All the IEC 61850 standards, their extensions, and many application domains are briefly discussed and the class delves into IEC 61850 real-time and client/server solutions. Each student (that brings his own PC) will do some hands-on training with IEC 61850 client/server communication and GOOSE messaging. We are using freely available evaluation software running under Windows. Two PCs could be connected to see messages on the Ethernet wire.

Click [HERE](#) for more details and registration information.

Posted by [Karlheinz Schwarz](#) at 8:57 PM 0 comments 

Labels: [DER](#), [DNP3](#), [electric power system](#), [embedded system](#), [Ethernet](#), [IEC 61850](#), [interoperability](#), [NIST Roadmap](#), [OPC](#), [Smart Grid](#), [Training](#)


Tuesday, September 7, 2010

Redundant Ethernet for Communication in Substation Automation Systems according to IEC 61850

The **High-availability Seamless Redundancy** protocol (HSR) was designed to meet the highest availability requirements of industrial applications (such as substation automation or motion control) with an Ethernet based communication infrastructure. IEC 61850-90-4 "Network Engineering Guidelines" recommends to use HSR for particular applications.

In the context of the project supported by the Swiss innovation promotion agency CTI, ZHAW is evaluating the feasibility of HSR. Project partners are ABB, Hirschmann, and Siemens. These companies have demonstrated the new solution during the recent Cigré Exhibition in Paris (end of August 2010).

Click [HERE](#) for a report in English.
Click [HERE](#) for a report in German.

Posted by [Karlheinz Schwarz](#) at 3:03 AM 0 comments 

Labels: [Ethernet](#), [GOOSE](#), [hirschmann](#), [IEC 61850](#), [implementation](#), [redundancy](#)

Saturday, September 4, 2010

NIST Smart Grid - Cyber Security Guidelines Released

The three volumes of the "Guidelines for Smart Grid Cyber Security (NISTIR 7628)" have been published by NIST end of August 2010.

The report presents an analytical framework that organizations can use to develop effective cyber security strategies tailored to their particular combinations of Smart Grid-related characteristics, risks, and vulnerabilities. Organizations in the diverse community of Smart Grid stakeholders—from utilities to providers of energy management services to manufacturers of electric vehicles and charging stations—can use the methods and supporting information presented in this report as guidance for assessing risk and identifying and applying appropriate security requirements.

This document is a companion document to the NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0 (NIST

► [2009](#) (162)

► [2008](#) (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

SP 1108), which NIST issued on January 19, 2010.

Click [HERE](#) to download Volume 1

Click [HERE](#) to download Volume 2

Click [HERE](#) to download Volume 3

Click [HERE](#) to download the NIST Framework and Roadmap for Smart Grid Interoperability Standards, R1.0

[Does IEC 61850 provide Security Measures? - Yes](#)

Posted by [Karlheinz Schwarz](#) at [3:27 AM](#) [0 comments](#) 

Labels: [Cyber Security](#), [IEC 61850](#), [IEC 62351](#), [NIST](#), [NIST Roadmap](#), [security](#), [Smart Grid](#)

Friday, September 3, 2010

IEC 61850 Tissue Database for Edition 2

The first four (4) parts of IEC 61850 have been published as Edition 2: Part 6, Part 7-4, Part 7-3, and Part 7-2.

The Tissue Database (technical issues) is now open for posting tissues on these four new parts (Edition 2):

www.tissue.iec61850.com

The first tissues have already been posted for Edition 2 documents. If you have any tissue to be reported to the editors of the standards please check with the tissue database - maybe your issue has already been posted.

The Tissue Database for IEC 61400-25 is also open:

www.tissue.iec61400-25.com

Click [HERE](#) for some general remarks on Edition 1 and Edition 2.

Posted by [Karlheinz Schwarz](#) at [3:58 AM](#) [0 comments](#) 

Labels: [conformance test](#), [Edition 2](#), [Edition1](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [tissues](#)

Update: NIST SGIP - Special Cross-PAP Session on Information Models for Generators and Storage

Please find the agenda for the upcoming meeting of the special group in St. Louis (MS):

Special Cross-PAP Session:
Coordinated Object Modeling for Generators and Storage
SGIP Fall Meeting
September 15, 2010, St. Louis, Missouri
12:30 to 3:00 PM

This Cross-PAP issues session is your chance to participate in discussions on coordinating consistent object models and information exchange requirements for different generator types (e.g., wind turbines, hydro power plants, PV systems, and storage) across multiple domains (consumer, distribution, and transmission). This session is expected to aid in producing consistent object model requirements (where possible) being developed for example by PAPs 7 and 16 for IEC 61850-7-420 (DER), IEC 61850-7-410 (hydro) and IEC 61400-25

(wind). The consistent generator control, monitoring and protection requirements are to be coordinated and combined with requirements of other PAPs including 3, 4, 9, and 10. There are several areas in which the various application domains highly benefit from consistent information models, consistent information exchange and security steps. The interface between power generation and the control center and between aggregators and distributed generators are obvious examples. This session is intended to provide overviews of and to initiate coordination of activities required to develop consistent object models for different generator/storage types across different Smart Grid domains.

Topics presented and discussed include:

- Status of object models for wind turbines, hydro power plants, PV systems, other distributed energy resources – (Karlheinz Schwarz, editor of IEC 61850 and IEC 61400-25) – 30 minutes
- IEC 61400-25-2 transmission level wind generator standard with first two logical nodes that define active power control and reactive power control (Bill Moncrief) – 20 minutes
- Key ES-DER Use Cases - The necessity of establishing a set of core functions as a foundation for standard protocols and device interoperability. Results from a collaborative industry activity. (Brian Seal) – 20 minutes
- IEC 61850-7-420 for ES-DER functions, focusing on pricing signals, volt/var schedules, direct control, and broadcast control, as well as cyber security (Frances Cleveland, editor of IEC 61850-7-420 and IEC 62351) – 20 minutes
- Common modeling concepts, key services like "report-by-exception" and configuration language – Mapping of 61850 to Webservices (IEC 61400-25-4), to DNP3 and to SEP 2.0 (Frances) – 30 min
- IEC 61850-on-a-chip (Karlheinz Schwarz) – 15 minutes

Related standards and PAPs:

- **IEC 61850-7-420, IEC 61400-25, IEC 62351**
- **IEEE P 1547.8, IEEE P174**
- **DNP3, SEP 2.0, MultiSpeak, CIM**
- **PAPs: Developed by 7 and 16; used by 3, 4, 9, 10, 8 and 14**

Posted by [Karlheinz Schwarz](#) at [3:22 AM](#) [0 comments](#) 

Labels: [DER](#), [distribution](#), [distribution automation](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-410](#), [IEC 61850-7-420](#), [NIST](#), [PAP](#), [PAP16](#), [wind power](#)

Tuesday, August 31, 2010

FREE IEC 61850/61400-25 Evaluation/Starter Kit

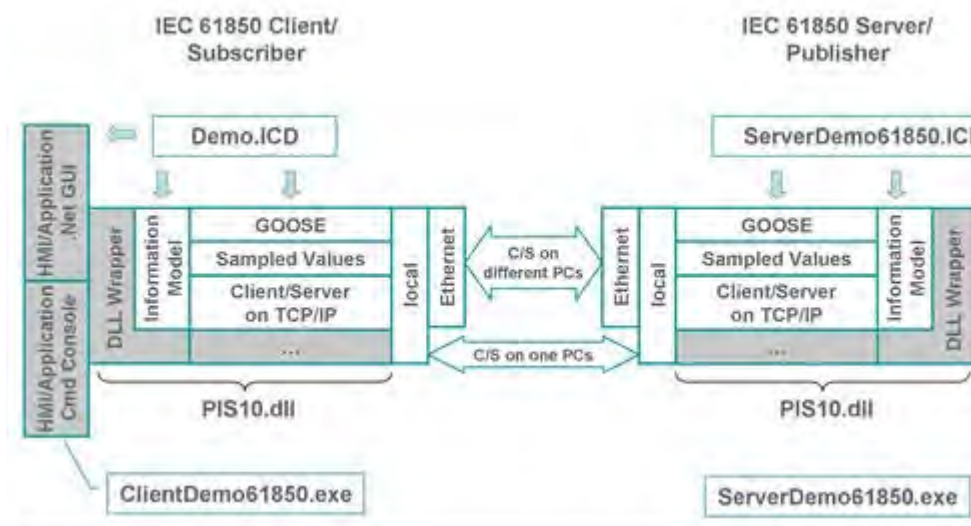
A FREE IEC 61850/61400-25 **Evaluation/Starter Kit** is now available for immediate **download and use**. The wait for a FREE IEC 61850/61400-25 Evaluation/Starter Kit is over - here it is for immediate use.

SystemCorp (Perth, Australia) and NettedAutomation offer an IEC 61850/61400-25 DLL (Dynamic Link Library) and three Application examples using the DLL (PIS10.dll; providing a simple stack API):

- C Server Application (simple Console)
- C Client Application (simple Console)
- C#/.Net Client Application (runs under XP, Vista, Windows 7)

The Kit contains executable software and the source code of the C and .Net Applications (projects) as well as "Getting started manuals". The

PIS10.dll is based on the IEC 61850 stack developed by [SystemCorp](#). The client and server (publisher/subscriber - GOOSE) run on one machine or on different machines as depicted below:



You can use these source code of the application examples and modify them according to your needs. The configuration of the Server AND the Client done by ICD files (according to IEC 61850-6, SCL) - no need for self-description; the model is build at start time. This client/Server package is applicable for M2M (machine to machine) communication. The IEDScout could be used as a Browser-Client as well. Modified applications would require a modified ICD file as well. The "ICD Designer" - a tool to design ICD files - will be available within a week or so.

The services supported are: Association, GetDataObjectValues, SetDataObjectValues, Control, Reporting, GOOSE, ...

NettedAutomation GmbH offers a new services for the integration of the PIS10 stack (DLL, ...) into your application:

Support will be provided by our experienced application programmer: Andreas Pfefferle. Andreas is familiar with Substation Automation, RTUs, IEC 60870-5-10x, protocol integration, ... SystemCorp PIS10-Stack API and many other power utility applications.

Click [HERE](#) to Download the IEC 61850/61400-25 Evaluation/Starter Kit (The Kit comprises first a readme.txt file and four (4) zip files - each file can be downloaded individually; **You need at least the <<Console-Server-Client_2010-08-31>> to get the server**; to run the client with another server you need to change the ICD file accordingly). IF you have an Account for downloading content from www.nettedautomation.com then you can use your email address and password. If you have forgotten the password, just enter your email address in the field "Email (required)" and click on the button "I agree ... continue" at the end - you will receive your password. Or just enter your email and further information and you will receive a password immediately.

Enjoy.

Posted by [Karlheinz Schwarz](#) at 1:15 PM 0 comments

Labels: [API](#), [applications](#), [configuration](#), [DLL](#), [embedded system](#), [Evaluation](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [interoperability](#), [starter kit](#)

Monday, August 30, 2010

NIST SGIP - Special Cross-PAP Session on Coordinated Information Modeling for Generators and Storage

The fall face-to-face meeting of the NIST SGIP (Smart Grid Interoperability Panel) will take place in St. Louis (MS) from September 14-16, 2010.

A Special Cross-PAP Session on Coordinated Information Modeling for Generators and Storage is intended to provide overviews of and to initiate coordination of activities required to develop consistent information models for different generator/storage types across different Smart Grid domains. This Cross-PAP issues session is your chance to participate in discussions on coordinating consistent information models and information exchange requirements for different generator types (e.g., wind turbines [IEC 61400-25-2], hydro power plants [IEC 61850-7-410], PV systems, and storage [IEC 61850-7-420], ...) across multiple domains (consumer, distribution, and transmission).

Session is scheduled for Wednesday, Sept. 15th (12:30-15:00)

Click [HERE](#) for the full program and other details of the meeting.

Please note that **Mr. Karlheinz Schwarz** (member of PAP16, editor IEC 61850, IEC 61400-25) will be in St. Louis on Sept. 15 and 16 ... to meet you ...

Posted by [Karlheinz Schwarz](#) at [11:42 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850-7-4 Ed2](#), [IEC 61850-7-410](#), [IEC 61850-7-420](#), [Information Model](#), [interoperability](#), [interoperability tests](#), [models](#), [NIST](#), [Power Automation](#), [seamless](#), [standards](#), [wind power](#)

Friday, August 27, 2010

SystemCorp and NettedAutomation exhibit at DistribuTech 2011

SystemCorp Embedded Technology Pty Ltd (Perth, WA/Australia) and **NettedAutomation** GmbH (Karlsruhe/Germany) will exhibit the latest developments in lite implementations of IEC 61850 and IEC 61400-25, gateways between IEC 61850/61400-25, DNP3, IEC 60870-5, Modbus, RTUs, Bay controller, PLC programming IEC 61131-3, starter kits, ... training opportunities, training tools at **booth 2822** at the DistribuTech 2011 Exhibition in San Diego (CA), 1.-3. February 2010.

Please plan for a meeting the "IEC 61850 Lite" experts.

Click [HERE](#) for the floor plan and booth 2822.

Posted by [Karlheinz Schwarz](#) at [6:42 AM](#) [0 comments](#) 

Labels: [DER](#), [Distributech](#), [DLL](#), [embedded system](#), [Gateway](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61850](#), [Power Automation](#)

Thursday, August 26, 2010

Draft Technical Report - IEC 61850 for Synchrophasor

Draft IEC 61850-90-5 TR Ed. 1 – Use of IEC 61850 to transmit synchrophasor information according to IEEE C37.118 has been published as draft Technical Report (57/1086/DC). Comments by 2010-10-01.

This technical report describes how to use IEC 61850 to transmit synchrophasor information according to IEEE C37.118. Later, once the report is approved and published, results will be integrated as amendments in the relevant parts of the IEC 61850 standard. This document contains a first draft of that report. As a significant part, it includes new mappings of the IEC 61850 GOOSE and sampled value services that can be used for a wide area communication.

Two new control blocks are defined for IP networks:

- The sending of stream information (e.g. Sampled Values)
- The sending of event driven information (e.g. GOOSE)

Two possibilities are drafted:

The streams for SMV and GOOSE will be transmitted over a transport profile that utilizes IPv4 or IPv6, and TCP as well as UDP.

Once these models are extended in the ACSI (IEC 61850-7-2) they may also be used for Reporting over UDP.

Posted by [Karlheinz Schwarz](#) at [11:59 PM](#) [0 comments](#) 

Labels: [communication](#), [distribution automation](#), [GOOSE](#), [IEC 61850](#), [SMV](#), [Synchrophasor](#), [UDP](#)

FDIS of IEC 61850-7-3 Edition 2 out for final Ballot

IEC Central Office has published the FDIS of IEC 61850-7-3 Edition 2 (57/1087/FDIS). The **ballot closes 2010-10-29**.

The second edition comprises 39 Common Data Classes (CDC):

- defines new common data classes used for new standards defining object models for other domains based on IEC 61850 and for the representation of statistical and historical data,
- provides clarifications and corrections to the first edition of IEC 61850-7-3.

Common data class specifications for status information

1. Single point status (SPS)
Double point status (DPS)
Integer status (INS)
2. Enumerated status (ENS) - **NEW**
3. Protection activation information (ACT)
4. Directional protection activation information (ACD)
5. Security violation counting (SEC)
6. Binary counter reading (BCR)
7. Histogram (HST) - **NEW**
8. Visible string status (VSS) - **NEW**

Common data class specifications for measurand information

1. Measured value (MV)
2. Complex measured value (CMV)
3. Sampled value (SAV)
4. Phase to ground/neutral related measured values of a three-phase system (WYE)
5. Phase to phase related measured values of a three-phase system (DEL)
6. Sequence (SEQ)
7. Harmonic value (HMV)
8. Harmonic value for WYE (HWYE)
9. Harmonic value for DEL (HDEL)

Common data class specifications for controls

1. Controllable single point (SPC)
2. Controllable double point (DPC)
3. Controllable integer status (INC)
4. Controllable enumerated status (ENC) - **NEW**
5. Binary controlled step position information (BSC)
6. Integer controlled step position information (ISC)
7. Controllable analogue process value (APC)
8. Binary controlled analog process value (BAC) - **NEW**

Common data class specifications for status settings

1. Single point setting (SPG)
2. Integer status setting (ING)
3. Enumerated status setting (ENG) - **NEW**
4. Object reference setting (ORG) - **NEW**
5. Time setting group (TSG) - **NEW**
6. Currency setting group (CUG) - **NEW**
7. Visible string setting (VSG)- **NEW**

Common data class specifications for analogue settings

1. Analogue setting (ASG)
2. Setting curve (CURVE)
3. Curve shape setting (CSG) - **NEW**

Common data class specifications for description information

1. Device name plate (DPL)
2. Logical node name plate (LPL)
3. Curve shape description (CSD)

Posted by [Karlheinz Schwarz](#) at [11:39 PM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [models](#)

ICS-CERT Advice on STUXNET Maleware Mitigation

In July, ICS-CERT published an advisory and a series of updates regarding the Stuxnet malware entitled "ICSA-10-201- USB Malware Targeting Siemens Control Software."

Stuxnet makes use of a previously unpatched Windows vulnerability. Since then, ICS-CERT has continued analysis of the Stuxnet malware in an effort to determine more about its capabilities and intent. As the analysis has progressed, understanding of the malware sophistication has continued to increase.

Click [HERE](#) for the complete report [pdf].

Click [HERE](#) for details published by Symantec.

Click [HERE](#) to visit the website (in German) of GAI NetConsultant (Berlin), a well experienced team of security experts.

Posted by [Karlheinz Schwarz](#) at [11:09 PM](#) [0 comments](#) 

Labels: [Automation](#), [malware](#), [process control](#), [security](#), [Siemens](#)

Friday, August 20, 2010

Kostengünstige IEC-61850-Lösung für kurze Entwicklungszeiten

Ein hoher finanzieller und zeitlicher Aufwand bei der Realisierung der IEC 61850 und IEC 61400-25 in Steuerungen und andere Geräten hat bisher die breite Anwendung in den unteren Spannungsebenen, in der Energieerzeugung und weiteren Bereichen gebremst oder gar blockiert. Seit der Hannover Messe 2010 ist jedoch eine kostengünstige Komplettlösung auf Basis des Beck IPC@Chip verfügbar, welche die Entwicklung von IEC-61850-konformen Schnittstellen innerhalb kurzer Zeit ermöglicht. Die Stack-Software auf dem Chip (von SystemCorp, Perth, Australien) bietet ein sehr einfaches IEC-61850-API an - MMS (ISO 9506) und weitere Definitionen sind verborgen. Das API hat neben einigen Management-Funktionen **nur drei Call-Back-Funktionen als Schnittstelle zwischen IEC 61850 und Anwendung: Read, Write, Update.**

Click [HERE](#) for the paper in German recently published by etz / VDE Verlag.

Click [HERE](#) to access the pdf version of the paper.

Click [HERE](#) for the API documentation in English.

Click [HERE](#) for the description of the starter kit DK61 (development kit).

Posted by [Karlheinz Schwarz](#) at [1:32 AM](#) [0 comments](#) 

Labels: [Beck](#), [CIP](#), [communication](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [MMS](#), [Power Automation](#), [Smart Grid](#)

Wednesday, August 18, 2010

IEC 61850 Test Labs and Certified IEDs

The UCA International Users Group (UCAIug) has approved seven IEC 61850 Test Labs (as of 21 July 2010):

ABB Switzerland Ltd
Server: Level B

American Electric Power (AEP)
Dolan Technology/Testing Center
Client and Server: Level A

AREVA T&D UK Ltd,
Substation Automation Solutions
Server: Level B

KEMA Nederland BV
Client and Server: Level A

NARI-RELAYS Electric Co., Ltd., Nanjing, China
Server: Level B

Xuchang KETOP Electrical Apparatus
Testing & Research Institute, Henan, China
Server: Level B

Additional labs are underway.

A total of **155 certified products** are listed at the [UCAIUG website](#).

Posted by [Karlheinz Schwarz](#) at [10:00 AM](#) [0 comments](#) 

Labels: [conformance test](#), [IEC 61850](#), [testing](#), [UCA](#), [Users Group](#)

IEC 61850 Tutorial at IEEE PES Conference,

Gothenburg, 10-13 October 2010

Everybody talks about Smart Grid but what is interesting about standards? What is a "smart" standard? Come to the **IEEE PES Conference on Innovative Smart Grid Technologies Europe 2010**, Gothenburg, Sweden, 10-13 October 2010.


And join the tutorial "**IEC61850 and related standards for interoperability within Power Utility Automation**":

Sunday 10th October, 3 sessions with 2 breaks (13:00 - 16:30):

- Requirements and challenges of a future proof migration towards a Smart Grid
- Smart Grid Standard Landscape
- Implementation of the Standards
learn about IEC for small devices, **Starter Kit IEC 61850 and IEC 61400-25**, Lite implementation, ... there is no excuse anymore for not implementing these standards!
- IED for Smart Grid

Click [HERE](#) for the Tutorial description and program.

Click [HERE](#) for the conference information and registration.

Posted by [Karlheinz Schwarz](#) at [9:18 AM](#) [0 comments](#) 

Labels: [communication](#), [distribution automation](#), [education](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [Training](#)

European Roadmap - More Euros for Smart Grids

The European Electricity Grid Initiative (EEGI) has published a Roadmap for the years 2010-18 and a Detailed Implementation Plan 2010-12; with proposals how many Euros to spend.

The EEGI has proposed a nine-year European research, development and demonstration (RD&D) program initiated by electricity transmission and distribution network operators to accelerate innovation and the development of the electricity networks of the future in Europe.

The following statement is great: "The proposed RD&D program focuses on **system innovation** rather than on **technology innovation**." Yes, the time to develop crucial Technologies was during the years 2000 and 2010. Several basic Technologies like the international communication standards IEC 61850, IEC 61400-25, IEC 62351, IEC 61968, and IEC 61970 are **published AND IMPLEMENTED** in many devices - **ready to build SYSTEMS**.


The time has come to **USE these standards and devices** - rather than start again discussing protocols again and again ... like in the nineties ...

Planned investments for monitoring, communication, ... automation are:

Start	Function	Budge
2012	Improved planning, monitoring and control of LV networks	100 M€
2011	Automation and control of MV network	90 M€

2012	Integrated Communication Solutions	50 M€
2011	Joint Task force on IT system protocols and standards (DSO driven)	19 M€

Click [HERE](#) to download the Roadmap.

Posted by [Karlheinz Schwarz](#) at [8:44 AM](#) [0 comments](#) 

Labels: [communication](#), [condition monitoring](#), [control](#), [DER](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [monitoring](#), [Smart Grid](#), [Transmission Grid](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Wednesday, August 18, 2010

Chinese Strong and Smart Grid Roadmap available

The "State Grid Cooperation China" (SGCC) has published the 139 page "SGCC Framework and Roadmap for Strong and Smart Grid Standards". One of the key challenges is the standardization. Several IEC TC 57 and TC 88 standards are crucial for the Strong and Smart Grid. Among others the following standards are key: **IEC 61850** and **IEC 61400-25** (15+ times referenced), **IEC 61968/61970** (30+), **IEC 62351** (5+).

The first sentence of the three sentence summary states: "The release and implementation of SGCC Framework and Roadmap for Strong and Smart Grid Standards **will greatly boost the standardization** of smart grid technologies in all related areas, promote wide public involvement and facilitate technical innovation and industrial upgrading."

The preface reads: " ... Faced with new challenges in energy sector, State Grid Corporation of China (SGCC) officially put forward the strategy of building a **world-leading strong and smart grid with ultra high voltage grid as its backbone and subordinate grids coordinated at various voltage levels, featured as being IT-based, automated, interactive, based on independent innovation**. Up to now, remarkable progress has been made in this regard. **By 2020, a smart grid** that is robust and reliable, economical and efficient, clean and environmental-friendly, transparent and open, user-friendly and interactive **is to be established**. Since August 2009, SGCC has started 228 demonstration projects of 21 categories in 26 provinces and municipalities. By now, the demonstration projects have been progressing smoothly. ... Based on SGCC smart grid research findings and **standard framework**, taking IEC smart grid standardization roadmap and international standardization gap into consideration, **SGCC set priorities for international standards and prepared new working item proposals for IEC**. ..."

Click [HERE](#) to download the 9 MB framework and roadmap.

During the 11th Five-Year Plan period (2006-2010), SGCC promoted power grid technology upgrading from the following ten aspects, and accelerate the progressing of model projects that applies IEC 61850 among ten new technologies: **Substation Automation Conformed with IEC 61850**.

Click [HERE](#) for details.

Posted by [Karlheinz Schwarz](#) at [6:46 AM](#) [0 comments](#) 

Labels: [China](#), [distribution automation](#), [electric power system](#), [electric vehicles](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC 62351](#), [Smart Grid](#), [Substation](#)

Tuesday, August 17, 2010

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 - [IEC 61850 Test Labs and Certified IEDs](#)

Bachmann M1 Automation System supports IEC 61850 Client

The Bachmann M1 Automation System runs also an IEC 61850 (MMS) Client. This allows the M1 to connect to any underlying IEC 61850 server, e.g., to connect to controllers for distributed power generation (wind power, PV, CHP, ...) or protection relays at the electrical connection point of the feeder.

Click [HERE](#) for the newsletter in English (doc).
Click [HERE](#) for the newsletter in German (doc).

Posted by [Karlheinz Schwarz](#) at 9:09 AM 0 comments 

Labels: [Bahmann](#), [communication](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [MMS](#), [Smart Grid](#), [wind power](#)

Monday, August 16, 2010

Preview IEC 61400-25-6 FDIS

Please find the preview of the FDIS IEC 61500-25-6: Wind turbines – Part 25-6: Communications for monitoring and control of wind power plants –

Logical node classes and data classes for condition monitoring

This part defines further information models for IEC 61850 respectively for IEC 61400-25.

Click [HERE](#) for the preview.

Posted by [Karlheinz Schwarz](#) at 8:28 PM 0 comments 

Labels: [condition monitoring](#), [IEC 61400-25](#), [IEC 61400-25-6](#), [IEC 61850](#), [wind power](#), [wind turbine controller](#)

IEC Goes Twitter

IEC uses the latest communication channel: Twitter !!

Click [HERE](#) for visiting IEC on Twitter.

Posted by [Karlheinz Schwarz](#) at 8:21 PM 0 comments 

Labels: [IEC](#), [Twitter](#)

New Smart Grid Information Clearinghouse Web Portal open

A beta version of the **Smart Grid Information Clearinghouse** (SGIC) web portal has been posted by The Virginia Tech Advanced Research Institute to invite comments and suggestions on usability from both consumers and the smart grid community. The full version of the site will be released this fall. The Virginia Tech Advanced Research Institute (ARI) was awarded a \$1.25 million five-year contract by the Department of Energy (DOE) in October 2009 to develop the portal with content assistance from the IEEE PES and the EnerNex Corporation.

There is hope to receive more input from the public ... "Anyone visiting the portal is invited to contact the SGIC with comments and

[IEC 61850 Tutorial at IEEE PES Conference, Gothenb...](#)

[European Roadmap - More Euros for Smart Grids](#)

[Chinese Strong and Smart Grid Roadmap available](#)

[Bachmann M1 Automation System supports IEC 61850 C...](#)

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[IEC 61850 Data Acquisition Options - An Overview](#)

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[IEC 61850 Workshop at Hydro Quebec, Montreal, Cana...](#)

[Smart Grid Interoperability Panel \(SGIP\) meets in ...](#)

[Security: Hackers to take control of Power System ...](#)

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[The "Beck-Bone" for Smart Grids Demonstrated at IE...](#)

► July (17)

► June (12)


suggestions by clicking on "Contact SGIC Team" in the Contact Us box located at the bottom middle of the home page."

Click [HERE](#) to visit the portal.

A very interesting paper provided by NEMA is posted on the portal - worth to read: Click [HERE](#) to open the paper.

The paper lists the **Factors of Intelligence** (see clause 4.2) The most crucial factor seems to be the following:

- **Communications** – the extent of interaction and exchange of data and control parameters between entities that can help in improving situational awareness, support for industry **standard communication protocol**.

Posted by [Karlheinz Schwarz](#) at 7:55 PM 0 comments 

Labels: [Automation](#), [communication](#), [IEC 61850](#), [peopleware](#), [Power Automation](#), [Smart Grid](#)


Friday, August 13, 2010

Integration of Process and Power Control using IEC 61850

Petrobras (Brazil) has decided to apply IEC 61850 for the integration of power system control into the process control system. ABB has been chosen to automate the production process and interface with the power delivery system using IEC 61850. IEC 61850 is a major standard to lower life-cycle cost of production facilities:

"One of the main benefits delivered to REPAR was optimal life-cycle management and **low life-cycle cost through the use of a future-proof system with IEC 61850 interoperability**. The reuse of engineering data and the use of a standard language for programming highlighted the power of IEC 61850 for REPAR projects and the associated costs savings through less need for training and reduced staff requirements."

Click [HERE](#) to access the interesting paper.

Posted by [Karlheinz Schwarz](#) at 1:15 AM 0 comments 

Labels: [800xA](#), [ABB](#), [IEC 61850](#), [interoperability](#), [Power Automation](#), [process control](#)

Saturday, August 7, 2010

IEC 61400-25-6 FDIS Ballot

The last step towards another International Standard for Information models (Logical Nodes; these LNs can be implemented using IEC 61850 compliant stacks) will start August 13, 2010:

IEC 61400-25-6 Ed.1

Wind Turbines - Part 25-6: Communications for monitoring and control of wind power plants - Logical node classes and data classes for condition monitoring (88/377/FDIS)

[The ballot is open](#) from August 13 to October 15, 2010.

This part of the IEC 61400-25 series specifies the information models related to condition monitoring for wind power plants and the

- ▶ [May](#) (7)
- ▶ [April](#) (8)
- ▶ [March](#) (9)
- ▶ [February](#) (10)
- ▶ [January](#) (12)
- ▶ [2009](#) (162)
- ▶ [2008](#) (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

information exchange of data values related to these models.

Condition monitoring is mainly based on the following kinds of information:

- **Time waveform records** (samples) of a specific time interval to be exchanged in real-time or by files for analysis (e.g. acceleration, position detection, speed, stress detection).
- **Status information and measurements** (synchronized with the waveform records) representing the Turbine Operation Conditions.
- **Results of Time waveform record analysis** of vibration data (scalar values, array values, statistical values, historical (statistical) values, counters and status information).
- **Results of analysis** for example oil debris.

Contact your national IEC TC 88 committee to receive a copy.
Click [HERE](#) to visit the TC 88 website with links to national committees.

Posted by [Karlheinz Schwarz](#) at [2:30 AM](#) [0 comments](#) 

Labels: [condition monitoring](#), [IEC 61400-25](#), [IEC 61400-25-6](#), [IEC 61850](#), [wind power](#), [wind turbine controller](#)

Friday, August 6, 2010

IEC 61850 Data Acquisition Options - An Overview

IEC 61850 provides several options to access the values of modeled information in sever devices. The following slide lists all options of IEC 61850-7-2 (ACSI - Abstract Communication Service Interface):

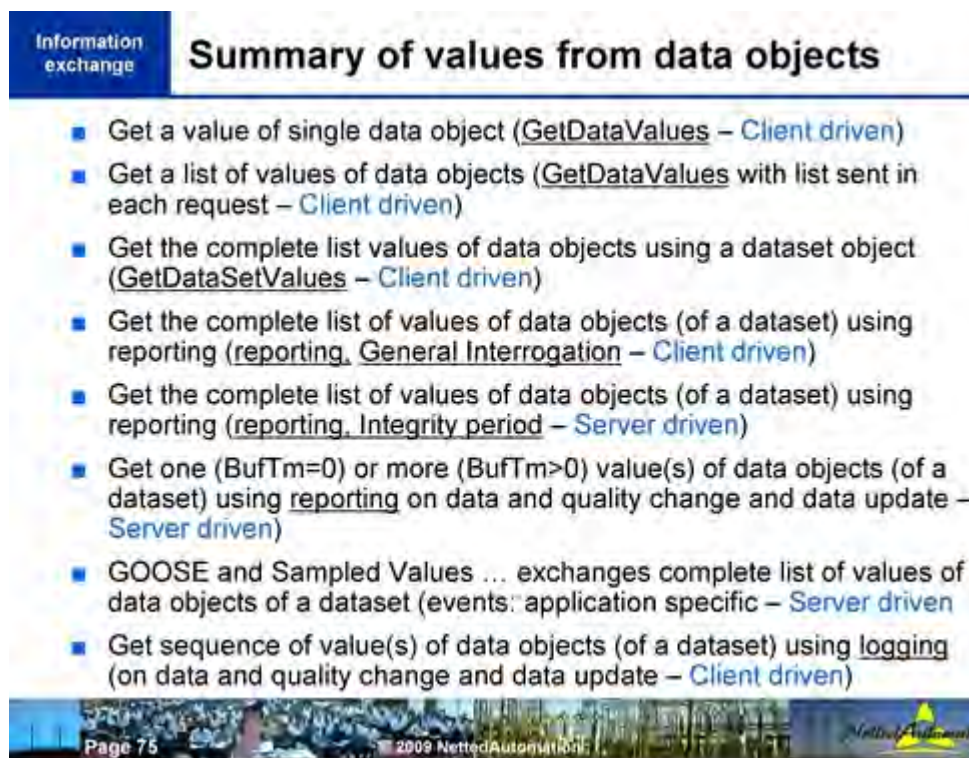
Information exchange

Summary of values from data objects

- Get a value of single data object ([GetDataValues](#) – [Client driven](#))
- Get a list of values of data objects ([GetDataValues](#) with list sent in each request – [Client driven](#))
- Get the complete list values of data objects using a dataset object ([GetDataSetValues](#) – [Client driven](#))
- Get the complete list of values of data objects (of a dataset) using reporting ([reporting](#), [General Interrogation](#) – [Client driven](#))
- Get the complete list of values of data objects (of a dataset) using reporting ([reporting](#), [Integrity period](#) – [Server driven](#))
- Get one ([BufTm=0](#)) or more ([BufTm>0](#)) value(s) of data objects (of a dataset) using [reporting](#) on data and quality change and data update – [Server driven](#))
- GOOSE and Sampled Values ... exchanges complete list of values of data objects of a dataset (events: application specific – [Server driven](#))
- Get sequence of value(s) of data objects (of a dataset) using [logging](#) (on data and quality change and data update – [Client driven](#))

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Depending on your needs you may use one or the the other option. Reporting is the most elaborated service. The behavior of reporting depends on the configuration of so-called Report Control Blocks. Reporting with Integrity Period set, e.g., to 1 second is more efficient than polling a list of data objects every second! Because polling needs two messages: request with then object references of all data to be polled and response with all values. Reporting with Integrity Period requires a single report with all values every second only. You **save 50**

per cent of the messages and a lot of processing resources. You can combine integrity period (e.g., 1 minute) with immediate transmissions of changes (events). This would save even more (in case there are events very seldom).

Before you can configure an optimized traffic (messages going back and forth in a Network in real-time or relaxed in seconds) you need to understand your needs - the arrival rate of values and the needs of the applications that access these values. And of course you need to understand the standard and what vendors have implemented. Some applications require information from other devices in the range of a few microseconds - this requires usually GOOSE. The various options serve different requirements with regard to the timeliness. It is easy to fill up the bandwidth of 10 GBit/s with wrong configurations. Monitoring for deadband changes (delta changes) of 0.001 per cent could cause a lot of messages ... ;-)

Smart Grids require smart systems and smart devices - all need smart people!

Posted by [Karlheinz Schwarz](#) at [10:27 PM](#) [0 comments](#) 

Labels: [communication](#), [engineering](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [IED](#), [peopleware](#), [Power Automation](#), [sampled value](#), [Smart Grid](#), [smart solution](#)

IEC 61850 and IEC 61400-25 Hands-On Training

A 3 day general IEC 61850/IEC61400-25 Seminar/Hands-on Training by Karlheinz Schwarz from NettedAutomation GmbH will be conducted in Frankfurt/M (Germany) from 22.-24. September 2010. He has trained more than 2,000 experts from more than 400 companies and more than 50 countries. You can tap a huge experience ...

For the hands-on training we will use the Beck IPC IEC61850@CHIP Development Kits, Client and Server DLL and several other demo software and free software.

There are still seats available.

Click [HERE](#) for the detailed program.

Click [HERE](#) for the registration information.

Posted by [Karlheinz Schwarz](#) at [3:29 AM](#) [0 comments](#) 

Labels: [distribution automation](#), [DLL](#), [electric power system](#), [engineering](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [interoperability](#), [MMS](#), [Power Automation](#), [Substation Automation](#), [Training](#), [wind power](#)

IEC 61850 Workshop at Hydro Quebec, Montreal, Canada

The IEC TC 57 WG 17 (DER) will meet in Montreal, Canada, on September 27-29, 2010. Experts from WG 17 invite interested experts from the power utility domain for a one day workshop on IEC 61850.

Date and Time: September 30, 2010, (Thursday); 8:30 -15:00 h

Venue: Hydro Quebec, Montreal, Canada

A couple of WG 17 members have suggested to organize an extra day for information dissemination of the results reached by WG 17 and the ongoing work. Another objective is to discuss common modeling issues with experts from other domains like hydro, wind, PV, ... one issue for

discussion is the remote monitoring and [control of power generation \(example of IEC 61400-25-2\)](#).

On Thursday (September 30) there will be an open presentation of crucial aspects of the standard IEC 61850 and especially of IEC 61850-7-420 and a demonstration of the latest development of the "IEC61850@CHIP" and first experiences with the small platform especially for PV systems.

The chip provides the complete IEC 61850 (IEC 61400-25) MMS, GOOSE and Sampled Value communication stacks. The stacks and the device data models are configurable by a standard SCL File (IEC 61850-6) uploaded to the chip. The stack provides a simple API for IEC 61850. Applications can be developed in C/C++ and IEC 61131-3. The focus shifts from communication (especially MMS) programming to your applications and system and device configuration. The chip supports SSL and other security standards.

The development of affordable standards-conformant interfaces for distributed energy resources can now be shortened to days or weeks - from months and years. The range of all crucial Beck IPC products (IPC@CHIP@s, modules, Development kits, ...SCL Designer, Application programming using the simple stack API) will be presented and discussed during the workshop. This extra workshop will be conducted by Karlheinz Schwarz.

The workshop is open to everyone interested in the presentation and demonstration free of charge. Breakfast and lunch breaks are on the attendees; drinks will be provided.

You may attend and invite other experts that may be interested to attend.

Please let Karlheinz Schwarz (schwarz@scc-online.de) know who will attend in order that we can confirm a seat. The number of seats is limited to 20 seats.

Posted by [Karlheinz Schwarz](#) at [2:53 AM](#) [0 comments](#) 

Labels: [communication](#), [DER](#), [education](#), [electric power system](#), [hands-on Training](#), [hydro power](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-420](#), [implementation](#), [interoperability](#), [interoperability tests](#), [Smart Grid](#), [wind power](#)

Smart Grid Interoperability Panel (SGIP) meets in September 2010

The next face-to-face meeting of the Smart Grid Interoperability Panel (SGIP) will be held in St. Louis (MO) on September 14-16, 2010.

Click [HERE](#) for the program and venue.

IEC 61850 and IEC 61400-25 will be an issue in PAP 16 (Wind Power) and several other PAPs. A joint meeting of PAPs that deal with these standards is planned. There are several areas in which the various application domains need consistent information models for real-time information exchange. E.g., for the interface between power generation and control center. There is a first standard available: IEC 61400-25-2 that defines two logical nodes - one for active power control and one for reactive power control.

These could be used as a basis for further work in other domains. I guess there is a need for a common core model that may have special data for the various resources like wind, hydro, CHP, PV, ...

[Karlheinz Schwarz](#) (Editor of IEC 61850 and IEC 61400-25) will be in St.

Louis on September 15 and 16.

The IEC TC 57 WG 17 (DER) will meet in Montreal, Canada, on September 27-29, 2010. Experts from WG 19 invite interested experts for a one day workshop on IEC 61850.

Click [HERE](#) for details on the Workshop.

Posted by [Karlheinz Schwarz](#) at [2:36 AM](#) [0 comments](#) 

Labels: [DER](#), [distribution automation](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [Power Automation](#), [Smart Grid](#), [Training](#), [wind power](#)

Security: Hackers to take control of Power System Automation?

Security is one of most crucial aspects in Power System Automation - in order to keep to power flowing. Hackers have started to take over control of critical infrastructures like power plants using Windows operating systems.

According to AP "The latest computer worm, dubbed Stuxnet, was an even more alarming progression. Now hackers are creating codes to actually take over the critical systems."

Click [HERE](#) to read more details.

It is highly recommended that intelligent devices that will be used to make the Power Systems smarter use the needed security measures. One of the key issues is that people deciding on how much money should be spend to ruggedize the systems are willing to develop the measures; and people that purchase devices only when they are secure.

Posted by [Karlheinz Schwarz](#) at [1:59 AM](#) [0 comments](#) 

Labels: [Automation](#), [Critical Infrastructure Protection](#), [Power Plants](#), [security](#)

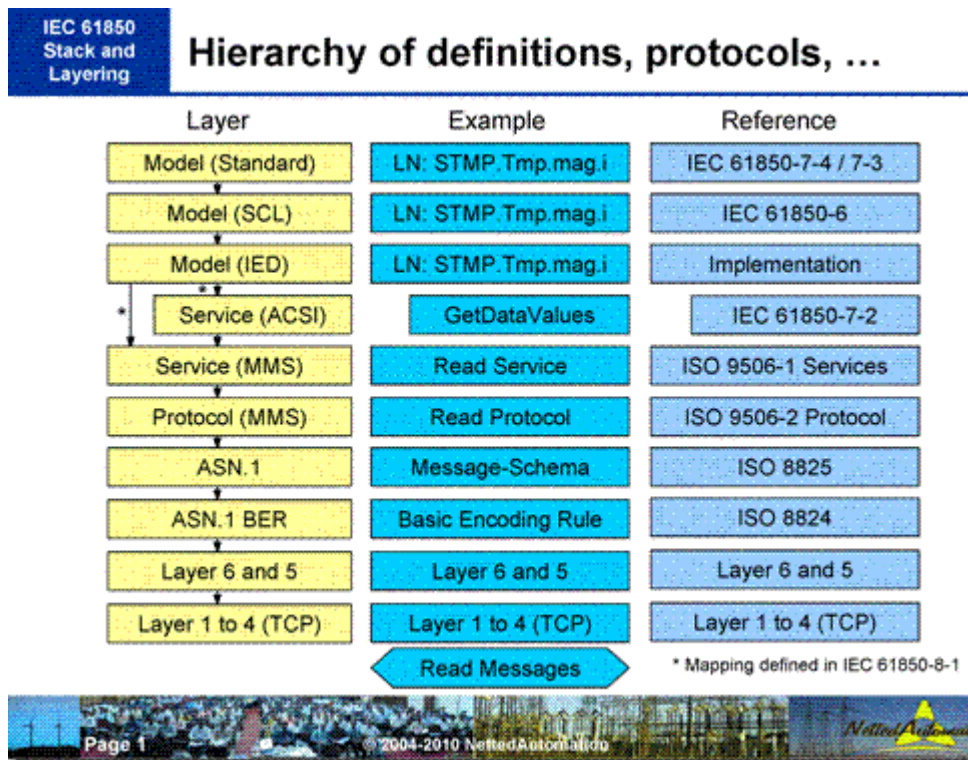
Monday, August 2, 2010

The many Abstract and Concrete Layers in IEC 61850 (61400-25)

A new Comprehensive Overview of the many different layers in the definition of IEC 61850 has been provided by Karlheinz Schwarz. The various levels of models, the services, the mappings to MMS services and protocols, mapping of MMS messages to ASN.1, ASN.1. BER, ... are confusing - if you don't understand them. This presentation provides a lot of details and examples. 15 Slides bring light to the - often not understood - IEC 61850 layering:

1. Abbreviations
2. Hierarchy of definitions, protocols, ...
3. Model (Standard)
4. Model (SCL)
5. Model (IED)
6. Services (ACSI)
7. Model and Service Mapping
8. Services and Protocols (MMS)
9. ASN.1 BER (Basic Encoding Rule)
10. Encoded MMS Message

Slide #1 of 15:



Click [HERE](#) to browse all 15 slides.

All these details are hidden in the implementation of IEC 61850 (IEC 61400-25) provided by [SystemCorp](#) (Perth, WA, Australia) and by the Smart Grid "Beck-Bone". The IEC 61850 API just needs 8 services:

IEC61850_Create	API to create a client or server object with callbacks for reading, writing and updating data
IEC61850_LoadSCLFile	API to read the SCL XML file to get the configuration of server or client
IEC61850_Start	API to start the server or client
IEC61850_Stop	API to stop the server or client
IEC61850_Free	API to delete a client or server object created
IEC61850_Read	Read the value of a specified data attribute
IEC61850_Write	Write the value to a specified data attribute
IEC61850_Update	Update the value of a specified data attribute

The three last API services are the crucial services an Application programmer has to deal with. The Beck Development Kit DK61 and the DLL demos provide application examples (in C/C++ source code).

Posted by [Karlheinz Schwarz](#) at 1:04 PM 1 comments 

Labels: [ACSI](#), [ASN.1](#), [BER](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [interoperability](#), [ISO](#), [programming](#), [real-time](#), [Training](#), [wind power](#)

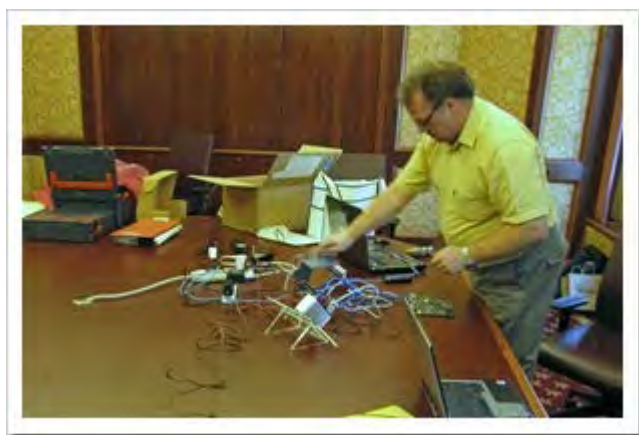
The "Beck-Bone" for Smart Grids Demonstrated at IEEE PES GM in Minneapolis

BECK IPC (Pohlheim, Germany), SystemCorp (Perth, Australia) and NettedAutomation (Karlsruhe, Germany) successfully demonstrated the "Beck-Bone" for Smart Grids at the IEEE PES GA in Minneapolis (MN, USA):

The IEC61850@CHIP.



More than 2,500 experts attended the IEEE Power & Energy Societies General Meeting in Minneapolis (MN, USA) from 26 to 29 July 2010. One of the highlights of the Power System Communications Committee's Event was the demonstration of a breakthrough implementation of IEC 61850 (IEC 61400-25) on a Chip. Detlef Raddatz (SystemCorp) runs a last test prior to the big show:



Detlef demonstrates the benefits of the IEC 61850 software running on different HW platforms (all using the same Chip): Development Kit DK61 (middle of photo), ruggedized I/O modules (left), COM.TOM module (right):



The Development Kit DK61 comes with IEC 61850 (61400-25) stack software, an easy to use API with 13 functions only, with C/C++ and IEC 61131-3 programming languages, FTP, Telnet, TCP/IP, IPSec, sample C code and sample exe files that run immediately, and comprehensive documentation.

Click [HERE](#) for more details of the DK61.

Click [HERE](#) to download the order form to get the special fair offer of US\$ 1.250.

The stack software and sample code (source and exe) have been introduced in Minneapolis as **DLL demos** (client, server, publisher, and subscriber). The DLLs run for 6 months fully functional for up to 50 signals/points. The demo also contains the fully functional **SCL designer** to model up to 50 signals/points. The server runs the same model as provided with the DK61. You may use the DLLs for any other application you build around them. The given sample code runs on one PC (local host) and two PCs. The DLLs run under **Windows** - while the Beck Chip runs a very powerful real-time operation system (RTOS) **for real-time applications**.

Click [HERE](#) to download the DLLs to run under Windows (available end of August 2010; the availability will be announced in a new blog posting as soon as it is available).

During the many technical discussions experts had questions about the platform and functions. People had been quite surprised when they understood the performance of such a simple and small platform.



The Buffet offered a variety of food and beverages ... including Beck's Beer and Beck "Chips". The German brewery Beck and Beck IPC (the chip manufacturer) are not linked.



Professor Dr. John Newbury (The Open University, Manchester, GB) was quite happy to see the results of 15 years of standardization work in IEC TC 57 (WG 10, WG17, WG 18) and TC 88 PT 25 (IEC 61400-25, Wind Power) on such a small but powerful platform:



What are the steps towards a the "Beck-Bone" for Smart Grids and many other applications?

1. Many experts start with the **Development Kit DK61** to do hands-on exercises using the provided software examples to get a good understanding of the IEC 61850 models and services. One of the big vendors of controllers reported the other day that they were able to implement their network interconnection for connecting PV systems to the power grid within 2 weeks !! The grid connection is completely modeled in IEC 61850. This is the easiest way to get your data communicated with IEC 61850 (IEC 61400-25). Another approach could be to start with DLLs on a PC and then use the DK61 for real-time requirements.
2. In case of implementing interfaces, e.g., for pilot projects, it is convenient to use one of the many ready to go **COM.TOM modules**:



3. After successful pilot projects it is recommended to use **one or the other Chip** in your specific hardware:



4. Other components hardened for higher EMC requirements are offered by SystemCorp: RTUs, Gateways, Protocol converter, ...



All these and other components implement IEC 61850 on the Beck Chip. The IEC 61850 stack software (developed by SystemCorp) runs on many other platforms:

Supported Platforms

Microsoft Windows XP, 2003/2008 and Vista

■ Ubuntu Linux (x86,x86-64)

■ Embedded Linux (ARM, Coldfire)

■ Beck @Chip SC1x3 RTOS

■ Other platforms available on request

Click [HERE](#) to visit the SystemCorp website (Perth, WA, Australia).

Posted by [Karlheinz Schwarz](#) at [12:06 AM](#) [0 comments](#)

Labels: [API](#), [Beck](#), [communication](#), [DLL](#), [example](#), [IEC 61400-25](#), [IEC 61850](#), [Power Automation](#), [RTU](#), [SCL](#), [stack](#)

Tuesday, July 27, 2010

DOE spends US\$ 615 Million for the Smart Grid Demonstration Program

The first presentation of the Session on "**Interoperability for a Smart Grid**" during the IEEE PES GA in Minneapolis yesterday (2010-07-26) was titled: "**Interoperability and the Federal Role**" (by Dan Ton; Chris Irwin and Steve Widergren).

Chris Irwin (a member of the Department of Energy team administering the Smart Grid Investment Grants, and is responsible for standards and interoperability activities, including participation in the NIST-led Smart Grid Interoperability Framework) pointed out that **INTEROPERABILITY** of devices and systems is key for building a smarter grid: "... given the importance of a smart electric system to meet national economic, societal, and environmental objectives, a **federal role is taking shape in the United States to improve the integration of automation elements** and thus make smart grid a reality."

He reported that the federal government will spend "**US\$ 615 million for the Smart Grid**

Demonstration Programs. ... To ensure that these investments have a lasting, positive effect to the nation, great attention is being given to address the **interoperability**".

The standards IEC 61850 and IEC 61400-25 are crucial standards in this context - also in North America. I talked yesterday to many conference attendees. Most of them are convinced that these standards will have a big impact on the devices and systems - in order to make them interoperable. Interoperability has first to be understood by smart people. Peopleware is key to the success of interoperability and smart(er) grids.

Click [HERE](#) to read the abstract of the paper.

Posted by [Karlheinz Schwarz](#) at [6:06 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [interoperability](#), [peopleware](#), [Smart Grid](#), [standards](#)

Beck Chip with IEC 61850 in EV Charging Station

An electric vehicle charging station, designed by Rittal GmbH & Co (Herborn, Germany) and Beck IPC GmbH (Pohlheim, Germany) **with IEC 61850 inside**, is installed outside of the IBM Industry Solutions Lab in Ruschlikon, Switzerland.

This charging station is part of the EDISON project.

Click [HERE](#) for photo of the charging station at IBM.

Click [HERE](#) for more information on EDISON.

Posted by [Karlheinz Schwarz](#) at [5:09 AM](#) [0 comments](#) 

Labels: [batteries](#), [Beck](#), [charging station](#), [Chip](#), [IBM](#), [IEC 61850](#), [Smart Grid](#)

Sunday, July 25, 2010

3 Days until the Demo of Beck Chips implementing IEC 61850/61400-25 at IEEE PES GA in Minneapolis

In just 3 days Beck (Pohlheim, Germany - IEC 61850 Chip), SystemCorp (Perth, Australia - IEC 61850 software) and NettedAutomation (Karlsruhe, Germany - peopleware) will present the **Beck Chip for IEC 61850 and provide free Beck's Beer**.

The presentation and demonstration of a break-through implementation of the standards 61850 and IEC 61400-25 on a small footprint programmable microcontroller chip for simple to complex applications will show that these standards can be used right away ... the API can be used immediately by your C/C++ or IEC 61131-3 programs. Application examples come with the Development Kit (DK61). And the solutions are affordable!

SystemCorp will demonstrate a **free of charge Evaluation DLL providing fully functional** Client/Subscriber and Server/Publisher. The DLL supports 50 points that can be modeled with the ICD Designer. **The demo DLL licence runs for 6 months - long enough to test IEC 61850 and IEC 61400-25**. You will get a USB memory stick with the DLL.

Where and when:

Wednesday, July 28, 2010 18:00-21:00
Minneapolis Convention Center, Room 209B

Come in and learn the latest IEC 61850 and IEC 61400-25 technologies. You have also the chance to drop your business card and **win one of the two DK61**.

Karlheinz Schwarz (NettedAutomation) **will be available for a meeting with you during the PES GA**. Please contact me by posting a comment on this blog entry (at the end of this posting) and I will contact you. May be you will bump into me anyway on Monday, Tuesday or Wednesday.

A photo of me may help you to find me:

Click [HERE](#) for my profile including a photo of myself

Click [HERE](#) for more details.

Click [HERE](#) for the Floor plan of Level 2 of the MCC.

Posted by [Karlheinz Schwarz](#) at [5:26 AM](#) [0 comments](#) 

Labels: [Beck](#), [Chip](#), [communication](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [MMS](#), [Smart Grid](#), [smart solution](#), [wind power](#)

Wednesday, July 21, 2010

How to Spend \$45 Billion for Smart Grids by 2015?

Estimated spending for Smart(er) Grids during the next five (5) years will be more than \$45 Billion (45.000.000.000) - according to a forecast.

Some 40.000.000.000 "will be invested globally in the electrical Transmission and Distribution infrastructure through 2015, compared to \$4.8 billion for the purchase and installation of smart meters. This infrastructure spending will focus on grid automation and control, distribution automation, distributed generation and demand response programs."

If only five (5) per cent would go into smart(er) communication based on IEC 61850 then this would sum up to \$ 2.000.000.000 (\$2 Billion) !!
... \$ 400.000.000 per year.

Any question? ;-)

Hope there are enough smart engineers ...

Click [HERE](#) to read the news release from ABI.

Posted by [Karlheinz Schwarz](#) at [7:53 AM](#) [0 comments](#) 

Labels: [communication](#), [distribution](#), [distribution automation](#), [IEC 61850](#), [Smart Grid](#), [smart metering](#), [smart solution](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Monday, July 19, 2010

Crucial Impact on Power System Automation

While the power industry is **struggling with the retiring workforce** as well as **educating and recruiting power system engineers** (see IEEE Power & Energy Magazine issue 7/8 2010) there are two other crucial influences on power systems on my radar screen:

- Manufacturers of (non-utility) Industrial Automation Systems
- Manufacturers of (non-utility) IP Network Infrastructures

Whoever wants to make his living from building a future Smart(er) Grids has to keep in mind that such smart(er) networks are power systems - that still need being designed, build, operated, and maintained by **smart power system engineers**.

The 11th VDI Congress on Automation Technology in Baden-Baden (Germany) May 2010 had a very interesting motto "**Leading through Automation**". Manufacturers of products and systems for industrial Automation applications are proud of their success in automation of factories (car production, machines of any kind, chemical processes, ...). There was not that much to automate in the power (distribution and distributed generation) systems - so far. That seems to change all in a sudden: The discussions and activities in the domain of power systems to implement smart(er) grids has infected the industrial automation experts.

During the last 20 years there was very little automation in the power industry influenced by factory automation vendors and their solutions. This will change in a fast pace: One of the leading experts (Roland Bent, CEO of Phoenix Contact) stated during the VDI Congress that the market for automation systems in the utility domain (electric power, water, ..., clean and green technologies) will be three times bigger in 2030 than today's factory automation.

There is the second crucial influence on the future of utility systems: The industry that offers the IP Network infrastructure for smart(er) grids. Read how, e.g., CISCO sees the future: "The smart grid promises a more efficient way of supplying and consuming energy. In essence, **the smart grid is a data communications network ...**".

CISCO states also that IEC 61850 plays a major role in the future: "The **existing** supervisory control and data acquisition (SCADA) and remote terminal unit (RTU) systems located inside the substation **cannot scale and evolve to support next generation intelligence**. Since flexible **IEC 61850-compliant** intelligent electronic devices (IEDs) and utility-grade rugged IP routers and Ethernet switches have become more widely available, many utilities are now ready to transform their communications networks from serial to IP-based communications." With a single standard they can sell their standard-compliant products all over! They do not need to develop and maintain tenth of solutions. This benefit of a single protocol stack (IEC 61850) is also what IBM and other IT companies like.

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[Does IEC 61850 provide Security Measures? - Yes](#)

[IEC61850@Chip - Presentation of the break-through ...](#)

[IEC 61850 at IEEE PES Conference on](#)

Click [HERE](#) for the white paper from CISCO on their vision to build smart(er) grids.

So, the utility industry will soon see a lot of new solutions offered by companies experienced mainly in non-utility markets. I hope that the **management in the utility domains** understand that the future of the utility systems must be controlled by smart power system engineers!! And not mainly influenced by the focus on share holder value, general automation and network infrastructure.

The future of the automation in the smart(er) grids requires TEAMWORK of many disciplines - **led by smart power engineers**. One of the crucial tasks is to get more education on topics like Network Infrastructure and IEC 61850 for power engineers. Since IEC 61850 is much more than any of the field busses or DNP3 it requires comprehensive education by well experienced trainers.

The power engineers have to take care that the utility automation systems will not be flooded by a myriad of field busses from the industrial automation domain (see [discussion on IEC Fieldbus](#)). Getting cheap automation devices with one of the many different fieldbusses does not automatically mean to get low life-cycle cost!

[Smart People are the most crucial asset for Smart Power Systems](#)

Posted by [Karlheinz Schwarz](#) at 11:13 PM 0 comments 

Labels: [Automation](#), [communication](#), [Critical Infrastructure Protection](#), [distribution](#), [distribution automation](#), [education](#), [IEC 61850](#), [Information Model](#), [peopleware](#), [SCADA](#), [Smart Grid](#)

Wednesday, July 14, 2010

Does IEC 61850 provide Security Measures? - Yes

Some people had a concern that IEC 61850 does not define security measures. This is only half-way correct.

The fact is that IEC 62351 defines the Security for IEC 61850! IEC 61850 references IEC 62351. So, don't worry. Even the Beck Chip for IEC 61850 provides standard security.

IEC 62351-3:

Data and communications security: Communication network and system security – Profiles including TCP/IP

IEC 62351-4:

Data and communications security: Profiles including MMS

Part 3 specifies how to secure TCP/IP-based protocols through constraints

on the specification of the messages, procedures, and algorithms of Transport Layer Security (TLS) (defined in RFC 2246) so that they are applicable to the telecontrol environment of IEC TC 57. It is intended that this specification be referenced as a normative part of other IEC TC 57 standards that have the need for providing security for their TCP/IP-based protocol.

Click [HERE](#) for a preview of part 3.

Part 4 specifies procedures, protocol extensions, and algorithms to facilitate securing ISO 9506 – Manufacturing Message Specification (MMS) based applications. It is intended that this technical specification be referenced

[Innovative Sma...](#)

[Catalog of Control Systems Security: Recommendation...](#)

[IEC 61850-7-4 Edition 2: Insulation Medium Supervi...](#)

[IEC 61850 Information Models for Large Power Plant...](#)

[IEC 61850-7-2 Edition 2 approved](#)

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[IEC 61850 IEDScout - Version 2.11 Available](#)

[GE Promotes International Standards like IEC 61850...](#)

[Danish Power System with 50 per cent Wind Energy -...](#)

[IEEE 1815 DNP3 - Old Wine in New Wineskins](#)

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Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

as a normative part of other IEC TC 57 standards that have the need for using MMS in a secure manner.

This technical specification represents a set of mandatory and optional Security specifications to be implemented for applications when using ISO/IEC 9506 (Manufacturing Message Specification).

Click [HERE](#) for a preview of part 4.

Posted by [Karlheinz Schwarz](#) at 4:33 AM 0 comments 

Labels: [Beck](#), [Chip](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 62351](#), [MMS](#), [security](#)

IEC61850@Chip – Presentation of the break-through solution during IEEE PES GM in Minneapolis, MN, on the evening of July 28, 2010

Power System Communication Committee Event

Wednesday, July 28, 2010 18:00-21:00 MCC 209B

IEC 61850-on-a-Chip – Presentation and demonstration of a break-through implementation of the Standard 61850 on a small footprint programmable microcontroller chip for simple to complex applications by Beck IPC (Pohlheim, Germany)

Beck IPC (Pohlheim, Germany) invites to a Presentation and Demonstration of the low cost Beck Chip implementing IEC 61850 (IEC 61400-25):

Location: IEEE PES GM, Minneapolis Convention Center

Room: 209 B (Level Two)

Date and time: Wednesday, 28 July 2010, 6 p.m. – 9 p.m.

Food and drinks will be provided.

The IEC 61850 standard is the most successful standard for protection and substation automation communication for both HV and MV. The standard is intended to be used in centralized and distributed power generation as well as in distribution automation.

The high cost for the implementation of IEC 61850 is one of the crucial reasons the standard is currently being used in relatively few applications in DER systems and low voltage applications. Since the Hanover Fair 2010 (Hanover/Germany) in April 2010 this has been changed completely: A powerful and low price embedded and freely programmable Microcontroller implementing IEC 61850 has been demonstrated – the IPC@CHIP®.


The development of affordable standards-conformant interfaces for distributed energy resources can now be shortened from months or even years to days or weeks.

At this Wednesday evening event we will discuss the range of all crucial Beck IPC products (Chips, modules, Development kits, ...) and related products, e.g., IEC 61850, Modbus, IEC 60870-5, and DNP3 stack software from SystemCorp (Perth, Australia):.

Click [HERE](#) for more details.

Click [HERE](#) for the Floor plan of Level 2 of the MCC.

Please drop by to view the demonstration and discuss with the experts from Beck, SystemCorp and NettedAutomation - this event may accelerate your development of IEDs that speak IEC 61850 (IEC 61400-25).

Posted by [Karlheinz Schwarz](#) at 4:08 AM 0 comments 

Labels: [61850](#), [Beck](#), [Chip](#), [communication](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [Power Automation](#), [Smart Grid](#), [smart solution](#), [tools](#)

Saturday, July 10, 2010

IEC 61850 at IEEE PES Conference on Innovative Smart Grid Technologies Europe

Date and Location:

October 10-13, 2010 Chalmers Lindholmen, Gothenburg, Sweden

The first Conference on Innovative Smart Grid Technologies (ISGT) Europe, is sponsored by the IEEE Power & Energy Society (PES) and hosted by Chalmers University of Technology. The Conference will be a forum for the participants to discuss the state-of-the-art innovations in smart grid technologies. The Conference will feature paper sessions, panels and tutorials by international experts on smart grid. The organizing committees invite researchers, practitioners, decision makers and students, worldwide to participate and submit papers!


Tutorial 3 will be about IEC 61850.

Implementation of the standards IEC 61850 and IEC 61400-25 in **small devices** (14:15-15:15) by Karlheinz Schwarz ... See you there.

Click [HERE](#) for the program of the tutorial 3 on IEC 61850.

Click [HERE](#) for an overview on all three tutorials.

Click [HERE](#) to visit the conference home page

Posted by [Karlheinz Schwarz](#) at [12:56 AM](#) [0 comments](#) 

Labels: [communication](#), [distribution](#), [distribution automation](#), [education](#), [en](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [SCADA](#), [Smart Grid](#), [wind power](#)


Thursday, July 8, 2010

Catalog of Control Systems Security: Recommendations for Standards Developers

The US Homeland Security has published a comprehensive list of recommendations for System Security of Control Systems like SCADA systems the other day.

Hope your system is secure - and hope that you have people you can trust ...

Click [HERE](#) for the 171 page list [pdf].

Posted by [Karlheinz Schwarz](#) at [1:29 PM](#) [0 comments](#) 

Labels: [en](#), [SCADA](#), [security](#), [standards](#)

IEC 61850-7-4 Edition 2: Insulation Medium Supervision Liquid Logical Node (SIML)

The edition 2 of IEC 61850-7-4 has new Logical Nodes (LN) and existing LNs that have been cleaned up. One of these LNs is the LN SIML (Insulation Medium Supervision Liquid).

The new Data Objects (DO) defined in Edition 2 are marked in yellow. One DO (marked in red) has changed its name from "H2" to "H2ppm".

LN SIML - IEC 61850-7-4 Edition 2

Status information	
InsAlm	Insulation liquid critical (refill insulation medium)
InsBlk	Insulation liquid not safe (block device operation)
InsTr	Insulation liquid dangerous (trip for device isolation)
TempAlm	Insulation liquid temperature alarm
GasInsAlm	Gas in insulation liquid alarm (may be used for Buchholz)
GasInsTr	Gas in insulation liquid trip (may be used for Buchholz)
GasFlwTr	Insulation liquid flow trip because of gas (may be used for Buchholz)
InsLevMax	Insulation liquid level maximum
InsLevMin	Insulation liquid level minimum
H2Alm	H ₂ alarm
H2Wrm	H ₂ warning level
MstAlm	Moisture alarm
MstWrm	Moisture warning
Measured and measured	
Temp	Insulation liquid temperature
Lev	Insulation liquid level (usually in m)
Pres	Insulation liquid pressure
H2O	Relative saturation of moisture in insulating liquid (in %)
H2OPap	Relative saturation of moisture in insulating paper (in %)
H2OAir	Relative saturation of moisture in air in expansion volume
H2OTmp	Temperature of insulating liquid at point of H ₂ O measurement
H2ppm	Measurement of Hydrogen (H ₂) in ppm
N2ppm	Measurement of N ₂ in ppm
COppm	Measurement of CO in ppm
CO2ppm	Measurement of CO ₂ in ppm
CH4ppm	Measurement of CH ₄ in ppm
C2H2ppm	Measurement of C ₂ H ₂ in ppm
C2H4ppm	Measurement of C ₂ H ₄ in ppm
C2H6ppm	Measurement of C ₂ H ₆ in ppm
O2ppm	Measurement of O ₂ in ppm
OmibuGas	Measurement of total dissolved combustible gases (TDCG)
FltGas	Fault gas volume in Buchholz relay

LN SIML IEC 61

Measur
Temp
Lev
Pres
H2O
H2OTmp
H2
Status
InsAlm
InsBlk
InsTr
TempAlm
PresTr
PresAlm
GasInsA
GasInsT
GasFlwT
InsLevM
InsLevM
H2Alm
MstAlm

new in Ed
changed

Posted by [Karlheinz Schwarz](#) at 11:32 AM 0 comments

Labels: [Edition 2](#), [Edition1](#), [en](#), [IEC 61850](#), [Information Model](#), [monitoring](#)

Tuesday, July 6, 2010

IEC 61850 Information Models for Large Power Plants

Experts defining and using IEC 61850 for hydro power plants are working on the second edition IEC 61850-7-410 (Hydroelectric power plants – Communication for monitoring and control). This second edition will comprise quite comprehensive models for **large power plants** - the device models cover more or less the whole electrical side, while the mechanical side covers only hydro power plants.

It is intended **to use the existing definitions of the electrical side** (Power System Stabilizer functions, complete excitation systems, other controls, ...) for other Large (non-hydro) Power Plants. And further it is intended to convince experts of non-hydro Power Plants to start working on **extended/new models for mechanical components** of large plants.

Please post a comment (see below) on the above.

Posted by [Karlheinz Schwarz](#) at 5:58 AM 0 comments

Labels: [control](#), [Edition 2](#), [hydro power](#), [IEC 61850](#), [large power plants](#)

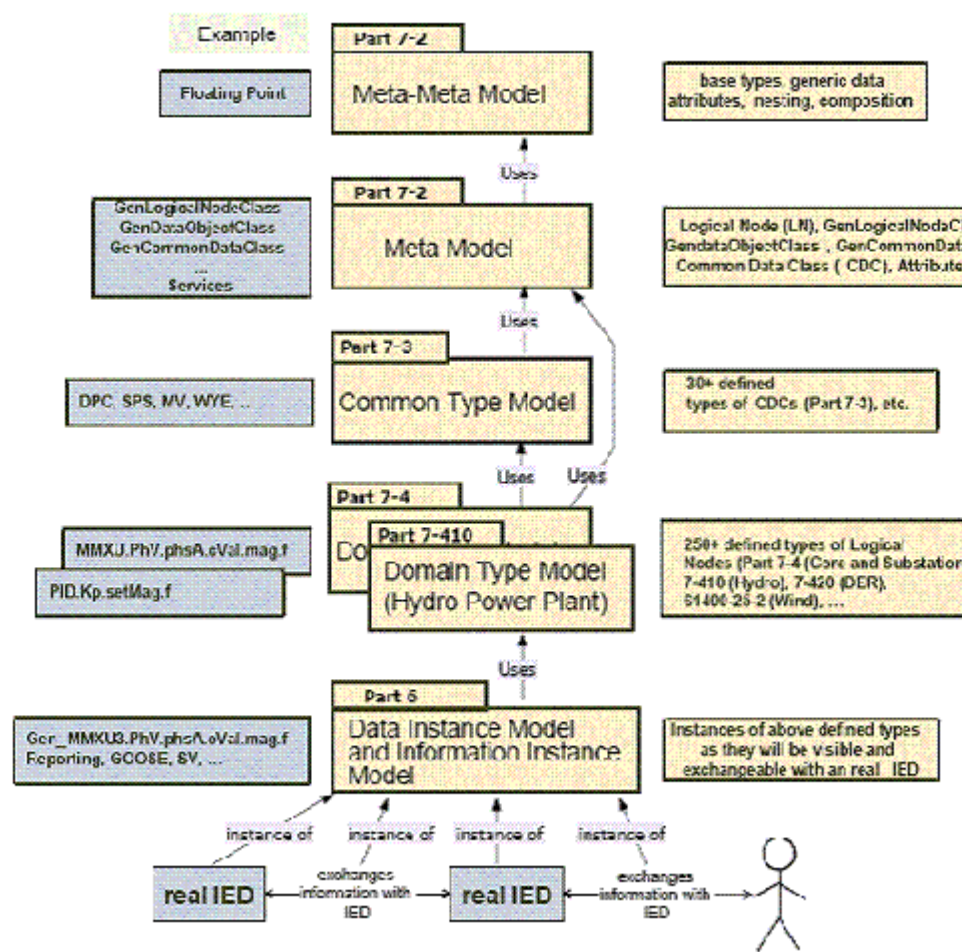
IEC 61850-7-2 Edition 2 approved

IEC 61850-7-2 Edition 2: "Communication networks and systems for power utility automation - Part 7-2: Basic information and communication structure - Abstract communication service interface (ACSI)" has been approved for publication as International Standard Edition 2 on July 02, 2010.

This edition 2 adds some minor new definitions, corrects errors of the first edition and aligns the content with other parts, e.g., 8-1. Here is a list of the most crucial issues:

- class diagrams have been updated (the modeling method is quite close to an UML model)
- data types not required have been removed, new types have been added,
- errors and typos have been corrected (see tissue database),
- substitution model has been moved to IEC 61850-7-3,
- service tracking for control blocks have been added; in edition 1 it was possible to treat control block instances in the same way as Data Objects. This has been changed - from a modeling point of view only. T
- the view concept (access restriction) will be implemented with the new work on role bases access (RBA) as part of IEC 62351-8,
- security issues are solved by the IEC 62351 series, and
- several terms have been harmonized with those defined in other parts

Part 7-2 contains the basic definitions of the models and the services:



Labels: [communication](#), [Edition 2](#), [IEC 61850](#), [interoperability](#), [UML](#)

Saturday, July 3, 2010

NIST Smart Grid Architecture and Interoperability Standards - What has been accomplished?

The "Committee on Science and Technology's Subcommittee on Technology and Innovation" of the U.S. House of Representatives held a hearing on the NIST Smart Grid activities with regard to Interoperability Standards.

Read what the Witnesses have said:

- Dr. George Arnold: National Coordinator for Smart Grid, National Institute of Standards and Technology
- Mr. Mason Emmett: Associate Director of the Office of Energy Policy and Innovation, Federal Energy Regulatory Commission
- Mr. John McDonald: Director of Technical Strategy and Policy Development, GE Energy
- Mr. Conrad Eustis: Director of Retail Technology Development, Portland General Electric
- Ms. Lillie Coney: Associate Director, Electronic Privacy Information Center

A remarkable statement was made by Dr. George Arnold: "The basic structure of the **present grid has changed little over its hundred-year history**. The U.S. grid, which is **operated by over 3100 electric utilities** using **equipment and systems from hundreds of suppliers**, has **historically not had much emphasis on standardization and thus incorporates many proprietary interfaces and technologies that result in the equivalents of stand-alone silos**.

Transforming this infrastructure into an interoperable system capable of supporting the nation's vision of extensive distributed and renewable resources, energy efficiency, improved reliability and electric transportation may well be described by future generations as the **first great engineering achievement of the 21st century**."

One of THE KEY prerequisites for a smooth transformation is Peopleware - Only **smart and well educated people** can transform the system! Education usually has a low priority in the utility industry. Usually IT people in the utilities do not much care about monitoring, protection and control of the electric grid - may be they fear the high voltage ;-)

I have trained more than 2,000 people on IEC 61850 all over. Just a very few IT people have attended. IT people usually lack understanding of the electrical network. Many protection and control engineers have a good knowledge of information and communication technologies. Even Smarter Grids will be electrical networks.

In January 2010 I conducted a 3-day training on IEC 61850 for 30 experts in Reykjavik (Iceland). Iceland's population is some 300,000. Germany has a population of some 80,000,000. If I would train the same percentage of people in Germany I would need a soccer stadium for 8,000 attendees (for the U.S. I would need some 30,000 seats). That would not be a problem: Just do it ... like in Bangalore (India) for 350 attendees in 2006:

Click [HERE](#) for a brief report on the Bangalore event.

One show-stopper of the success of Interoperability Standards like IEC 61850 is the behavior of some employees from well known vendors making statements like: "Dear user, you do not need to understand IEC

61850 ... we do everything for you ... ". Another is the time and effort people have to invest to implement and use interoperable systems based on IEC 61850. With IEC 61850 running on a Chip and an affordable Development Kit experts can right start to use IEC 61850 and link their application to the IEC 61850 models, services and configuration language. Since the Kit is available (March 2010) I use several Kits for Hands-on Training.

Click [HERE](#) to get details on the Development Kit, Beck IPC (Pohlheim/Germany).

Click [HERE](#) on some discussion on Peopleware.

Click [HERE](#) for the Hearing Charter, Opening Statements and all Witness Statements

Posted by [Karlheinz Schwarz](#) at [5:55 AM](#) [0 comments](#) 

Labels: [communication](#), [distribution automation](#), [education](#), [electric power system](#), [en](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [interoperability](#), [lite](#), [NIST](#), [NIST Roadmap](#), [Training](#)

Friday, July 2, 2010

IEC 61850 IEDScout - Version 2.11 Available

Omicron has posted a new version (2.11) of their IEC 61850 IEDScout.

The new version supports Windows 7 (64 bit and 32 bit); some modifications resolve minor issues.

Click [HERE](#) to go to the IEDScout web page.

Posted by [Karlheinz Schwarz](#) at [3:41 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#), [IEDScout](#), [SCL](#), [tools](#)

Thursday, July 1, 2010

GE Promotes International Standards like IEC 61850

John D. McDonald (P.E. Director, Technical Strategy and Policy Development Digital Energy GE Energy) - well known in the power industry - reported on the ongoing efforts under NIST SGIP to accelerate the definition and use of (international) Standards for information and communication to make the electric grid smarter.

According to John McDonald, the transformation of "our grid into a more automated, interactive and intuitive power delivery system has begun. Crucial to this undertaking are **system architecture and standards**, the foundation for **bringing together the electrical and communications infrastructure** and for evolving technology to meet many and disparate needs. **System architecture and standards that foster interoperability** provide a framework for development, a roadmap for progress and a catalyst for continued industry investment." He is right in stating that "The Smart Grid will be a system of interoperable systems."

He gives an overview of the work of the 16 PAPs and talks about the lack of use of international standards, mainly due to the lack in **awareness of the standards** like IEC 61850.


Mr. McDonald states also: "In the USA, **the transition from DNP 3.0 to IEC 61850 for substation automation and communications** is an excellent example of the challenge we have before us. IEC 61850 calls

for sending protection messages over Ethernet local area networks (vs. dedicated copper wires) and accessing measurements via a central process bus (vs. wired to the individual relays). These relatively small technology changes, but large process **and cultural changes**, have resulted in continued performance **with substantial savings for those deploying this new technology worldwide**. But there is enough concern and resistance to these changes here in the USA that IEC 61850 is not yet widely accepted or deployed."

Some 3 years ago I did a half day seminar on IEC 61850 for a North American utility. Half a year later I asked the engineer that had invited me: "How is IEC 61850 doing in your utility?" He answered: "**Hmm, we are still two retirements away**". This year he responded to the same question: "We are just one retirement away." What's about the young engineers? Let them learn what they need. Vattenfall (the biggest Scandinavian utility) recommends to utilities and vendors (and of course the system integrators) to do **much more education and training on IEC 61850!!**

Click [HERE](#) for the statement from Vattenfall.

Click [HERE](#) for the complete testimony of John McDonald (GE).

Posted by [Karlheinz Schwarz](#) at [11:49 PM](#) [0 comments](#) 

Labels: [communication](#), [DER](#), [DNP3](#), [education](#), [electric power system](#), [General Electric](#), [IEC 61850](#), [interoperability](#), [peopleware](#), [Power Automation](#), [Smart Grid](#), [standards](#), [Vattenfall](#)

Danish Power System with 50 per cent Wind Energy - with the help of IEC 61400-25

The Danish TSO Energinet is challenged by several questions like:

- How should the Danish power system be designed to **securely handle** 50 % wind power generation?
- What **technical solutions** can offer necessary system services in such a system? And how can the electricity market be designed to support the power system?
- Can Denmark expect neighboring countries to provide the present or even an increased contribution to our growing need for resources to balance supply and demand?
- And what can we do to mitigate the dependency on neighbors resources and interconnections?

The EcoGrid.dk project was initiated to find the best solutions to meet these requirements. One key issue is the information and communication technologies. Since Denmark is one of the key countries involved in the definition of the IEC Standard IEC 61400-25 (Communications for monitoring and control of wind power plants) it is no surprise that the report on phase 1 states:

The international "**communication standard for wind power is IEC61400-25**: the standard will provide a critical measure to manage the rapidly growing wind power penetration – **such a standard can really make a difference**. Through communication standards the current state of the individual wind plant can be controlled and monitored when required, and counter measurements can be enforced if needed, in order to meet the changing demand for energy and to provide support to the overall power system operation."

Click [HERE](#) for the complete Report on phase 1.

Click [HERE](#) for more information on EcoGrid.dk.

Posted by [Karlheinz Schwarz](#) at [1:25 PM](#) [0 comments](#) 

Labels: [en](#), [IEC 61400-25](#), [IEC 61850](#), [wind power](#)

IEEE 1815 DNP3 - Old Wine in New Wineskins

IEEE announced on June 28, 2010, that a "Collaboratively **developed** Distributed Network Protocol standard set to benefit worldwide Smart Grid, process automation industries". What is meant is the old standard DNP3 with a new brand label: **IEEE 1815**.

IEEE has ratified the IEEE 1815 Distributed Network Protocol (DNP3) standard. The **new standard**, which improves device interoperability and strengthens security protocols, was fast-tracked for completion and was **delivered in only seven months**; i.e. **re-labeled**. The development of DNP3 was done many years ago.

Click [HERE](#) for the full press release from IEEE.

Click [HERE](#) for the PAR that lead to the IEEE 1815.

Posted by [Karlheinz Schwarz](#) at [4:23 AM](#) [0 comments](#) 

Labels: [DNP3](#), [en](#), [IEC61850](#), [IEEE 1815](#), [standards](#)

Monday, June 28, 2010

Standard Rules for Extensions of Information Models for IEC 61850 and IEC 61400-25

IEC 61850 und IEC 61400-25 define already (or just) some hundreds of Information Models (LNs, Data Objects, and Common Data Classes).

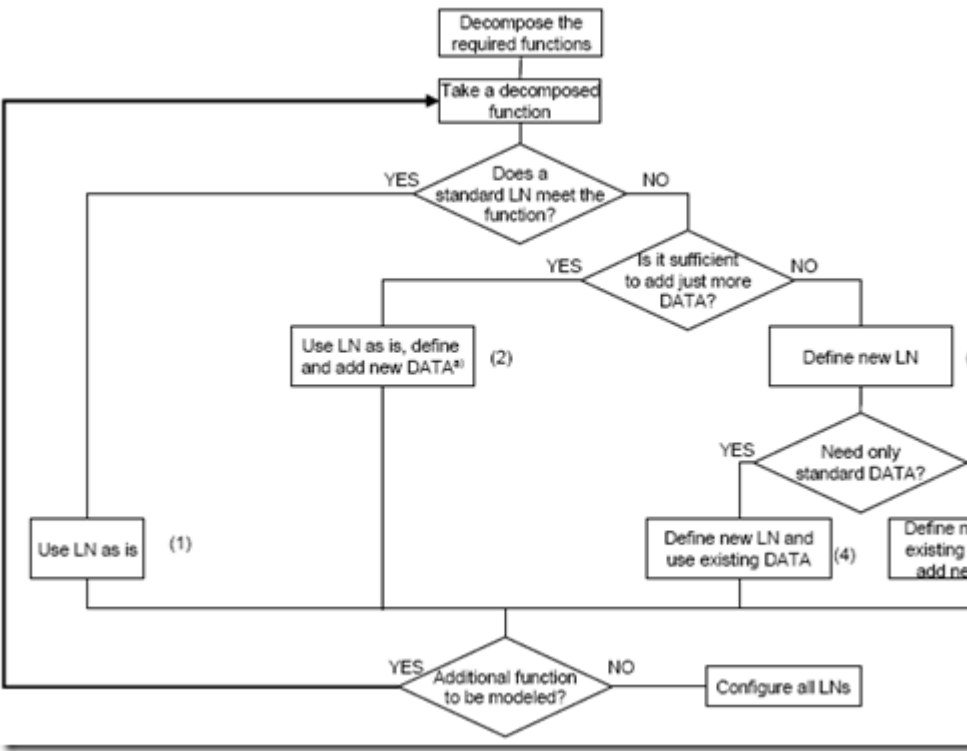
Click [HERE](#) for a list of some 285 defined Logical Nodes.

The list will definitely grow while we go. Standards are defined based on consensus of experts and national committees involved. Very often the groups cannot agree on adding some useful information model - so it is often decided to NOT include the model into the standard. In other cases it is decided to just define the model as an optional definition.

A lot of information needed in real systems is not (yet) defined as part of the standards - and may never be standardized.

To allow the users of the standard to use the modeling method, the basic models like types and Common Data Classes, and Data Objects, IEC 61850-7-1 **defines a STANDARD Rule on how to cope with needed extensions**. The rule is named "**Name Space Concept**".

The name space concept follows the needs of new models as depicted in the following figure from draft edition 2 of IEC 61850 (edition 1 already defined the name space concept):



The rules defined allows:

- 1. To extend any existing standardized LN by **adding Data Objects from other LN classes** or by defining **new Data Objects**.
- 2. To extend any existing standardized Data Object by **adding Data Attributes** or by defining **new Common Data Classes**.

The following excerpt of Logical Node Name Plate Common Data Class (LPL) shows the corresponding attribute "InNs" (Logical Node Name Space). This is used to "tag" an extended Information Model. In this case an extended LN. Extended could mean a new LN or a LN that comprises new Data Objects.

LPL class					
Attribute name	Attribute type	FC	TrgOp	Value/value range	
DataSource	Inherited from Data Class (see IEC 61850-7-2)				
DataAttribute					
configuration, description and extension					
...	
IdNs	VISIBLE STRING255	EX		shall be included in LLNO only; for example "IEC 61850-7-4:2003"	A
InNs	VISIBLE STRING255	EX			A

Any Common Data Class has the following attributes:

Applied by all common data classes					
Attribute name	Attribute type	FC	TrgOp	Value/value range	
DataSource	Inherited from Data Class (see IEC 61850-7-2)				
DataAttribute					
...	
configuration, description and extension					
cdcNs	VISIBLE STRING255	EX			AC
dataNs	VISIBLE STRING255	EX			A

The "dataNs" is intended to identify (or reference) the extended Data Object.

The complete rules can be found in edition 1 of IEC 61850-7-1 - these

rules will be refined in edition 2 which will be published as International Standard later in 2010.

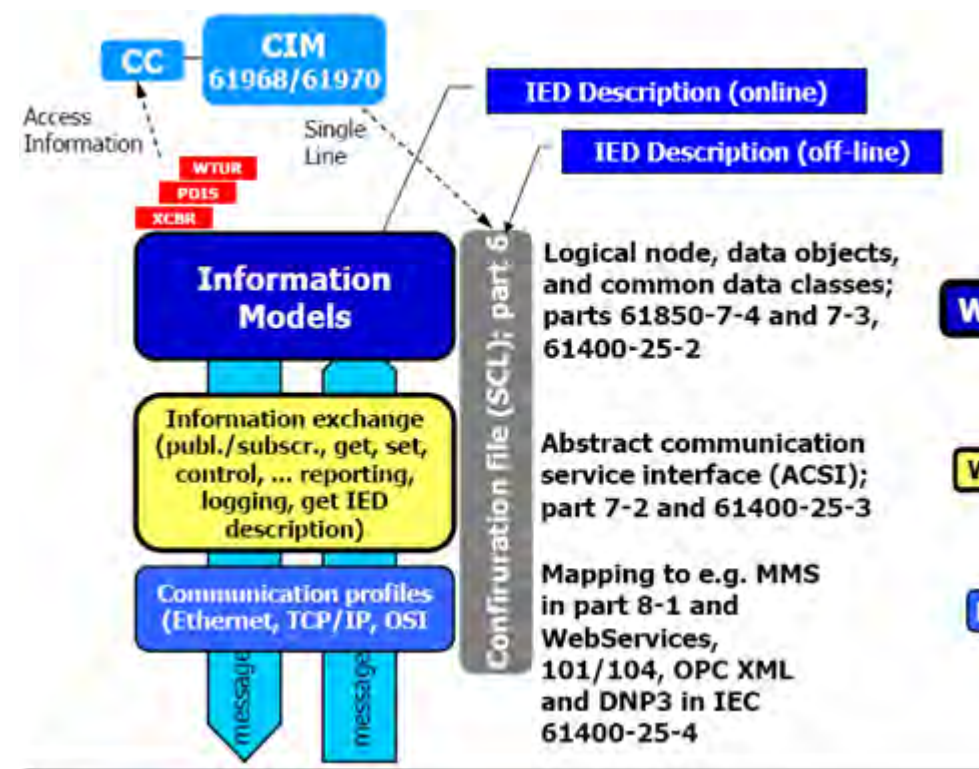
The current rules (edition 1) allow to define any extension needed for the Wind Power application in the US.

There is no need to wait until any future edition of IEC 61400-25-2 or any other standard models are published before people can use these standards in the US (and global wind power market). If models need to be extended this can be done on a **user** or **vendor** basis, on a **market** base (NIST, FERC, NERC, ...), **regional** base (North America), or a **global** (**UCA International Usersgroup**, or **IEC standard**) base.

It is very likely that the Information Models will grow while the industry goes.

If somebody would wait until **ALL** his currently needed information (in existing applications) is modeled as LNs, Data Objects and Common Data Classes and is standardized, then he would **NEVER START to use the standard**.

The crucial benefit of the IEC 61850 based standards is the independence of the models from the communication services, and the independence of the services from the communication protocols:



The Name Space Concept is a very **SMART solution** to make the grids smarter - **in a few steps**.

See also the next two blog postings.

Posted by [Karlheinz Schwarz](#) at [11:25 AM](#) [0 comments](#)

Labels: [communication](#), [IEC 61400-25](#), [IEC 61850](#), [Information Model](#), [interoperability](#), [logical node](#), [model extensions](#), [smart solution](#), [wind power](#)


Sunday, June 27, 2010

How to extend Models of IEC 61850 and IEC 61400-25?

Very often you can hear that IEC 61850 and IEC 61400-25 could be applied for new use cases only if new Logical Nodes would be standardized - which may take several years. Waiting years for new models is not what many companies and groups are looking for. Why to wait for years?

IEC 61850 has implemented a rule on how to extend and define new models: Name Space concept. This concept allows for defining extensions and new models (Logical Nodes, Data Objects, Common Data Classes).

Click [HERE](#) for an example of an extended Model: an new Logical Node (links to the next blog posting).

Posted by [Karlheinz Schwarz](#) at [1:15 PM](#) [0 comments](#) 

Labels: [Extensions](#), [IEC 61400-25](#), [IEC 61850](#), [Information Model](#), [wind power](#), [wind turbine controller](#)

Saturday, June 26, 2010

Adoption and Update of Wind Power Plant Communications Standard 61400-25

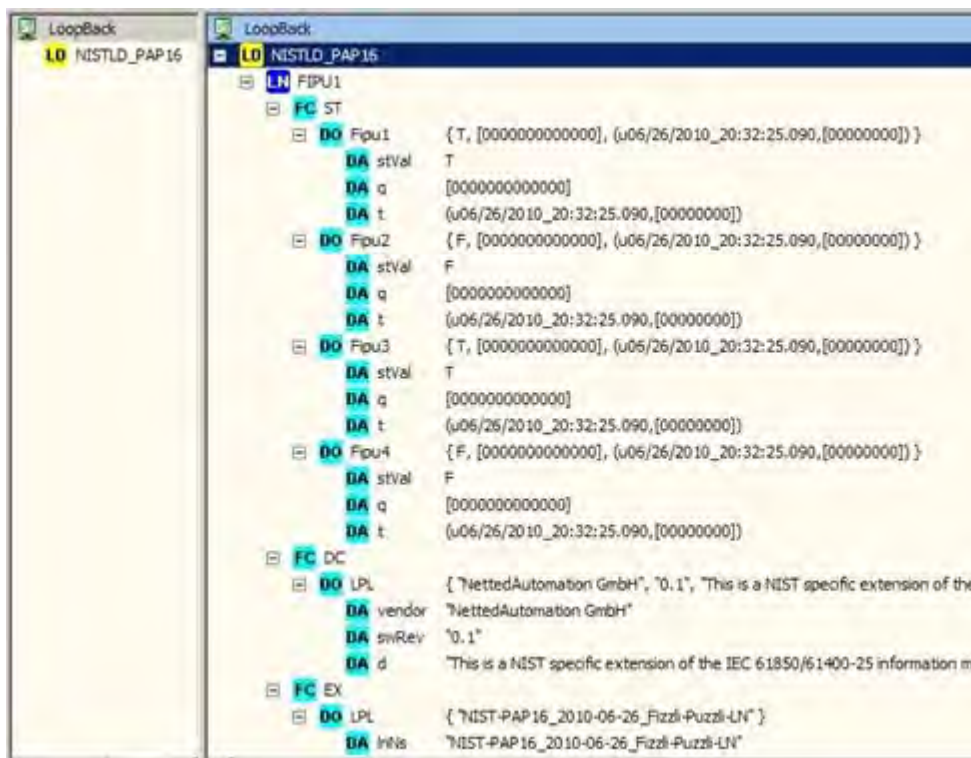
The NIST PAP 16 team (Wind Plant Communication) will gather use cases and requirements from wind industry stakeholders with a focus on those requirements associated with integrating bulk wind assets into wind plant operation and utility command and control systems. Special attention will be given to those use cases and requirements that differ from those developed by the IEC TC 88 61400-25 working group to quickly identify the gaps that are preventing ubiquitous application of the standard in the US. The PAP Team will seek out recent ARRA funding awardees involved in wind plant projects to ensure that their requirements are discovered and they are made aware of the existing portfolio of standards available.

The PAP 16 team will provide specific recommendations to the IEC TC 88 working group responsible for maintaining the 61400-25 standard to address the gaps identified.

Click [HERE](#) for the PAP Proposal [WORD document].

The standard IEC 61400-25-2 (Wind) mainly extends the information models of IEC 61850-7-4, 7-410 (DER) and 7-420 (Hydro). All objects of all four standards build a huge set of standard information models. ALL models can be used on generic IEC 61850-8-1 compliant communication stacks. Even new models not yet standardized but defined by anybody (!) can be configured and run on compliant communication stacks - the extended models just have to follow the well defined name space concept.

So, if you need a Logical Node, e.g., **LN FIZL = Fizzli Puzzli**, for your **Puzzli application**: just define the Data Objects you need: Fipu1, Fipu2, ... of common data class **SPS** (single point status) ... and you are done. Define the corresponding SCL file and run it with a communication stack. You need to know what the LN and its Data Objects mean - and you have to bind it to your Puzzli application. Here is how a client sees the corresponding server:



The value of the name space of the LN nameplate **FIPU1.EX.LPL.lnNs** is "**NIST-PAP16_2010-06-26_Fizzli-Puzzli-LN**" - indicates that this is a standard conformant Extension (Functional Constraint **FC=EX**).

The LN instance in SCL notation is:

```
<LN lnType="FIPU_1" lnClass="FIPU" inst="1">
  <DOI name="LPL">
    <DAI name="lnNs">
      <Val>NIST-PAP16_2010-06-26_Fizzli-Puzzli-LN</Val>
    </DAI>
    <DAI name="vendor">
      <Val>NettedAutomation GmbH</Val>
    </DAI>
    <DAI name="swRev">
      <Val>0.1</Val>
    </DAI>
    <DAI name="d">
      <Val>This is a NIST specific extension of the IEC 61850/61400-25
information model.</Val>
    </DAI>
  </DOI>
</LN>
```

DataTemplate for new LN class:

```
<LNNodeType id="FIPU_1" lnClass="FIPU">
  <DO name="Fipu1" type="SPS_0" />
  <DO name="Fipu2" type="SPS_0" />
  <DO name="Fipu3" type="SPS_0" />
  <DO name="Fipu4" type="SPS_0" />
  <DO name="LPL" type="LPL_1" />
</LNNodeType>

<DOType id="LPL_1" cdc="LPL">
  <DA name="vendor" bType="VisString255" fc="DC" />
  <DA name="swRev" bType="VisString255" fc="DC" />
  <DA name="d" bType="VisString255" fc="DC" />
  <DA name="lnNs" bType="VisString255" fc="EX" />
</DOType>
```

So, NIST or any other organization can quickly identify the gaps in the information models and **define any model that is needed for the application of the standard in the US (!!)**. Most use cases known so far may be implemented by extending the models or defining new models - private models, models defined by any other organization, or by IEC or ANSI or ...

Posted by [Karlheinz Schwarz](#) at [1:55 PM](#) [0 comments](#) 

Labels: [61850](#), [communication](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-410](#), [IEC 61850-7-420](#), [logical node](#), [NIST](#), [Smart Grid](#), [wind power](#), [wind turbine controller](#)

Thursday, June 24, 2010

IEC 61850 in the IEC Smart Grid Standardization Roadmap

IEC has published the "IEC Smart Grid Standardization Roadmap" for public access. It is a "technically oriented reference book which represents the standardization requirements" for Smarter Grids.

The core standards identified in this framework are mainly:

- IEC/TR 62357 – Framework of power automation standards and description of the SOA (Service Oriented Architecture) concept
- **IEC 61850 – Substation automation and beyond**
- IEC 61970 – Energy Management System – CIM and GID definitions
- IEC 61968 – Distribution Management System – CIM and CIS definitions
- IEC 62351 – Security

IEC 61850 is referenced more than 150 times in the Roadmap.

Click [HERE](#) to download the full report.

Posted by [Karlheinz Schwarz](#) at [11:16 PM](#) [0 comments](#) 

Labels: [CIM](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-410](#), [IEC 61850-7-420](#), [IEC 61968](#), [IEC 61970](#), [Smart Grid](#)

Wednesday, June 16, 2010

Congratulation - Spanish Utilities put their Heads together

Five Spanish utilities have shared their experience and ideas in trying to reach a high level of Interoperability of IEC 61850 devices from different vendors. The result of the many discussions, tests and projects has been made available the other day (Report of 182 pages full of good information). The group has granted me permission to post the result on this blog. Thanks to the companies:

RED ELÉCTRICA DE ESPAÑA, IBERDROLA, ENDESA DISTRIBUCIÓN, GAS NATURAL FENOSA and HIDRO CANTÁBRICO

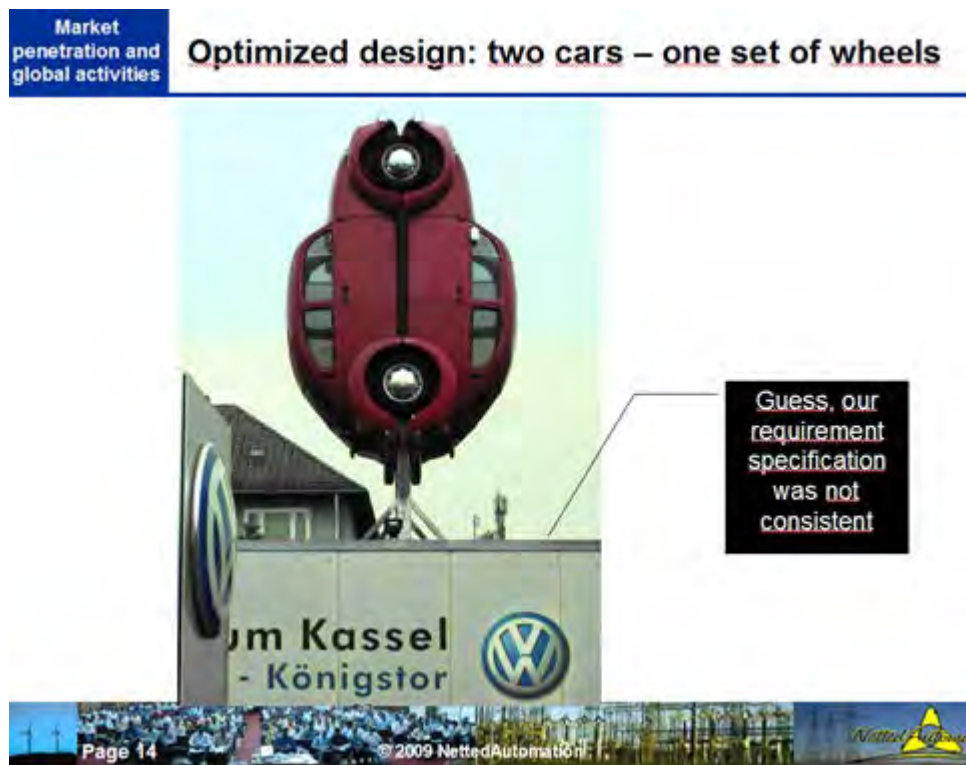
"The "E3 - Spanish Electricity Companies for Studies on IEC 61850" is a working group formed by representatives and specialists from the main Spanish electricity companies, who have agreed on the urgent necessity to come to a set of unified criteria about **minimal requirements to comply with by the devices to be installed in their substations** under the IEC 61850 standard.

This is a result of the common standpoint reached by all participants

after the experience gathered through several pilot projects.
The E3 group feeling is that the future success of IEC 61850 will be based not only on filling, under common criteria, the gaps that are still contained within the standard, but also on driving the manufacturer's developments according to the user's needs. ..."

For many years I have told the utility industry to get more involved in the use and maintenance of the standards. Many managers in the utility industry have learned that it is worth that their experts share their experience and prepare for the future (build their muscles!). One result of this advice is the report you can download via the link below (after the photo).

There are still many people out that write specifications for an optimized use of IEC 61850 ... sometimes the result is like the car in the following photo:



Hope your specification is more than "Everything as before and use IEC 61850 - one way or the other". The above shown "Design" is good for VW promotion, it attracts people - but the product is not usable.

Click [HERE](#) for the full E3 report [6.9 MB, PDF]

Some utility experts are still in this comfortable position:



How long will this last? Some hope: at least until they retire ;-)

Be aware: There is something to do for everyone. Build your muscles for the next generation of technology - with or without IEC 61850 ... it will come. Hope you get strong enough to deal with it.

Posted by [Karlheinz Schwarz](#) at 2:34 PM [0 comments](#) 

Labels: [communication](#), [electric power system](#), [IEC 61850](#), [interoperability](#), [Power Automation](#), [standards](#), [Substation Automation](#), [sustainable interoperability](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Tuesday, June 15, 2010

Analysis of Wind Power Plant Information Flow

A very interesting study of the many information flows in a wind power plant system has been done by a Swedish student:

Master Thesis

REFERENCE ARCHITECTURE FOR WIND POWER INTEGRATION

A wind power plant system structure based on analysis of wind power plant information flow

By Ivan Löfgren, Stockholm, Sweden 2009

The thesis provides an excellent overview and many useful details on the information flow in wind power plants! It is really worth to read - not only by wind power experts but also by experts of other application domains.

One of his findings are summarized in the following trend statement:

"The current trends in the architecture incorporate the following aspects:

- Standardization for both the **communication** (TCP/IP protocol), and also for the **information models** (IEC 61850, IEC 61400-25).
- Existence of a **unified information model** which allows a common language to be used between all the wind power plant components.
- **Access from any location to any element** of the wind power plant.
- Existence of an element dedicated solely to the management of communications

In definitive terms, the new architecture is designed to standardize not only the data access, but also the information from each one of the components that makes up the wind power plant. ..."

Click [HERE](#) for the full thesis [pdf].

Congratulation to Ivan Löfgren - he did a great job!!

Click [HERE](#) for all information on IEC 61400-25 on this blog.

Posted by [Karlheinz Schwarz](#) at 9:20 AM [2 comments](#) 

Labels: [communication](#), [condition monitoring](#), [control](#), [IEC 61400-25](#), [monitoring](#), [Smart Grid](#), [Vattenfall](#), [wind power](#), [wind turbine controller](#)

AUD 100 million Government Smart Grid project awarded

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[AUD 100 million Government Smart Grid project awar...](#)

EnergyAustralia has won the smart grid project. A CONSORTIUM led by EnergyAustralia has been named the other day the successful bidder in the federal government's **\$100 million smart grid, smart city project**.

Newcastle will be the main site for the country's first commercial-scale smart grid project. The trial will also cover other parts of NSW including Scone, Homebush, Ku-ring-gai and the Sydney CBD. The consortium includes IBM Australia, AGL, GE Energy, TransGrid, Newcastle City Council and the NSW government. Click [HERE](#) for a news release.

EnergyAustralia is already working on making the system smarter: see the following examples:

"Building a new communications platform - EnergyAustralia has rolled out 800 kilometres of new fibre optic cables, installed hundreds of communications switches and deployed carriergrade **Internet Protocol (IP) technology to connect more than 200 key substations and depots**.

This **telecommunications backbone is the foundation for a smart grid**. It will provide many benefits including greater **equipment monitoring and control**, allowing better decision-making and earlier fault detection and repair.

Installing smart monitoring devices to collect data - EnergyAustralia is rolling **out 12,000 monitoring devices throughout its electricity distribution network**. This data will allow EnergyAustralia to reduce outages through faster fault location and preventive maintenance and to work towards managing distributed energy sources such as solar and storage devices. The smart sensors will give EnergyAustralia an instant picture of the electricity network and how it is performing.

Rolling out smart sensors and analytical tools on the high voltage electricity network - This includes new smart equipment at zone substations and major transmission cables to allow better, more efficient management of power equipment and greater automation of the network." Click [HERE](#) for more details what they do.

EnergyAustralia and IEC 61850 - check the following documents:

NS 178 - Secondary System Requirements for Major Substations
Click [HERE](#) for the document

More to come ...

Posted by [Karlheinz Schwarz](#) at [8:59 AM](#) [0 comments](#) 

Labels: [communication](#), [EnergyAustralia](#), [GOOSE](#), [IEC 61850](#), [Smart Grid](#), [Substation](#), [Substation Automation](#)

Native Ethernet, IEC 61850 and Emerson Process Management

One of the real benefits of IEC 61850 is that it uses **native Ethernet** - not one of the many specialized "Ethernet Solutions". IEC 61850 compliant IEDs can easily communicate with any system that provides native Ethernet and TCP/IP connectivity. Ethernet for GOOSE and Sampled Values and Ethernet/TCP/IP for Client-Server communication (Get, Set, Control, Reporting events, browse the IEDs, logging events, ...).

Emerson Process Management announced on June 09, 2010, that its

[Native Ethernet, IEC 61850 and Emerson Process Man...](#)

[Siemens to erect 160 wind turbines in a single off...](#)

[UML model of IEC 61850](#)

[Do Wind Turbines change our Climate?](#)

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Contributors


[Karlheinz Schwarz](#)

[Michael Schwarz](#)

new Ovation™ Ethernet Link Controller I/O Module supports IEC 61850 connectivity.

"Applications protocol packages can be loaded onto the Ethernet Link Controller I/O Module, enabling Emerson to extend its PlantWeb™ digital architecture and Ovation system beyond traditional plant boundaries. One such protocol package is IEC (International Electrotechnical Commission) **61850, which has emerged as a global standard for Substation Automation (SA). Integrating data from electrical devices used in generators, switchgear, transmission lines, transformers and substations drives more-informed decision making throughout the organization.**"

Click [HERE](#) for the press release.

Posted by [Karlheinz Schwarz](#) at [8:19 AM](#) [0 comments](#) 

Labels: [Automation](#), [Emerson](#), [Ethernet](#), [IEC 61850](#), [Power Automation](#), [standards](#)

Saturday, June 5, 2010

Siemens to erect 160 wind turbines in a single off-shore park

Siemens reported the other day that they will supply and erect 160 wind turbines each with a capacity of 3.6 megawatts for the Gwynt y Môr project (North Wales coast). Siemens will also provide the connection of the wind turbines to the power grid including substations (offshore transformer platforms).

Click [HERE](#) to read the full press release.

The first German off-shore park ([Alpha-Ventus](#)) is in operation since Spring 2010. This is just the first step - huge projects are planned. More to come.

Click [HERE](#) for a (HUGE) list of planned wind power projects (these are challenges for engineers!).

Click [HERE](#) for general information on off-shore wind parks.

Posted by [Karlheinz Schwarz](#) at [10:00 PM](#) [0 comments](#) 

Labels: [off-shore](#), [RWE](#), [Siemens](#), [wind power](#), [wind turbine controller](#)

Thursday, June 3, 2010

UML model of IEC 61850

As you know, IEC 61850-7-x uses mainly a table notation for the many models. Using UML as an optional notation for the content of IEC 61850 and the harmonization of IEC 61850 and CIM has been discussed since the late nineties. ABB has recently provided a UML based model notation for IEC 61850.

The initial version of this model has been developed by ABB, Switzerland, Corporate Research for further discussion and maintenance in IEC TC 57 WG 10.

Click [HERE](#) to access the UML model.

Posted by [Karlheinz Schwarz](#) at [9:51 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [models](#), [UML](#)

Wednesday, June 2, 2010


Do Wind Turbines change our Climate?

Some 10 years ago when there was not so much to discuss in the electric power industry (the Smart grid was not yet invented) I attended a conference on Electric Power Systems. One of the crucial questions was: Do Wind Power Turbines change our Climate? These questions are still asked - all over and by many experts.

The other day I read in the IEEE Power & Energy Magazine some interesting answers on this question. In the May/June 2010 issue you can read on page 6 (share your thoughts) an answer from NREL: "... it should be kept in mind that our energy mix will never be comprised solely of wind energy, so at even at large but reasonable levels of wind penetration the **global impact would not be measurable**. These results should not be surprising because fundamentally wind turbines just increase the friction or drag at the bottom of the atmospheric boundary layer **much like trees** or any other obstruction to the flow. My conclusion is that levels of wind energy amounting to 20-50% of our electricity should not cause any measurable change in global climate."

There is another question: Can you proof that the leaves of a tree are moved by the wind? Or are they generating the wind? Wind turbines may be used to generate wind - once we have too much electric power ... ok, I am kidding.

Click [HERE](#) to read the full text in May/June 2010 issue.

Posted by [Karlheinz Schwarz](#) at [11:04 PM](#) [0 comments](#) 

Labels: [electric power system](#), [en](#), [wind power](#), [wind turbine controller](#)


Deutsche Industrie empfiehlt China einheitliche Standards für Smart Grid

Namhafte deutsche Verbände und Firmen haben während des ersten "Sino-EU Smart Grid Technology and Standardization Forums" Ende Mai 2010 in Peking die Bedeutung von Normen für Smart Grids diskutiert.

Der chinesische Energiemarkt ist für deutsche Firmen sehr wichtig -
"Allerdings nur, wenn wir uns **frühzeitig** mit China bezüglich der Architektur und Standardisierung von Smart Grid **abstimmen** können", betont Dipl.-Ing. Roland Bent, Geschäftsführer Marketing und Entwicklung bei PHOENIX CONTACT. Eine frühzeitige Berücksichtigung von Normungsaspekten im Forschungsprozess und bei der Umsetzung schafft Wettbewerbsvorteile für Deutschland. "Was wir brauchen sind **einheitliche internationale Standards, die den Informationsaustausch für Grid Automation, Industry Automation und Home Automation** beschreiben", fordert auch Dr.-Ing. Bernhard Thies, Sprecher der Geschäftsführung von VDE/DKE."

Diese Forderungen nach einheitlichen internationalen Standards können nur unterstrichen werden - einheitlich für China, für Europa und für Deutschland! Wenn es "**einheitliche**" internationale Standards gibt, dann gibt es auch mindestens einen "**un-einheitlichen**" internationalen Standard! Oder? In der Tat den gibt es tatsächlich: [IEC 61158](#). Mit IEC 61850 gibt es glücklicherweise **EINE wirklich einheitliche Norm** für Smart Grids, Industrie-Automation und Gebäudeautomation.

Click [HIER](#) für die Pressemitteilung des VDE.

Posted by [Karlheinz Schwarz](#) at [10:36 PM](#) [0 comments](#) 

Labels: [Automation](#), [de](#), [IEC 61158](#), [IEC 61850](#), [NIST](#), [Smart Grid](#), [standards](#)

Wednesday, May 26, 2010

The next wave of Ethernet Switches and Routers for Smart(er) Grids

Have you heard of SISCO in conjunction with IEC 61850? Which S/C-isco? I mean the "C"-Cisco. May be you did not expect Cisco getting involved in the Power market!

But "In electric substations there are so many sensors, meters and other control elements," said Inbar Lasser-Raab, a senior director of network systems at Cisco. "Tens of millions of elements will be connected to the network through these routers and switches," she said.

If each element provides some 100 signals, we will have to manage billions of signals! What is the right approach to manage these signals? Signal lists? Signal lists provided by field busses? **There is only one international standard that has the answer to that challenge: IEC 61850 - The standard for (process) information management! Or?**

Click [HERE](#) for more information.

Posted by [Karlheinz Schwarz](#) at [8:00 AM](#) [0 comments](#) 

Labels: [Cisco](#), [GOOSE](#), [IEC 61850](#), [IEC61850](#)

Tuesday, May 25, 2010

Seminar and Training Opportunities - Update

STRI (Ludvika/Sweden and NettedAutomnation (Karlsruhe/Germany) offer two comprehensive SAS Seminars and Training opportunities in **Paris/France** the week before the Cigré Conference (18-20 August 2010) and in **Stockholm/Sweden** (02-05 November 2010).

General seminars will be conducted by NettedAutomation in **Frankfurt/Germany** (22-24 September 2010) and in **Dallas/Texas** (19-20 October 2010)

Click [HERE](#) for the updated schedule.

Posted by [Karlheinz Schwarz](#) at [3:23 PM](#) [0 comments](#) 

Labels: [Automation](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [Power Automation](#), [seminar](#), [Smart Grid](#), [standards](#), [Substation Automation](#), [wind power](#)

Mitsubishi Electric will Invest 7 Billion JPY in Smart Grid Technology - New Approach

New approach in Japan with regard to Smart(er) Grids:

Don't discuss what could be done - just do it!

Mitsubishi Electric Corporation announced the other day that it will invest a total of 7 billion yen by March 2012 in a project to build facilities

within the company's production sites in Japan for experiments designed to establish advanced smart grid technologies. The project will contribute to the company's efforts to support the adoption of sustainable power supplies worldwide.

Mitsubishi Electric's smart grid business will be carried out as a company-wide project spanning the company's five business segments. In April 2010, Mitsubishi Electric established two project teams to promote development in smart grid technology. The Power Grid Project in the Transmission & Distribution Systems Center will be responsible for smart grid electric systems and equipment. **The Next Generation Energy Communication Project in the Communication Networks Center will be responsible for the smart grid communication network.**

Click [HERE](#) for the full press release.

Posted by [Karlheinz Schwarz](#) at [3:15 PM](#) [0 comments](#) 

Labels: [communication](#), [electric power system](#), [Japan](#), [Power Automation](#), [Substation](#), [Substation Automation](#)

Thursday, May 20, 2010

Copy machines and security

You may think: A copy machine has nothing to do with security - you may be right with the old machines manufactured some 10 years ago. But what's about the digital copiers?

What happens with the copy of your passport the hotel staff makes? It may be communicated all over ... thanks to the digital images taken and stored.

What has all this to do with IEC 61850? May be a lot: Think of someone that wants to check his SCL file against the standard. There was (may be still is) a syntax checker available on the Internet. You just need to upload your complete SCL file to the tool and let it check your file. Somebody may have taken a copy of that file ... and now knows a lot of access information of that substation or other plant.

Click [HERE](#) for a nice report on the issue - quite interesting, isn't it?

Posted by [Karlheinz Schwarz](#) at [10:20 PM](#) [0 comments](#) 

Labels: [communication](#), [IEC 61850](#), [SCL](#), [security](#)

Tuesday, May 18, 2010

Wireless Communication and IEC 61850 meet for Distribution Automation

It was just a question of time to see IEC 61850 running on Wireless communication systems. Here it is: Siemens and RuggedCom announced the other day that SIPROTEC will use WiMAX 802.16e to communicate IEC 61850 GOOSE messages for various (distributed!) functions in Distribution Automation Systems.

We have always said that one of the crucial benefits of IEC 61850 is that it can use advances in the domain of high speed communication solutions developed for the IEEE 802 suit.

It may take a few more years to see the distributed functions specified

by the standard IEC 61499 (Function Blocks). The benefits of distributed functions (versus centralized control systems) is that "the faulted segment is quickly isolated by the relay(s) and where possible, segments at the end of a feeder have service restored through the tie-point switch. The relays are **"self-aware" and operate based on real-time information they have about the network, so no master is required.**"

Click [HERE](#) for the press release.

Click [HERE](#) for some discussion on IEC 61499 and IEC 61850 based distribution automation.

Posted by [Karlheinz Schwarz](#) at [10:34 PM](#) [1 comments](#) 

Labels: [Automation](#), [distribution automation](#), [electric power system](#), [GOOSE](#), [IEC 61499](#), [IEC 61850](#)

Saturday, May 1, 2010

IEC 61850-7-2 Ed.2 published for final approval

IEC has published the IEC 61850-7-2 Edition 2 of "Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure – **Abstract communication service interface (ACSI)**" for final approval.

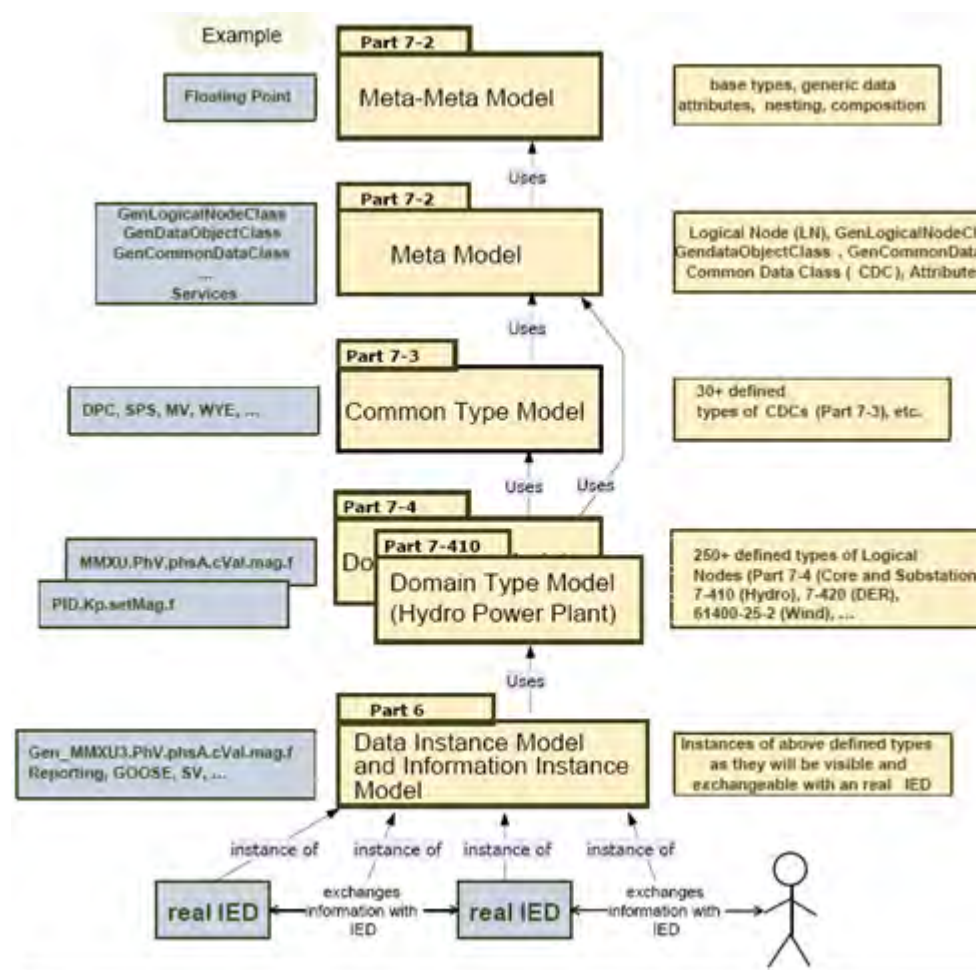
Ballot on the FDIS (IEC TC57 document 1065) **closes on July 02, 2010.**

The second edition improves as follows:

- class diagrams of edition have been updated,
- data types not required have been removed,
- errors and typos in the first edition haven been corrected,
- substitution model has been moved to IEC 61850-7-3,
- service tracking for control blocks have been added,
- the view concept (conceptually described in edition 1) will be implemented according to the new work on role bases access (RBA),
- security issues are solved by the IEC 62351 series, and
- several terms have been harmonized with those in the other parts.

For a copy of the FDIS contact your national IEC TC 57 committee.

The Model of IEC 61850-7-2 and its relation to other parts is shown in the following figure (modified slightly: added additional 7-x):



Posted by [Karlheinz Schwarz](#) at 9:19 PM 0 comments

Labels: [ACSI](#), [IEC 61850](#), [IEC 61850 edition 2](#), [standards](#)

Two-day special Course on Crucial Standards for Smart Grids in Dallas (TX), October 19-20, 2010

A two-day special seminar and training on key standards for Smart Grids (IEC 61850, IEC 61400-25 and DNP3) will be conducted by Karlheinz Schwarz during the


Remote 2010 Conference & Expo
October 19-20, 2010
Dallas, Texas

Useful information and interoperable information exchange are among the most crucial needs for Smart(er) Grids. The "NIST Smart Grid Interoperability Standards Roadmap" recommends several standards for the interoperable exchange of information at the process level. Crucial standards like IEC 61850 and DNP3 are marked as high priority solutions. These standards are used in various application domains in medium and high voltage power systems. While most transmission systems are well monitored and automated there is almost no monitoring and automation in distribution networks. One of the crucial application domains for IEC 61850 is power (gas, oil and water) distribution.

This course is designed for utility IT and engineering staff who are tasked with specifying, organizing, managing and verifying open standards-based projects

aimed at **sustainable interoperability**. The application of the standards is not restricted to power system automation - its use is underway in many automation application domains like factory or process control automation. The roots of the standard IEC 61850 are - among others - the factory [and process automation domains in the eighties](#).

Click [HERE](#) for more information on the event.

Posted by [Karlheinz Schwarz](#) at [12:46 AM](#) [0 comments](#) 

Labels: [61850](#), [communication](#), [electric power system](#), [engineering](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [NIST Roadmap](#), [Power Automation](#), [Training](#)

Thursday, April 29, 2010

German E-Energy Roadmap for Smart Grid published

The 70+ page Roadmap of the German E-Energy Projects and German Standardization organizations has been published the other day.

The Roadmap contains many recommendations on how to use existing standards and how to improve or extend those standards. According to the German Federal Minister of Economics and Technology "it is the task now to ascertain the extend to which these approaches can be implemented". He wishes the Roadmap many readers and users.

The Roadmap refers some 50 times to IEC 61850 - IEC 61850 is one of the very crucial standards for Smart Grids. IEC 61850 is likely THE standard that will be used in many domains outside the electrical world. The new edition of the information models (IEC 61850-7-4) contain many new Logical Nodes like STMP (Supervisory of temperatures) that can be used wherever a temperature is to be monitored for limit violation (alarm and trip): in a factory, building, power plant, ship, ...

IEC 61850 is a single standard for many application domains. More to come. Stay tuned.

Click [HERE](#) to download the German Smart Grid Roadmap in English [pdf, 2,9 MB]

Click [HERE](#) to download the German Version [pdf, 1.3 MB]

Posted by [Karlheinz Schwarz](#) at [2:09 AM](#) [0 comments](#) 

Labels: [communication](#), [E-Energy](#), [electric power system](#), [IEC 61499](#), [IEC 61850](#), [IEC 61850-7-410](#), [IEC 61850-7-420](#), [Power Automation](#), [standards](#)

Wednesday, April 28, 2010

IEC 61850 @ CHIP Development Kit (Starter Kit) available

The Beck IPC IEC 61850 @ CHIP Development Kit (Starter Kit) is now available for order: **Special price until 2010-05-21!**

This is one of the easiest and most cost effective ways to get started with IEC 61850!


The IPC@CHIP DK61 Development Kit is the complete development system for the IPC@CHIP SC123/SC143 Embedded Controller. It contains all the hardware and software components required for the fast development of customer applications.

The fair package also includes:

- DK60 Development Board including the SC143-IEC
- Paradigm C/C compiler on CD®
- CoDeSys CD (IEC 61131-3 PLC programming language)
- IEC 61850Li C
- 100 – 240V/24V plug-in power supply unit
- Programming and Ethernet cable
- SD card

ORDER FORM and other information:

- [Orderform Special-Price DK61-IEC61850](#)
- [IEC 61850 Protocol API User Manual](#)
- [PIS10 PICS](#)
- [Getting Started DK61 IEC61850](#)
- [General info on IPC@CHIP](#)

Posted by [Karlheinz Schwarz](#) at [6:07 PM](#) [0 comments](#) 

Labels: [education](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [starter kit](#)

Monday, April 19, 2010

First day at Hanover Fair was a big success for IEC 61850 @ Chip

The first day of the Hanover Fair (Hannover Messe 2010) - Monday April 19, 2010 - was a big success for IEC 61850 on the Beck IPC@Chip.

Many experts came by and stopped at the Beck booth E51 in hall 27 to see the IEC 61850 @ Chip in action. Even the German Chancellor, Mrs. Angela Merkel (in the center of the photo), came by and enjoyed seeing the many new products. The Beck booth has one of the crucial products of interest for Smart Grids: IEC 61850 @ Chip!




The booth has been "tagged" with an additional banner at the end of the first day ... as an eye catcher for people coming by on Tuesday and the other days:



We hope that You will stop for a demonstration and some discussion on the benefit of the standard @ Chip:



See you at booth E51 in hall 27 !! Once you are in hall 27 you will not miss the booth!

Posted by [Karlheinz Schwarz](#) at 1:29 PM 0 comments 

Labels: [E-Energy](#), [electric power system](#), [IEC 61850](#), [implementation](#), [Smart Grid](#)

Wednesday, April 14, 2010

Manitoba Hydro (Canada) Goes IEC 61850 for 100+ Substations

Cooper Power Systems announced on April 12, 2010, that it is working with Manitoba Hydro and its system integrator, Virelec, to develop fully IEC 61850 compliant substations. The project is intended to modernize, automate and integrate over 100 substations, following the IEC 61850 standard.


Click [HERE](#) for the Cooper press release.

Manitoba Hydro, a utility headquartered in Winnipeg, Manitoba (Canada), was looking to replace their current Substation Automation System (SAS) which is a discrete RTU and PLC-based control and metering architecture with an integrated IEC 61850-based architecture. This initiative follows a trend that is observed throughout the world, as the benefits of technologically advanced IEDs and IEC 61850 get more interest from utilities.

A comprehensive 4-day training in 2008 for some 25 of their best engineers helped the Manitoba Hydro "IEC 61850 Team" to write the system specification in a way so that the potential vendors and system integrators got a very detailed and comprehensive specification taking

IEC 61850 into account. The responsible engineers wanted to write a document that covers all crucial requirements with regard to the standard. This is contrary to many specifications today that spend one sentence: "Communication: according to IEC 61850."

Click [HERE](#) for the White paper from Manitoba Hydro and Cooper.

Posted by [Karlheinz Schwarz](#) at [2:56 AM](#) [0 comments](#) 

Labels: [electric power system](#), [IEC 61850](#), [Interlocking](#), [RTU](#), [Smart Grid](#), [standards](#), [Substation Automation](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Friday, April 9, 2010

IEC 61850 Goes University in Sydney - And You?

IEC 61850 is one of the crucial standards that needs to be understood by young aspiring automation and electrical engineers. ABB has opened a hands-on training lab including their substation automation system at the University of Sydney. This will allow young people to get first experience with the power of the standard.

The Beck IPC Development Kit (DK61) for IEC 61850 / IEC 61400-25 to be presented at the Hannover Messe 2010 (Hanover Fair) at booth E51 in hall 27 from 19-23 April 2010 is an excellent **opportunity to get started with IEC 61850** - in real projects, in pilot projects, in university labs, ... any kind of lab or just at your office desk. The DK61 is a 16 Bit programmable micro controller (C/C++, IEC 61131-3 CoDeSys) that has the IEC 61850 stack integrated on the IPC@CHIP.


To my knowledge: This Kit provides the **fastest and easiest way to get started with the use of IEC 61850 implementations** - and very likely the **most cost effective way!**

Come and visit Beck IPC at the Hannover Messe Hall 27 Booth E51 - See you there ([Plan of hall 27](#))

Click [HERE](#) if you want to get a free entry ticket for the fair.

Click [HERE](#) to for more information on the IPC@CHIP with IEC 61850 integrated.

Click [HERE](#) to contact BECK IPC for an Request for Quotation (RFQ) for the IEC 61850 Chip, Ready-to-Go modules, and Development Kit DK61.

Posted by [Karlheinz Schwarz](#) at [1:34 AM](#) [0 comments](#) 

Labels: [61850-7-420](#), [IEC 61131-3](#), [IEC 61850](#), [implementation](#), [MMS](#), [Power Automation](#), [Smart Grid](#), [wind power](#)

Thursday, April 1, 2010

What are the benefits of IEC 61850?

If you ask different people you get various answers. Guess most experts agree that crucial benefits are: use of TCP/IP, Ethernet, Client/Server, and Layer 2 Publisher/Subscriber (GOOSE and Sampled Values), get rid of copper wires. What else? Information Models, System Configuration Language (SCL), retrieving the self-description of Information Models from IEDs, and ...

Another crucial benefit of IEC 61850 and IEC 61400-25 (IEC 61850 extensions for Wind Power Plants - defined in IEC TC 88) is that it is a **GLOBALLY accepted STANDARD**. Hmm, a standard is a standard! - So, what is special here?

If you implement client/server, GOOSE, and SV it is defined **WHICH** protocol you have to choose for each of the three: MMS, TCP/IP, ... for

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client/server, "GOOSE" for GOOSE, and "SV" for SV ... You don't have to choose between 40 or 50 solutions! See the international field bus standard IEC 61158: click [HERE](#) for a list of the 50+ field-bus-standards in a single standard.

You should ask (from time to time) this question: **What would the situation in the domain of power utility protection, control and automation be WITHOUT IEC 61850?** We would have a lot of very different vendor specific solutions, regional standards, utility standards, ... and may be a situation like in the field-bus domain!

"A technical standard is an established norm or requirement. It is usually a formal document that establishes UNIFORM engineering or technical criteria, methods, processes and practices." (according to Wikipedia). This is what IEC 61850 provides: **UNIFORM** definitions to a high degree. The field-bus standard has **TOO MANY NON-UNIFORM** definitions.

It's a big benefit that we have **prevented really an intoxicating proliferation of protocols and other definitions**. We have even prevented two standards for utility communication: In 1998 IEC TC 57 and IEEE agreed to merge UCA 2.0 and IEC 61850 into ONE standard - a great decision! From a global viewpoint we have one situation where we have two standards: IEC 610870-5-101/104 and DNP3 ... this is definitely better than having 10 or more under one number ;-)

Posted by [Karlheinz Schwarz](#) at [8:49 PM](#) [0 comments](#) 

Labels: [Ethernet](#), [fieldbus](#), [GOOSE](#), [IEC 61850](#), [SMV](#), [standards](#)

Edition 2 of IEC 61850-7-4 has been published

The second edition of IEC 61850-7-4 has been published as international standard:

Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes

Click [HERE](#) to download the preview of part 7-4.

A list of all currently published Logical Nodes and Data Objects can be found [HERE](#).

Posted by [Karlheinz Schwarz](#) at [4:04 AM](#) [0 comments](#) 

Labels: [Edition 2](#), [IEC 61850](#), [IEC 61850-7-4 Ed2](#), [IEC 61850-7-410](#), [IEC 61850-7-420](#), [logical node](#), [models](#)

IEC 61850 on IPC@CHIP® at Hannover Messe, April 19-23, 2010

[Beck IPC](#) (Pohlheim, Germany), [SystemCorp](#) (Perth, Australia), and [NettedAutomation](#) (Karlsruhe, Germany) will present at the Hannover Messe 2010 (Hannover, Germany) in **Hall 27 Booth E51** on 19.-23. April 2010 the IEC 61850 integrated on the IPC@CHIP®, compact modules and ruggedized IEDs for harsh environments

[4 has been published](#)

[IEC 61850 on IPC@CHIP® at Hannover Messe, April 19...](#)

- ▶ [March](#) (9)
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Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

based on IPC@CHIP®.

The IEC 61850 conformant products shown in Hannover are applicable for many domains of utility automation - to make the power delivery system smarter:

- **Smart Automation of Power Generation**
Monitoring, protection and control of process and equipment (reactive power control, condition monitoring of turbines, ...)
- **Smart Automation of Power Transmission**
Monitoring, protection and control of process and equipment (interlocking, condition monitoring of transformer and switch gears, ...)
- **Smart Automation of Power Distribution**
Monitoring, protection and control of process and equipment (fault location, power restoration, condition monitoring of transformer, ...)
- **Smart Automation of Vehicle to Grid**
Monitoring and control of process and equipment (charger station, condition monitoring of charging station, ...)
- **Smart Automation of Loads and Generation**
Monitoring and control of process and equipment (load control, active and reactive power control, ...)

Due to the fact that IEC 61850 / IEC 61400-25 define many common aspects of standardized information and information exchange services it is obvious that standard conformant products can be applied in many domains outside the power industry: in gas and oil transmission and distribution networks, and in any other industrial automation domain.

Posted by [Karlheinz Schwarz](#) at [1:14 AM](#) [1 comments](#) 

Labels: [asset management](#), [communication](#), [condition monitoring](#), [distribution](#), [distribution automation](#), [electric power system](#), [electric vehicles](#), [IEC 61131-3](#), [IEC 61850](#), [integration](#), [interoperability](#), [monitoring](#), [Power Automation](#), [process control](#), [Smart Grid](#), [Substation](#), [wind turbine controller](#)

Tuesday, March 30, 2010

IEC 61850 Chip Revealed at DistribuTech 2010 in Tampa

The Beck IP@CHIP integrating IEC61850Li (IEC 61400-25) was revealed during the DistribuTech Exhibition in Tampa (Florida) from March 23-25, 2010.

The Tampa Convention Center hosted the 20th DistribuTech. The Conference and Exhibition was a big success - more exhibitors, more visitors, and more products, interest and discussions related to IEC 61850!



One of the crucial topics was the discussion of Smart Grids. The range of names for the same thing span a variation of terms: from Advanced Metering, Smart Metering, Smart Grid, to **Intelligent Smart Grid**. Experts that have a good understanding of the North American market told that this was the first time where almost all people talked about IEC 61850 - one way or the other.



In the light of the many requirements from Smarter Grids and Distribution Automation to define, use, exchange, store, and manage much more "signals" in future, the **IEC 61850 Chip** revealed at the UCA IUG Booth was really welcomed by many international experts: from Australia, Russia, Europe, North an South America.



The module shown above is a Gateway (Beck IPC - COM.TOM; with the Chip integrated) that could map CAN Bus signals into IEC 61850 models. The Module supports also a GSM/GPRS modem. The application could be programmed using C/C++ or IEC 61131-3 (PLC programming language - based on CoDeSys, the well known platform). Other modules with different I/O's are available. Support for IEC 60870-5-101/104 and DNP3 is under way.

The most crucial help for the application of IEC 61850/61400-25 is the Development Kit for IEC 61850: DK61. The Chip as well as the Development Kit are available for purchase. The prices for both components are amazingly low - you can afford to purchase the Development Kit without long discussions with your management and your accountants.

Get Smart Quick with the IEC61850Li (IEC 61850 Lite implementation). One interesting product with the IEC 61850 Lite implementation is the **IPC@Chip®** with IEC 61850 Client, Server, GOOSE publisher and subscriber **on the Chip** in addition to **IEC 61131-3** (PLC programming language, using the well known [CoDeSys platform](#)), **C/C++** programming, **FTP, TELNET, TCP/IP, web server, 2 Ethernet ports, GSM/GPRS, WiFi, CAN** bus, and many other possibilities.

The **Chip** and **Ready-To-Go Modules** (with the chip on board) are applied for IEDs, Gateways, RTUs, Data and Information Managers, Smart Grids, Distributed Energy Resources like PV, CHP, Wind, Hydro, Fuel Cells, ...

Click [HERE](#) to get general and background information.

Beck IPC (Germany) and SystemCorp (Perth, Australia) will present the Chip, compact modules, ruggedized IEDs for high voltage environments, and IEC 61850/61400-25 Stack Software at the Hannover Messe 2010 in Hannover (Germany) on 19-23 April 2010. Visit them in **Hall 27 Booth E51**.

I want to share a nice experience with you: Some 2 1/2 years ago I did a half day presentation on IEC 61850 to the experts and the management of a North American electric utility. At DistribuTech 2008 I asked the young engineer of that utility how IEC 61850 is doing in his company. He said: "Oh, we are still two retirements away from using the standard." During the Distributech 2010 I asked the young man again. This time he mentioned, that things are improving: They are now just one retirement away from using IEC 61850. This is an experience I have made quite often - utility management blocks new technologies, technologies that they may need to keep the lights on in the long run.

Posted by [Karlheinz Schwarz](#) at [1:08 AM](#) [0 comments](#) 

Labels: [61850](#), [communication](#), [condition monitoring](#), [DER](#), [distribution](#), [distribution automation](#), [E-Energy](#), [electric power system](#), [IEC 61850](#), [IEC61850Li](#), [implementation](#), [Power Automation](#), [Smart Grid](#), [wind power](#)

Monday, March 29, 2010

IEC 61400-25 AND IEC 61850 for Wind Turbines

The standard IEC 61400-25 (Wind turbines – IEC 61400-25: Communications for monitoring and control of wind power plants) must be seen in conjunction with IEC 61850. The wind turbine specific information models (Logical Nodes) can be used with IEC 61850 compliant tools and communication stacks. Services like GOOSE and Sampled Values Exchange are NOT referenced in IEC 61400-25 - because the SCADA experts that have defined the standard series some 10 years ago did not see any need to include these services in the list of services to be inherited from IEC 61850.

From a technical and implementation point of view there is no reason to not use these real-time services for wind power applications. **Any IEC 61850 compliant implementation of GOOSE and SV could be used to exchange any data object of IEC 61400-25-2 (Wind turbine LNs)**. The missing reference of GOOSE and SV in IEC 61400-25 has already been used to state that IEC 61400-25 would not support real-time services (**I guess this is an excuse in order to propose a non-IEC61850 solution for real-time applications, e.g., a fieldbus**). The statement is - from a document point of view - true, but the fact is, that GOOSE and SV as specified in IEC 61850 can be understood as an integral part of IEC 61400-25. That is the benefit of the fact that IEC 61400 builds on IEC 61850 - most of the IEC 61850 definitions,

implementations, and tools can be used also for wind power plants - without any change!

On the other side: The additional communication stacks (mappings) defined in IEC 61400-25-4 may be usually not implemented in substation IEDs. The stacks specified in this part of IEC 61400-25 comprise:

- SOAP-based web services,
- a mapping to OPC/XML-DA,
- a mapping to MMS (IEC 61850-8-1),
- a mapping to IEC 60870-5-104,
- a mapping to DNP3.

Click [HERE](#) for more details on mappings in IEC 61400-25-4.

Click [HERE](#) for a General Electric paper that discusses the application of SV realtime communication in wind power parks.

Posted by [Karlheinz Schwarz](#) at [5:18 AM](#) [0 comments](#) 

Labels: [Automation](#), [communication](#), [condition monitoring](#), [electric power system](#), [fieldbus](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [real-time](#), [wind power](#), [wind turbine controller](#)

DistribuTech 2010: Paper and Presentation on IEC 61850/61400-25 for Monitoring

A very important topic at the recent DistribuTech Conference (23-25 March 2010) was the paper presentation on "**Monitoring and Control of Power Systems and Communication Infrastructures**" based on IEC 61850 and IEC 61400-25" presented by Karlheinz Schwarz, SCC. The Session was about "Enterprise Information and Asset Management". The first presentations were the right basis for the presentation of IEC 61850: the smart grid and the transformer monitoring will create much more information to be exchanged than in today's systems. Transformer monitoring in the Distribution Network is one of the crucial solutions to keep the power flowing. IEC 61850 and IEC 61400-25 have a lot of logical nodes and data objects.

The presentation was attended by some 40 experts. Good questions were discussed at the end of the presentation.

The paper has an attachment with the names of all 283 published Logical Nodes of all standards of the series IEC 61850 and IEC 61400-25.

Click [HERE](#) for the paper [PDF, 670 KB]

Click [HERE](#) for the presentation slides [PDF, 300 KB]

Posted by [Karlheinz Schwarz](#) at [3:52 AM](#) [0 comments](#) 

Labels: [communication](#), [condition monitoring](#), [DER](#), [Distributech](#), [distribution automation](#), [electric power system](#), [IEC 61850](#), [IEC61850](#), [IEC61850Li](#), [interoperability](#), [Smart Grid](#), [Substation](#)

Sunday, March 21, 2010

Get Smart Quick with IEC 61850 on a Chip

The long wait for a lite implementation of IEC 61850 is over:

IEC61850Li® is available now

Get Smart Quick with the IEC61850Li (IEC 61850 Lite implementation). One interesting product with the IEC 61850 Lite implementation is the **IPC@Chip®** with IEC 61850 Client, Server, GOOSE publisher and subscriber **on the Chip** in addition to **IEC 61131-3** (PLC programming language), **C/C++** programming, **FTP**, **TELNET**, **TCP/IP**, **web server**, **2 Ethernet ports**, **GSM/GPRS**, **WiFi**, **CAN** bus, and many other possibilities.

The **Chip** and **Ready-To-Go Modules** (with the chip on board) are applied for IEDs, Gateways, RTUs, Data and Information Managers, Smart Grids, Distributed Energy Resources like PV, CHP, Wind, Hydro, Fuel Cells, ...

Click [HERE](#) to get more details and contact information.

A demonstration will be provided during the DistribuTech 2010, Tampa (Florida), 23-25 March 2010: See you at the UCA IUG **Booth 1932**

Posted by [Karlheinz Schwarz](#) at 3:40 AM 0 comments 

Labels: [Chip](#), [DER](#), [Ethernet](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61850](#), [IEC61850Li](#), [IED](#), [lite](#), [RTU](#), [SCADA](#), [Smart Grid](#)

Wednesday, March 10, 2010

See you in two weeks: IEC 61850 - Enterprise Information and Asset Management at DistribuTech 2010

Three case studies explore experiences in planning, architecting and implementing innovative applications that leverage power system automation and control infrastructure and **data to extend benefits beyond the control room**.

DistribuTech 2010, Wednesday, March 24, 9:30 a.m.

[Enterprise Information and Asset Management](#) (Room 19)

Conquering Organizational, Business Process and IT Challenges

Author(s):

- Al Mithani, DMS Project Manager, BC Hydro
- Bob Uluski, Executive Advisor, QuantaTechnology

Distribution Substation Transformer Monitoring and Diagnostics at AEP

Author(s):

- Paul Thomas, AEP Ohio gridSMARTSM Deployment Project Manager, American Electric Power
- Byron Flynn, Technical Director, GE Energy
- Leon White, Monitoring & Diagnostics Sales Manager, GE Energy

Monitoring of Power System and Communication Infrastructures Based on IEC 61850 and IEC 61400-25

Author(s):

- Karlheinz Schwarz, Owner, SCC (Schwarz Consulting Company)

Click [HERE](#) for the paper abstract.

See you in Room 19 on Wednesday, March 24, 9:30 a.m.

Posted by [Karlheinz Schwarz](#) at [9:53 AM](#) [0 comments](#) 

Labels: [asset management](#), [communication](#), [Distributech](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [Power Automation](#), [wind power](#), [wind turbine controller](#)

Friday, March 5, 2010

Deutsche Normungstrategie - Aktualisierte Ausgabe


Deutschland hat eine Normungsstrategie! Normungsarbeit rückt zunehmend ins Bewußtsein der Verantwortlichen aus Wirtschaft, Verbänden und Regierung! Seit 2005 werden strategische Konzepte zur Normung definiert und permanent an die Gegebenheiten angepasst.

Die große Bedeutung der Normung - auch und gerade im Bereich der Energieversorgung mit IEC 61850, IEC 61400-25, IEC 61968/70 CIM, ... - wird von maßgeblichen Verantwortlichen immer häufiger gesehen!

"Durch eine effiziente, von der Politik unterstützte, engere Verknüpfung von Forschung und Entwicklung mit Normung und Standardisierung ist dafür Sorge zu tragen, dass die innovationsfördernde Wirkung der Normung und Standardisierung in noch stärkerem Maß zum Tragen kommt. ... Für Deutschland als Exportland ist die Wettbewerbsfähigkeit deutscher Produkte und Technologien auf dem Weltmarkt zu sichern und weiter auszubauen. Weltweit akzeptierte, einheitliche Normen und Standards sind hierzu der Schlüssel."

Der hohe Nutzen von Norm wird sicher auch am Beispiel der Meterkonvention deutlich, in der am 20. Mai 1875 17 Staaten einen internationalen Vertrag unterzeichnen mit der Aufgabe, Maß und Gewicht international zu vereinheitlichen und dafür nötige Organisationsformen zu schaffen sowie diese zu finanzieren. Ganz nach dem Motto "Einer braucht eine Idee, einer muss es haben wollen und einer muss es bezahlen".

Click [HIER](#) zum Laden der neuen Ausgabe der Deutschen Normungsstrategie.

Posted by [Karlheinz Schwarz](#) at [12:25 AM](#) [0 comments](#) 

Labels: [de](#), [IEC 61850](#), [Normung](#), [standards](#)


Thursday, March 4, 2010

Die IEC 61850 – ein Kernstandard des zukünftigen Smart Grids

Am 15. und 16. April 2010 findet im [Kloster Eberbach bei Wiesbaden](#) ein **Expertenforum zum Thema "Die IEC 61850 – ein Kernstandard des zukünftigen Smart Grids"** statt. Namhafte Experten werden sowohl wesentliche Aspekte der Normenreihe vorstellen als auch in einem Dialog führen mit betroffenen verantwortlichen Vorstände und Geschäftsführer sowie leitenden Mitarbeiter und Entscheidungsträger der technischen und IT-Abteilungen von Energieversorgungsunternehmen, Netzbetreibern in öffentlichen und innerbetrieblichen Verteilnetzen und Betreibergesellschaften von erneuerbaren Energieerzeugungsanlagen. Angesprochen sind ebenfalls verantwortliche Mitarbeiter von Systemlieferanten, aus den Hersteller- und Zulieferunternehmen.

Teilnehmer können bereits im Vorfeld Fragen an die Experten stellen!

Click [HIER](#) für weitere Informationen.

Posted by [Karlheinz Schwarz](#) at [11:25 AM](#) [0 comments](#) 

Labels: [de](#), [fieldbus](#), [IEC](#), [IEC 61850](#), [Power Automation](#), [Stationslettechnik](#), [wind power](#)

3 day IEC 61850 Seminar and Hands-on Training Moved from Rio de Janeiro to São Paulo

The 3 day Seminar/Hands-on Training on IEC 61850 with real protection and control IEDs and test sets scheduled for **Rio de Janeiro (Brazil), 28.-30. April 2010**, has ben moved to **São Paulo**. Program and dates are the same:

Buenos Aires (Argentina), 26.-28. April 2010

Support for the organization and local contact: [Artec](#)

São Paulo (Brazil), 28.-30. April 2010

Support for the organization and local contact: [Instronic](#)

Click [HERE](#) for the program and registration information [pdf] ... see you there.

Posted by [Karlheinz Schwarz](#) at [4:38 AM](#) [0 comments](#) 

Labels: [communication](#), [electric power system](#), [engineering](#), [Ethernet](#), [GOOSE](#), [hands-on Training](#), [IEC 61850](#), [interoperability](#), [Power Automation](#), [protection](#), [Relays](#), [Training](#)

Wednesday, March 3, 2010

What is Edition 1 and Edition 2 of IEC 61850?

The first 14 parts of the standard SERIES IEC 61850 have been published between 2001 and 2004. These standards are often understood as IEC **61850 EDITION 1**. Each of these parts and also the two parts IEC 61850-7-410 (Hydro Power) and IEC 61850-7-420 (DER) have been published tagged as EDITION 1. Example:

Click [HERE](#) for preview of Part 7-420 EDITION 1: Basic communication structure – Distributed energy resources logical nodes

Several of these 16 published standards are now under revision (IEC calls this process maintenance). The revised document - once published - will be tagged EDITION 2, e.g., the EDITION 2 of part IEC 61850-6 has been published recently:

Click [HERE](#) for the Preview of the standard IEC 61850-6 **EDITION 2**.

Additional parts, e.g., IEC 61850-7-4 or -7-3 are in the maintenance process and will be published in their EDITION 2 very soon.

BUT there will be not an EDITION 2 of the standard SERIES IEC 61850 per se!! Various parts (of the **first 16** parts) will be revised and extended and then published tagged as EDITION 2.

New parts will be published with the tag **EDITION 1**, e.g., IEC 61850-80-1 (Guideline to exchanging information from a CDC-based data model using IEC 60870-5-101 or IEC 60870-5-104) - **IEC/TS 61850-80-1, Edition 1.0, 2008-12**.

Click [HERE](#) for a preview of IEC 61850-80-1 **EDITION 1**.

All parts published after the first 14 parts that had been published by

2004 have either the tag Edition 2 or Edition 1 !!

If you are waiting for "Edition 2" what do you mean? I guess you mean the following:

- **EDITION 2** of parts IEC 61850-6, -7-4, -7-3, -7-2, -7-1, -8-1, 9-2, 7-410, 7-420, etc. and
- **EDITION 1** of the parts IEC 61850-80-1, 61850-90-1, -90-2, -90-3, -90-4, etc.

Click [HERE](#) to download a table of all parts of Edition 1 and Edition 2 (updated 2010-02-01).

It is highly recommended to **name the specific part** when we talk about EDITION 2! Example: **IEC 61850-6 EDITION 2**.

Hope that helps!

Posted by [Karlheinz Schwarz](#) at [6:10 AM](#) [1 comments](#) 

Labels: [Edition 2](#), [Edition1](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEc 61850-7-4 Ed2](#), [SCL](#)

Wednesday, February 17, 2010

UCA International Users Group at DistribuTECH 2010

The UCA International Users Group (UCAiug) will be present at the DistribuTECH 2010: **Booth 1932**; March 23-25, 2010 - Tampa Convention Center - Tampa Florida


Celebrating 20 years as the leading annual T&D event. DistribuTECH covers automation and control systems, energy efficiency, engineering, demand response, renewables integration, power delivery equipment and water utility technology. No show provides more educational and networking opportunities than DistribuTECH.

Plan for a stop at **Booth 1932** for a chat with Karlheinz Schwarz (NettedAutomation) about the latest developments on "**IEC61850-Li**" (Lite implementation) and to see how it looks like. You will be surprised!

Click [HERE](#) to visit the DistribuTCH website.

Click [HERE](#) for an abstract of a paper on IEC 61850 at the DistribuTECH

Click [HERE](#) to visit the UCAiug

Posted by [Karlheinz Schwarz](#) at [10:17 AM](#) [1 comments](#) 

Labels: [Distributech](#), [IEC 61850](#), [interoperability](#), [real IEDs](#), [RTU](#), [Smart Grid](#)

Monday, February 15, 2010

3 day IEC 61850 Seminar and Hands-on Training in Buenos Aires and Rio de Janeiro

STRI and Nettedautomation GmbH have posted the **program and registration information** for the 3 day Seminar/Hands-on Training with real protection and control IEDs and test sets:

Buenos Aires (Argentina), 26.-28. April 2010
Rio de Janeiro (Brazil), 28.-30. April 2010

Click [HERE](#) for the program and registration information [pdf] ... see you there.

Posted by [Karlheinz Schwarz](#) at 9:42 AM 0 comments 

Labels: [communication](#), [electric power system](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [interoperability](#), [MMS](#), [Power Automation](#), [process bus](#), [Smart Grid](#), [Training](#), [wind turbine controller](#)

Sunday, February 14, 2010

IEC 61850 for Smart Grid in High Voltage Valley

STRI (Ludvika/Sweden) will build a Smart Grid using IEC 61850 interoperable solutions for Substation Automation, Wind Power, Hydro Power and Process bus.

The project totals 3 million EUR including 4 PhD students at 3 Swedish Universities and is funded by The Swedish Governmental Agency for Innovation Systems together with ABB, High Voltage Valley association consortium and STRI.

Click [HERE](#) for more details.

Posted by [Karlheinz Schwarz](#) at 11:49 PM 0 comments 

Labels: [hydro power](#), [IEC 61850](#), [interoperability](#), [NIST](#), [NIST Roadmap](#), [process bus](#), [Smart Grid](#), [wind power](#)

Monday, February 8, 2010

IEC 61850-3 compliant Gigabit Ethernet Switch from Hirschmann

Hirschmann goes Gigabit for substation and other applications. The new Ethernet Switch offers 16 Gigabit Ethernet combination ports (1000 BASE-TX) that will also connect SFP fiber optical transceivers (100/1000 BASE-FX/SX/LX/LH). All ports support version 2 of the Precision Time Protocol (IEEE 1588 V2) as well as optionally Power over Ethernet (IEEE 802.3af).

Further characteristics include an operating temperature range of -40 to +70 °C, high resistance to jarring, and extensive insusceptibility to electrical discharge and magnetic fields. Passive cooling (no fans) and a redundant power supply add to ensure high operational safety. Furthermore, the new Hirschmann™ Gigabit Ethernet switch meets the standards and approval requirement of IEC 61850, IEEE 1613, EN 50121-4, EN 50155, cUL 508, cUL 1604 C1 Div2 and GL.

EPRI (Electric Power Research Institute) tested 10 Megabit Shared Ethernet for UCA 2.0 (Utility Communication Architecture) in the mid nineties. I remember when we had some 25 PCs connected to test UCA communication services. EPRI called me during these days to come to Los Angeles to give a presentation on the performance of Ethernet compared to Profibus DP. At that time many experts already believed that Ethernet is a serious option for Substation automation. Nowadays almost all experts are supporting Ethernet - some people that just know the old Shared Ethernet of the eighties don't believe that this is the right solution. After some explanation they change their mind - usually.

Click [HERE](#) for product information.

Click [HERE](#) for a paper **published in 1991-11 on the use of Ethernet instead of Token passing** [PDF, 720 KB] - at that time the author did not know about Gigabit Ethernet.

Click [HERE](#) for a paper **published in 1991-03 on the use of Ethernet as a fieldbus** [PDF, 720 KB].

Posted by [Karlheinz Schwarz](#) at [9:27 PM](#) [1 comments](#) 

Labels: [Ethernet](#), [fieldbus](#), [IEC 61850](#), [IEC 61850-3](#), [IEEE 1588](#), [MAP](#), [MMS](#), [Power Automation](#), [redundancy](#)

Saturday, February 6, 2010

10th Anniversary of NettedAutomation GmbH

NettedAutomation GmbH was established on 2000-01-01. All in a sudden we celebrate the 10th Anniversary. Stay tuned with this blog and the NettedAutomation Website - a source of free information.

After 25 years active participation in the international Standardization of Karlheinz Schwarz, the vision of NettedAutomation GmbH (as posted on our website in 2000) becomes really true - step by step:

The [Vision of NettedAutomation GmbH](#):

The Net is the Automation

Current trend: Very soon we will see Ethernet Switches that can provide some kind of a remote I/O functionality and (distributed) automation functions ... and more to come!

Posted by [Karlheinz Schwarz](#) at [1:54 AM](#) [1 comments](#) 

Labels: [Automation](#), [NettedAutomation](#), [standards](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Saturday, February 6, 2010

IEC 61850-7-4 approved as International Standard

The FDIS on IEC 61850-7-4 Edition 2 has been approved as International Standard (100 % approval)!

Click [HERE](#) for the voting result.

Posted by [Karlheinz Schwarz](#) at [1:37 AM](#) [0 comments](#)

Labels: [IEC 61850](#), [IEC 61850-7-4 Ed2](#)

283 Logical Nodes defined in IEC 61850 and IEC 61400-25

Click [HERE](#) to get a list of all 283 Logical Nodes [PDF, 75 KB] defined in:

- IEC 61850-7-4 Ed2 FDIS
- IEC 61850-7-410 Ed1 IS
- IEC 61850-7-420 Ed1 IS
- IEC 61400-25-2 Ed1 IS

The list contains all LN Class names for your convenience.

Posted by [Karlheinz Schwarz](#) at [1:36 AM](#) [0 comments](#)

Labels: [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-410](#), [IEC 61850-7-420](#), [logical node](#)

Friday, February 5, 2010

New PAP16 to deal with Wind Plant Communications according to IEC 61400-25

The NIST **Smart Grid** Priority Action Plan (PAP) has been extended by the PAP 16 "**Wind Plant Communications**".

Motivation for the new PAP:

"While an **international standard for wind power plant communications interoperability exists**, few if any developers or utilities have implemented it in the US. **Given that 1.5 billion dollars in ARRA funds have been awarded to wind plant projects**, it is critical to accelerate the adoption of this standard to ensure those funds do not end up going to systems that are not interoperable which eventually results in stranded assets and less market competition. Most of the existing command and control infrastructure for wind power plants and site monitoring is based on **proprietary technologies and products or at best old protocols that are not capable of being managed or secured**. The Director of the Utility Wind Integration

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[IEC 61850-7-4 approved](#)

Group (UWIG) – one of the two major wind industry associations – has brought this situation to the attention of the [SGIP](#) Administrator and has requested that a new PAP be formed to address this immediate need. "

Schedule:

- February 11: Presentation to UWIG membership in Albuquerque – solicit participation
- March 1: Begin weekly teleconferences
- May: Completed set of use cases and requirements
- July: Completed analysis of gaps in 61400-25 standard
- September: Completed best practices
- October: Completed recommendations to IEC TC 88

Objectives:

- Gather and develop use cases and requirements related to wind power plant communications
- Map these requirements to the existing 61400-25 standard and **identify gaps and issues** that are hindering its use in the US
- Develop best practices on the application of 61400-25
- **Provide specific recommendations to the IEC TC 88 working group** responsible for maintaining the 61400-25 standard to address the gaps identified.

Click [HERE](#) for the PAP16

Click [HERE](#) for the list of all PAPs

Click [HERE](#) to visit the Users Group for IEC 61400-25 USE61400-25

Posted by [Karlheinz Schwarz](#) at [9:41 PM](#) [0 comments](#) 

Labels: [control center](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [NIST](#), [wind power](#)

Wednesday, February 3, 2010

Deutsche Normungsroadmap Smart Grid

Am 02. Februar 2010 wurde beim BMWi in Berlin der erste Entwurf der **deutschen Roadmap für Smart Grids** (E-Energy) vorgestellt und diskutiert.

"Dieses Dokuments ist der Entwurf für eine strategische und dennoch technisch orientierte Roadmap, welche die Anforderungen an Normen und Standards für die deutsche Vision des 94 Smart Grids unter besonderer Berücksichtigung der BMWi- und BMU-Fördermaßnahme E-Energy [BMWi] darstellt. Zudem bietet sie eine Übersicht über Normen und Standards in diesem Umfeld, aktuelle Aktivitäten, notwendige Handlungsfelder, internationale Kooperationen und strategische Empfehlungen."

Der Entwurf steht jetzt zur öffentlichen Kommentierung bis zum 05.März 2010 zur Verfügung!

Klicken Sie [HIER](#), um den Entwurf herunterzuladen [pdf].

Klicken Sie [HIER](#) für weitere Informationen bezüglich der Kommentierung.

Machen Sie unbedingt Gebrauch von der Kommentierung!

Die DKE hat das Kompetenzzentrum E-Energy als Ansprechpartner zu allen Normungs- und Standardisierungsfragen mit Bezug zur Optimierung, Vernetzung und Steuerung von intelligenten Erzeugern, Speichern, Verbrauchern und Netzbetriebsmitteln in der

[as International Standard](#)

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Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Energieversorgung mit der Hilfe von Informations- und Kommunikationstechnologien (E-Energy/Smart Grid) gegründet. Damit wird die Bedeutung der Normen für die Energieversorgung nicht nur anerkannt, sondern auch mit Rat und Tat unterstützt!!

Klicken Sie [HIER](#), um auf die Webseite des Kompetenzzentrums zu gelangen!

Posted by [Karlheinz Schwarz](#) at [10:48 AM](#) [0 comments](#) 

Labels: [DKE](#), [E-Energy](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [NIST Roadmap](#), [Roadmap](#), [Smart Grid](#)

Monday, February 1, 2010

Comprehensive IEC 61850 Training - New Opportunities

NettedAutomation GmbH offers new hands-on training and seminar opportunities in 2010:

Public Courses:

02.-05. March 2010	Moscow (Russia)
26.-28. April 2010	Buenos Aires (Argentina)
28.-30. April 2010	Rio de Janeiro (Brazil)
05.-07. May 2010	Frankfurt (Germany)
18.-20. August 2010	Paris (France)
22.-24. September 2010	Frankfurt (Germany)
19.-20. October 2010	Dallas (TX, USA)
November 2010	Stockholm (Sweden)

Training Modules: Click [HERE](#) for a list of seminar/training modules.

In-House Courses: Click [HERE](#) for an example program for a 5 day training conducted in January 2010.

Posted by [Karlheinz Schwarz](#) at [3:03 AM](#) [0 comments](#) 

Labels: [61850](#), [applications](#), [Automation](#), [DER](#), [DNP3](#), [electric power system](#), [IEC 60870-5-101](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [maintenance](#), [MMS](#), [process bus](#), [RTU](#), [SCL](#), [seminar](#), [Smart Grid](#), [Substation](#), [Training](#), [workforce](#)

Sunday, January 31, 2010

Status of all parts of IEC 61850

The first part of IEC 61850 Edition 2 has been published as standard: part 6. Several other parts are in the final preparation for publication. Other new parts are under preparation.

Click [HERE](#) to download a table of the latest update of the parts (2010-02-01).

Posted by [Karlheinz Schwarz](#) at [5:56 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [standards](#)

Friday, January 29, 2010

Smart Grid Devices with IEC 61850 and IEC 61499 at

IEEE T&D Conference in New Orleans - 21 April 2010

The [2010 IEEE Transmission and Distribution Conference and Exposition](#) (New Orleans, 19-22 April 2010) has the title: **Smart Solutions for a Changing World**.

What makes the Grid smart? Smart people that develop smart solutions! One of these smart solutions will be presented (by smart people) on

Wednesday, 21 April, 2010 8:00 AM-10:00 AM

IG01Wd1

Intelligent Grid Coordinating Committee Poster Session

2010TD0592: Towards Intelligent Smart Grid Devices with IEC 61850 Interoperability and IEC 61499 Open Control Architecture

The Smart Grid vision, outlined in EPRI's "Report to NIST on the Smart Grid Interoperability Standards Roadmap", incorporates into the grid "the benefits of distributed computing and communications to deliver real-time information and enable the near-instantaneous balance of supply and demand at the device level". This vision implies a multilayer information and control system architecture, with power transmission and distribution layer playing a crucial role in achieving the "smartness" of the grid.

The complexity of this task requires reconsidering grid control architectures, possibly changing them from the traditional hierarchical topology with distributed data acquisitions but central decision making, to decentralized decision making. **For that, basic automation devices would need to become "intelligent"**. Most advanced version of such devices are currently based on microcomputers with communication capabilities, but the data flow is purely bottom up, from devices to the control center, and control flow is opposite: from the control centre to instruments. **In Smart Grids this may need to change to horizontal communication, negotiation and collaborative decision making by the instruments.**

There has been considerable amount of research on the corresponding computing architectures capable of implementing such distributed intelligence. For example, multi-agent system architectures for grid automation have been proposed. Unfortunately these ideas cannot be implemented on current grid devices based on proprietary and closed hardware/software platforms. Besides, multi-agent implementations require high computation performance and still cannot deliver sufficient real-time performance and determinism. While multi-agent systems need powerful workstations to run, practitioners in the field are very conservative and insist on high reliability, determinism and performance of the microprocessor-based instruments. Reliable communication is crucial, and interoperability amongst IEDs (Intelligent Electronic Devices) is of paramount importance.

Thus, practical deployment of intelligent multi-agent solution at the transmission and distribution layer of Smart Grid can happen if a new generation of IEDs appears that have open architecture based on industrially accepted standards in the areas of information, configuration, communication and distributed automation.

The paper presented proposes an approach to pave the way to multi-agent intelligent control of grid is using two standards: IEC 61850 and IEC 61499.

IEC 61499 (Function Blocks) promises a framework for gluing those functions together in patterns of increasing capability and complexity.

Abstract-- The paper reports on developments and experiments

conducted to prove the feasibility of using decentralized multi-agent control logic in the automation of power distribution networks. The utility network is modelled as communicating logical nodes following IEC 61850 standard's architecture, implemented by means of IEC 61499 distributed automation architecture. The system is simulated in an IEC 61499 execution environment combined with Matlab and proven to achieve simple fault location and power restoration goals through collaborative behaviour and interoperable devices.

Index Terms-- Smart Grid, IEC 61850, interoperability, distributed intelligent automation, IEC 61499

Posted by [Karlheinz Schwarz](#) at 8:53 PM 0 comments 

Labels: [Automation](#), [communication](#), [Functionblock](#), [IEC 61499](#), [IEC 61850](#), [IEEE](#), [NIST Roadmap](#), [Power Automation](#), [Smart Grid](#)

Monday, January 25, 2010

Automation Standard (IEC 61499) meets Power Standard (IEC 61850)

"The first Conference on Innovative Smart Grid Technologies", sponsored by the IEEE Power & Energy Society (PES) and hosted by the National Institute of Standards and Technology (NIST), was held January 19-21, 2010 in Gaithersburg, Maryland, USA. The Conference was a forum to discuss the state-of-the-art innovations in smart grid technologies.

The paper "Towards the Energy Web via Standards-enabled Smart Grid" presented by Prof. Mihaela Ulieru was a big Blast.

Authors of the paper:

Valeriy Vyatkin, Senior Member, IEEE,
Gulnara Zhabelova, non-member,
Neil Higgins, Member, IEEE,
Mihaela Ulieru, Senior Member, IEEE
Karlheinz Schwarz, Member, IEEE and
Nirmal-Kumar C Nair, Member, IEEE


Abstract -- "In this paper we propose an information and control architecture for Smart Grid based on the combination of upcoming industrial standards and intelligent control methods. We make the case that an incremental approach is required for the transition to the Smart Grid and propose a way of doing that through bringing intelligence down to the level of substation automation devices. The architecture employs two strong international standards, IEC 61850 and IEC 61499, to enrich the applications that can be created using interoperable Smart Grid devices. Interoperability and open configurability - key enablers for efficient application of the revolutionary EnergyWeb ideas - are evident in this architecture.

The utility network is modeled as IEC 61850-compliant logical nodes, embedded in an IEC 61499 distributed automation framework. The system is simulated in an IEC 61499 execution environment combined with Matlab, and is proven to achieve simple fault location and power restoration goals through collaborative behavior."

Some 200 engineers - a forward looking crowd, extremely supportive and especially extremely receptive - were in fact quite enthusiastic of the ideas. The presentation was 'Stellar'! **"What a genial idea to merge an automation standard with a power standard"** has been the Motto everywhere after the talk.

Click [HERE](#) for the presentation.

The topic will also be presented and discussed during the IEEE PES T&D Conference in New Orleans, April 19-22, 2010.

Posted by [Karlheinz Schwarz](#) at [12:27 PM](#) [0 comments](#) 

Labels: [Automation](#), [communication](#), [engineering](#), [Functionblock](#), [IEC 61499](#), [IEC 61850](#), [integration](#), [interoperability](#), [Power Automation](#)

Saturday, January 23, 2010

Gigabit Ethernet and IEEE 1588 for Substations

[IEC 61850-3](#) compliant **Gigabit** Ethernet with **IEEE 1588** time synchronization available for substation automation and protection. Korenix offers an IEC61850-3 Modular Managed Ethernet Switch, equipped with 4 on-board Gigabit RJ45 / MINI GBIC combo ports plus 3 modular slots for maximum 24 10/100 Base-TX Ports or 18 100Base-FX Fiber interfaces ports.

Click [HERE](#) for more details.

Posted by [Karlheinz Schwarz](#) at [6:07 AM](#) [0 comments](#) 

Labels: [communication](#), [Ethernet](#), [IEC 61850-3](#), [IEEE 1588](#), [real-time](#), [Substation](#), [synchronization](#)

Saturday, January 16, 2010

The Wind of Change is blowing in Wind Power Protection using IEC 61850-9-2

When the IEC Technical Committee 88 (Wind Turbines) started the IEC 61850-based project IEC 61400-25 "Communications for monitoring and control of wind power plants" in 2001 only a few experts expected that IEC 61850 would have a crucial impact on the way how wind parks will be equipped with intelligent devices. Most experts believed that the main use of **standard information models** and **information exchange** is for **control and monitoring** purposes only.

A very interesting paper has been written recently that discusses the use of IEC 61850-9-2 "Sampled values over ISO/IEC 8802-3" for protection functions in a whole park. Each Turbine/Tower provides current and voltage samples and other information in a continuous stream of sampled value messages. The IEC 61850-9-2 sampled values are distributed as Ethertype multicast messages (from a publishing device, often called **Merging Unit**) - and received by many subscribing devices. This allows to distribute and collect the measurements for protection and other use cases (e.g., 80 samples per nominal period - 20 ms in a 50 Hz system). Protection could now be implemented in a **centralized location**, and a few central protection devices could **protect many distributed equipments** (generator, transformer, circuit breakers, ...).

Implementation of Merging Units may also be used in the near future to distribute non-electric measurements like vibration measurements from gear boxes and blades.

Click [HERE](#) for the very interesting paper.

Posted by [Karlheinz Schwarz](#) at [3:01 AM](#) [0 comments](#) 

Labels: [communication](#), [distribution](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [merging unit](#), [protection](#), [wind power](#)

Thursday, January 14, 2010

Why IEC 61850 will succeed

The **industrial automation** in manufacturing and petrochemical plants has fallen well short of the expectations of the 1980s and 1990s. The MAP project (1983-1990) for example has not been accepted and the many international field-busses have not helped to provide a few real internationally standardized solutions. The [many field-busses](#) are now the headaches of many engineers. Why could we expect that IEC 61850 will be a real international standard **accepted and applied all over and for many decades?**

The key is that the **physical power system** is easier to model than the **collective industrial processes of the world**. The basic topology of the current electrical power system is the same since the very first steps. It is likely that the **electrical power system** will be the same in many years down the street. Since its inception, the power industry has operated with clear demarcations between its generation, transmission, and distribution subsystems. All over we have physical measurements and processed information than can be used in all domains of the electrical system today and in the future, e.g., the [electrical measurements like voltage or currents](#).

The basics of the physical part of the power system will stay the same. The **number** of energy resources will explode and the **locations** of the grid connections will be quite distributed. The **number of loads** in existing grids will more or less be the same. **What will change is how to monitor and control the many new and existing connection points of power resources and loads.** It is likely that for every connection point there will be a need for a smarter device that communicates with its environment.

IEC 61850 implementations have proven that all basic requirements for the information and communication system are met by the various information models, communication services, networks, and configuration language. Missing elements can and will be added while we go. There is - to my knowledge - no competing standard on the horizon.

The challenges in the future power system are the **stability of the electrical system** with the many connection points (power engineers) and the management of the **sheer unlimited number of smart devices** (ITC engineers). There is a crucial need: These people have to team-up with each other - led by power engineers. Power engineers know the difference between a power network and the communication network: in the communication network **messages can be stored** in queues for seconds or hours - in the power network the **power is consumed at the very same moment when it is produced**.

Keep the grass green, the sky blue, and the power flowing.

Posted by [Karlheinz Schwarz](#) at [5:43 AM](#) [0 comments](#) 

Labels: [communication](#), [condition monitoring](#), [distribution](#), [distribution automation](#), [IEC 61850](#), [Smart Grid](#), [standards](#)

Wednesday, January 13, 2010


IEC 61850 on a Chip? - Yes!

Beck-IPC GmbH (Pohlheim/Germany) offers IEC 61850 on a Chip.

The Fully Integrated Single Chip Solution IPC-10 enables a cost effective integration of IEC 61850 in IED designs. The IEC 61850 software is also available as portable client/server software, or already integrated in the RTU MRU-10 and WEBCAN RTU and Gateway. The configuration is using/generating IEC 61850-6 conformant Configuration files (SCL).

Click [HERE](#) for information in English.

Click [HERE](#) for information in German.

Posted by [Karlheinz Schwarz](#) at [10:03 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [implementation](#), [MMS](#), [Power Automation](#), [RTU](#), [Substation](#), [Substation Automation](#)

IEC 61850-7-4 Edition 2 FDIS open for Ballot

The second edition of IEC 61850-7-4 has been published for final ballot until February 05, 2010:

IEC 61850-7-4 Ed.2:

Communication networks and systems for power utility automation –
Part 7-4: Basic communication structure – Compatible logical node classes and data object classes

The second edition specifies more than 150 Logical Nodes.

The major technical changes with regard to the first edition are as follows:

- corrections and clarifications according to information letter;
- extensions for new logical nodes for the power quality domain;
- extensions for the model for statistical and historical statistical data;
- extensions regarding IEC 61850-90-1 (substation-substation communication);
- extensions for new logical nodes for monitoring functions according to IEC 62271;
- new logical nodes from IEC 61850-7-410 and IEC 61850-7-420 of general interest.

Example of new Logical Nodes in IEC 61850-7-4 Edition 2:

New Logical nodes for functional blocks:

Counter - FCNT

Curve shape - FCSD

Generic filter - FFIL

Control function output limitation - FLIM

PID regulator - FPID

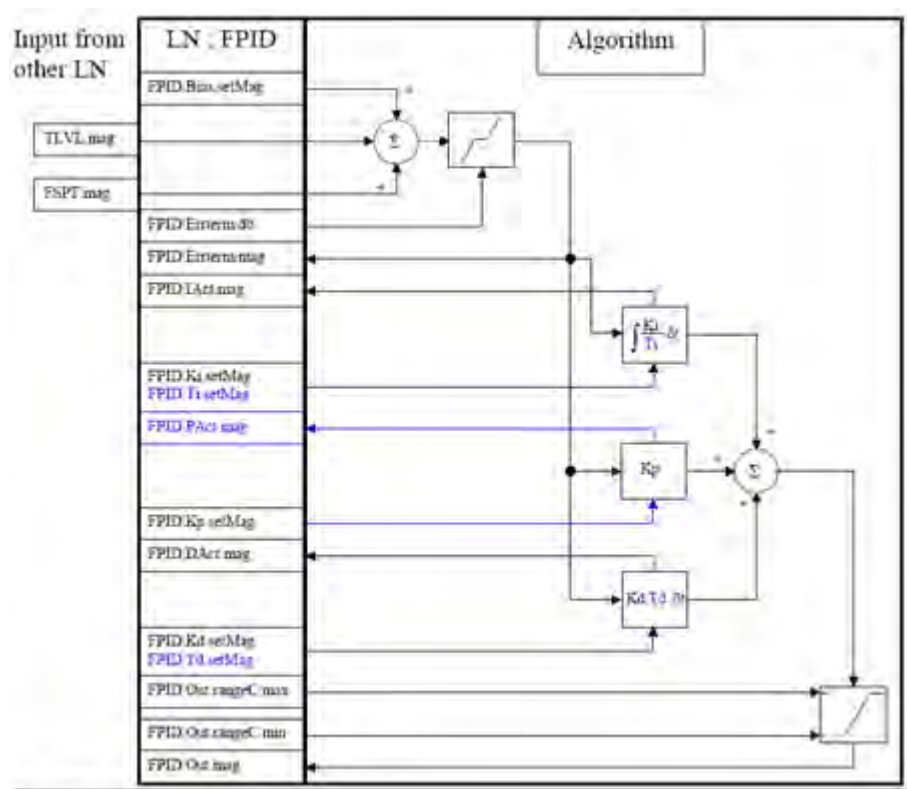
Ramp function - FRMP

Set-point control function - FSPT

Action at over threshold - FXOT

Action at under threshold - FXUT

An example of a PID loop control with an Logical Node FPID representing the attributes (or input and output signals):



Note that IEC 61850 DOES NOT specify the PID loop control algorithm or function. IEC 61850-7-4 Logical Nodes provide the "interface" or the presentation of the signals, the configuration of the object models and the exchange of the values. The Data Object "KP" (Proportional gain) can be set by an ACSI service. Or the Data Object "DAct" (Derivative action) can be read, reported, logged, or GOOSSED.

If you are interested to comment on the document, please contact your [national committee of the IEC TC 57](#).

Posted by [Karlheinz Schwarz](#) at 3:31 AM 0 comments

Labels: [Automation](#), [engineering](#), [Functionblock](#), [GOOSE](#), [hydro power](#), [IEC 61850](#), [IEC 61850-7-410](#), [Power Automation](#)

IEC 61850-6 (Configuration Language) Edition 2 has been published

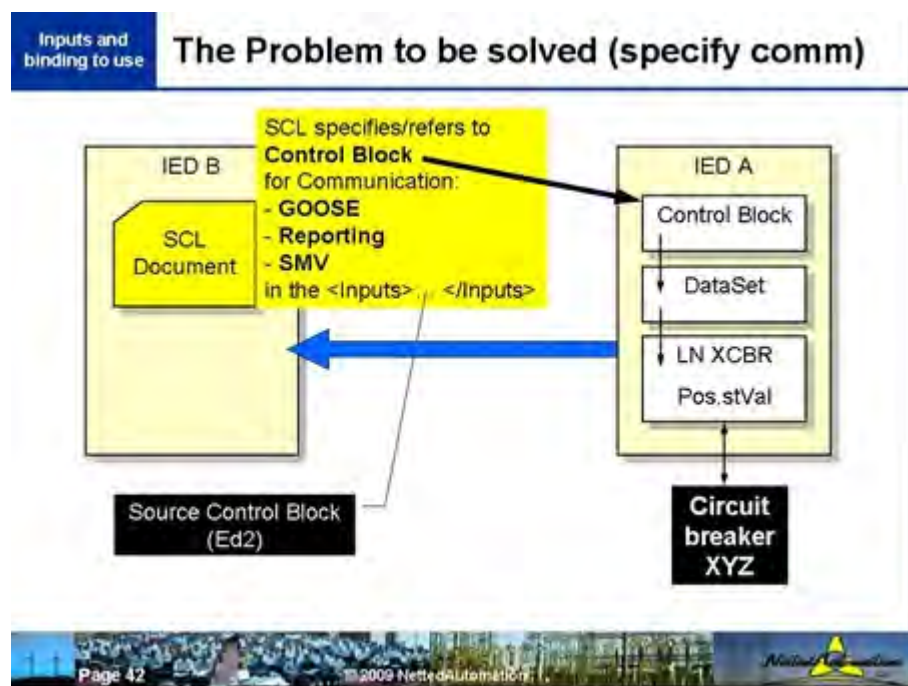
The first part of Edition 2 of IEC 61850 has been published as International Standard:

IEC 61850-6 Edition 2 (2009-12)

Communication networks and systems for power utility automation – Part 6: Configuration description language for communication in electrical substations related to IEDs

Click [HERE](#) for the Preview of the standard IEC 61850-6 Edition 2.

The second edition provides several crucial extensions. One extension is the way how to specify the source of a signal needed by an IED in more detail. The following slide from the NettedAutomation training shows that in the SCL file for IED B the source can be specified:



The list of extended details for the specification of the signal source is shown in the next slide:

Inputs and binding to use

Inputs in SCL (Edition 2)

Table 33 – Attributes of the Input/ExtRef element

All Attributes of Edition 1 plus the following	
desc	A free description / text. Can e.g. be used at system engineering time to tell the IED engineer the purpose of this incoming data
serviceType	Optional values: Poll, Report, GOOSE, SMV. Typically used at system design time to specify the service type to be used for sending the needed input data
srcLDInst	The LD inst of the source control block – if missing, same as ldInst above
srcPrefix	The prefix of the LN instance, where the source control block resides; if missing, no prefix
srcLNClass	The LN class of the LN, where the source control block resides; if missing, LLNO
srcLNInst	The LN instance number of the LN where the source control block resides – if missing, no instance number exists (LLNO)
srcCBName	The source CB name; if missing, then all other srcXX attributes should also be missing, i.e. no source control block is given.

Page 44

This allows to have a complete specification of the signal and how it is communicated. The specification uses a reference from the destination IED back to the source IED. The <Inputs>...</Inputs> represent a crucial part of the "wiring plan" of a substation automation system or any other automation system.

Posted by [Karlheinz Schwarz](#) at 2:30 AM 1 comments

Labels: [Automation](#), [configuration](#), [electric power system](#), [IEC 61850](#), [IED](#), [Power Automation](#), [Training](#)

Tuesday, January 12, 2010

IEC 61850 and IEC 61499 build a "Team"

The paper "**Distributed Power System Automation with IEC 61850, IEC 61499 and Intelligent Control**" presents a new approach to power system automation, based on distributed intelligence rather than traditional centralised control. The paper investigates the interplay between two international standards, IEC 61850 and IEC 61499, and proposes a way of combining of the application functions of IEC 61850-compliant devices with IEC 61499-compliant "glue logic," using the communication services of IEC 61850-7-2. The resulting ability to customise control and automation logic will greatly enhance the flexibility and adaptability of automation systems, speeding progress toward the realisation of the Smart Grid concept.

Click [HERE](#) to download the paper.

A second paper "**Towards Intelligent Smart Grid Devices with IEC 61850 Interoperability and IEC 61499 Open Control Architecture**" presents and discusses new developments and experiments conducted to prove the feasibility of using decentralized multi-agent control logic in the automation of power distribution networks. The utility network is modeled as communicating logical nodes following IEC 61850 standard's architecture, implemented by means of IEC 61499 distributed automation architecture. The system is simulated in an IEC 61499 execution environment combined with Matlab and proven to achieve simple fault location and power restoration goals through collaborative behavior and interoperable devices.

Click [HERE](#) to download the paper.

Posted by [Karlheinz Schwarz](#) at 7:45 AM 0 comments 

Labels: [Automation](#), [communication](#), [IEC 61499](#), [IEC 61850](#), [interoperability](#), [Smart Grid](#)

DNP3 to become an IEEE Standard

IEEE has announced yesterday (2010-01-11) that a new project (P1815 - Standard for Electric Power Systems Communications - Distributed Network Protocol (DNP3)) has been set up to publish the DNP3 specification as an IEEE Standard in mid 2010.

The "purpose of this standard is to document and make available the specifications for the DNP3 protocol. ... The intent of this DNP3 standard is to meet the goal established by NIST for a Smart Grid protocol:

- Provides a **protocol standard** from a recognized standard institution
- Provides interoperability with 100s of operational systems and 1000s of devices
- Provides cyber security based on **IEC 62351-5** ([Preview](#))
- Provides Devise data profiles in a format that can be mapped to **IEC 61850 Object Models**"

Click [HERE](#) to access the official IEEE press release.

This is what I have expected for some time. The mapping of IEC 61850 and IEC 61400-25-2 Object Models and (some) Services to DNP3 and IEC 60870-5-101/104 has already been standardized in IEC 61400-25-4 (some 2 years ago). DNP3 and IEC 60870-5-101/104 are used as SCADA protocols between substations and control centers all over.

Click [HERE](#) for some additional information on the mapping of IEC 61850/61400-25-2 objects and services to DNP3 and other protocols.

The following comparison shows that the objective of IEC 61850 goes far beyond the use as a SCADA protocol:

IEC 61850 In brief

What is the difference compared to DNP3?

IEC 61850	DNP3/101/104
<ul style="list-style-type: none">■ Communication protocols<ul style="list-style-type: none">– SCADA– Real-time– Selfdescription■ Information models■ Configuration language	<ul style="list-style-type: none">■ Communication protocol<ul style="list-style-type: none">– SCADA

Page 29 © 2009 NettedAutomation

The **Configuration Language** (IEC 61850-6 - [Preview of Edition2](#)) is the most crucial part of the standard series IEC 61850 and IEC 61400-25!!

Posted by [Karlheinz Schwarz](#) at 4:08 AM 0 comments 

Labels: [Automation](#), [communication](#), [control center](#), [DNP3](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [NIST](#), [Smart Grid](#), [standards](#), [Substation](#), [wind power](#)

Saturday, January 2, 2010

Successful IEC 61850 Hands-On Training Courses in Australia

NettedAutomation GmbH and STRI conducted two 3 day IEC 61850 Hands-On Training courses in Australia: in Brisbane on November 30 - December 02 and Sydney on December 02-04, 2009.



Brisbane course (attendees from 7 organizations)



Sydney course (attendees from 10 organizations)



Andrea Bonetti (STRI) in action
... actions speak louder than words!

The attendees reported that there are many concrete plans to apply IEC 61850 in Substations of Australian transmission and distribution utilities in 2010 and 2011. Also substations outside of utilities (e.g., in the mining industry) are being build with IEC 61850 compliant automation and protection systems.

The plans to implement a huge Smart Grid project in Australia are an additional opportunity for IEC 61850 being applied for distribution networks - to make the Grids smarter.

Feedback from an attendee of the Sydney course:

"Well organized and very well run. The presenters were well on top of the subject and could explain the subject matter. There was a huge amount of material to cover and they did it well. Being independent, the subject was presented objectively. Karlheinz was very strong on the background and the detail of the specification, including the interaction with related specifications. Andrea was excellent on the implementation and configuration. Had a very practical approach and committed to making it work in the real world. **I certainly gained much more than I expected from the seminar. Excellent value.**"

Posted by [Karlheinz Schwarz](#) at 4:12 AM 0 comments 

Labels: [Australia](#), [Automation](#), [hands-on Training](#), [IEC 61850](#), [interoperability](#), [protection](#), [Smart Grid](#), [Substation](#), [Training](#)


Thursday, December 31, 2009

ABB uses IEC 61850 for integrated power and process control in Greece

ABB has won in December 2009 an order worth \$26 million from Hellenic Petroleum SA to provide an integrated power and automation system for the upgrade of Hellenic Petroleum's Elefsina refinery, west of Athens. The environmentally friendly refinery will manufacture products in accordance with best in class technology and **global standards** to minimize environmental impact.

ABB will install a **fully automated power management and load shedding system** based on the 800xA automation platform and **IEC 61850 compatible communication networks**. **Integrating the electrical and automation system** on the common 800xA platform provides additional benefits including reduced maintenance, engineering and overall lifecycle costs.

Click [HERE](#) for the full press release.

Posted by [Karlheinz Schwarz](#) at [11:02 PM](#) [0 comments](#) 

Labels: [800xA](#), [ABB](#), [communication](#), [IEC 61850](#), [medium voltage](#), [process control](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Wednesday, December 30, 2009

2009 comes to a close - 2010 is about to come

As the year 2009 comes to a close, I want to say "Thank You!" for supporting the standardization of solutions for a smarter grid in 2009 and for using my knowledge and experience in the field of information technology for power systems.

I wish you and your family a happy, healthy and prosperous New Year 2010 - and successful applications of standards like IEC 61850, IEC 61400-25, IEC 61968/70 (CIM), TASE.2, DNP3, ...

The year 2009 was quite busy with many public and in-house courses and consultancy services on IEC 61850 and related standards. The interest in IEC 61850 has picked up in 2009 all over. What we see now is that we could expect even more interest in 2010. Many utilities are in the process of planning to equip first substation with IEC 61850 conformant substation IEDs (protection, control, monitoring, ...).

During 2009 we have seen the US NIST activities on Smart Grids popping up. In this context we see a lot of challenges to get "sustainable interoperable" solutions for power systems.

What concerns me is that the pace of events with regard to the use of IT is accelerating very very steep! The use of standards progresses faster than usual expected. All experts I know are quite busy. What we need is: more well educated people in the power business.

I look forward to helping you to get all information and experience you need in the application of advanced standards as listed above.

Click [HERE](#) for a discussion on education of engineers in the power industry and [HERE](#) for a list of of our 70+ up-to-date seminar modules.

Posted by [Karlheinz Schwarz](#) at [11:06 PM](#) [0 comments](#) 

Labels: [CIM](#), [DNP3](#), [education](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [Power Automation](#), [Smart Grid](#), [TASE.2 ICCP](#), [Training](#), [wind power](#)

IEEE Smart Grid Web Portal

IEEE has launched a new web portal on Smart Grid activities to support the many activities in the domain of making the grids smarter. The portal is intended to provide the "latest information on IEEE's involvement in the area of Smart Grid including conferences, publications, standards, educational programs and public policy."

Click [HERE](#) to visit the portal.

The focus seems to be on North American solutions. The list of "[IEEE Approved Standards Related to Smart Grid](#)" ignores many other

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International Standards (e.g., published by IEC). The page "[IEEE Smart Grid Standards in Development](#)" lists more than 30 (!) standard projects related to smarter grids.

Which international organization is about to coordinate the development of standards for the many different aspects of smarter grids? There seems to be some competition. It would be advantage for the global community to have - more ore less - a single set of standards for smarter grids. IEC should play a crucial role in getting a consistent set of standards (including IEC/IEEE double logo standards) ... in order to prevent the situation we have in the international fieldbus standardization with tooooo many standard solutions in one (!) standard: IEC 61158. Click [HERE](#) to see the list of filedbus standards.

Posted by [Karlheinz Schwarz](#) at [10:33 PM](#) [0 comments](#) 

Labels: [communication](#), [electric power system](#), [IEC 61850](#), [IEC61850](#), [IEEE](#), [Power Automation](#), [Smart Grid](#), [standards](#)

Sunday, December 20, 2009

Interoperability for Intelligent Devices for Transportation

A very comprehensive set of standards for information models and information exchange has been published for ITS (Intelligent Transportation Systems; defined and used in the U.S.). One crucial objective is to reach Interoperability: "A standards-based approach to integration helps to **facilitate the exchange of transportation data as well as more easily accommodate future equipment replacements, systems upgrades, and system expansions.**"

The standard NTCIP 1213, for example, defines a couple of information models that are also defined in IEC 61850.

NTCIP 1213 v02.19 (National Transportation Communications for ITS Protocol -- Object Definitions for Electrical and Lighting Management Systems (ELMS))

Examples of three phase voltages for Delta and Y, current and power:

```
BranchcircuitEntry ::= SEQUENCE {  
    ...  
    branchcircuitVoltageAB INTEGER,  
    branchcircuitVoltageBC INTEGER,  
    branchcircuitVoltageCA INTEGER,  
    branchcircuitVoltageAN INTEGER,  
    branchcircuitVoltageBN INTEGER,  
    branchcircuitVoltageCN INTEGER,  
    branchcircuitCurrent    INTEGER,  
    branchcircuitPower      INTEGER  
    ...  
}
```

These models are mapped to MIB (SNMP) and communicated, e.g., in ASN.1 BER - as is the case for IEC 61850-8-1. It would be nice to use the IEC 61850-7-4 [MMXU](#) (three phase electrical measurements for all applications - independent of transportation, distribution, generation, ...).

Smart Power Distribution Grids will have a lot of relations to Transportation Systems and vice versa.

No Power System - NO Transportation!

Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

The NIST Smart Grid activities list the NTCIP part 1213 in the [SGIP Identified Standards](#) (number 31).

Click [HERE](#) for the ITS website ... provides [free access](#) to model and protocol standards, e.g. part 1213 can be accessed for free (registration required).

Click [HERE](#) for more information on the ITS Standards Background.

Posted by [Karlheinz Schwarz](#) at 8:50 PM 0 comments 

Labels: [Automation](#), [communication](#), [IEC 61850](#), [Intelligent Transportation System](#), [interchangeability](#), [interoperability](#), [ITS](#), [message encoding](#), [NIST Roadmap](#), [NTCIP](#), [SNMP](#), [Transmission Grid](#)

Wednesday, November 25, 2009

IEC 61131-3 and IEC 61499 in action

The standard IEC 61499 (Functionblocks) is implemented on several platforms. NXTControl demonstrates a couple of PLCs (from Beckhoff, Siemens, ...) with IEC 61499 at the SPS/IPC/DRIVES Fair in Nuremberg (Germany) this week.

After discussions with several experts I expect a big move towards more standards in the Automation arena. The financial crisis lets more people think about using well accepted international standards - to get rid of too many vendor specific or even standardized solutions.

IEC 61499 focuses on:

Portability: the ability of software tools to accept and correctly interpret library elements produced by other software tools.


Configurability: the ability of devices and their software components to be configured (selected, assigned locations, interconnected and parameterized) by multiple software tools.

Interoperability: the ability of devices from different vendors operating together to perform the functions specified by one or more distributed applications.

The interoperability is mainly provided by a standardized international information and information exchange standard like IEC 61850. Several people I met at the fair yesterday are looking for the combination of the two standards: IEC 61499 and IEC 61850. More to come soon.

Click [HERE](#) for the comparison of IEC 61131-3 and IEC 61499.

Click [HERE](#) for other posts on this blog that discuss IEC 61499 and IEC 61850 to get to really sustainable interoperability.

Posted by [Karlheinz Schwarz](#) at 1:36 AM 0 comments 

Labels: [Automation](#), [communication](#), [IEC 61131-3](#), [IEC 61499](#), [IEC 61850](#), [interoperability](#), [sustainable interoperability](#)

Tuesday, November 24, 2009

AEP Ohio gridSMART Demonstration Project funded with US\$ 150.000.000

US DoE Secretary Chu announced on Nov. 24, 2009, a total of \$620 Million for 32 Smart Grid Demonstration and Energy Storage Projects.

"The projects include streamlined communication technologies that will allow different parts of the grid to **"talk" to each other in real time; sensing and control devices** that help grid operators monitor and control the flow of electricity to **avoid disruptions and outages**; smart meters and in-home systems that empower consumers to reduce their energy use and save money; energy storage options; and on-site and renewable energy sources that can be integrated onto the electrical grid."

"The project will include 13 different **technologies from the substation to the customer**, including **distribution automation and control**, smart meters and appliances, home area networks, plug-in hybrid electric vehicles, energy and battery storage, and renewable generation sources."

This is the time for Standards like IEC 61850, DNP3, IEC 61400-25, IEC 61968/70 CIM, ... to make the Grid smarter. After many years in operation these standards are mature for large scale implementations.

Recovery Act funding granted: \$435,200,987
Total Project Value Including Cost Share: \$877,241,878

Click [HERE](#) for the full press release.

Click [HERE](#) for the list of funded projects.

Posted by [Karlheinz Schwarz](#) at 9:44 PM 0 comments 

Labels: [communication](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [interoperability](#), [Power Automation](#), [Smart Grid](#)

Friday, November 20, 2009

Information Models and Protocols for Smart Grids

"The **Smart Grid Interoperability Panel (SGIP)**, a new stakeholder forum to provide technical support to the Commerce Department's National Institute of Standards and Technology (NIST) as it **coordinates standards for a modernized electric power system**, concluded today (19. Nov. 2009) with election of 20 members to its governing board."

Key for the SGIP is to "coordinate the development of a **framework** that includes **protocols** and **model standards** for information management to achieve interoperability of smart grid devices and systems."

Click [HERE](#) for the press release.

Posted by [Karlheinz Schwarz](#) at 9:38 PM 0 comments 

Labels: [communication](#), [interoperability](#), [interoperability tests](#), [Smart Grid](#), [standards](#)

IEC 61850 at the Conference on Innovative Smart Grid Technologies

"The first Conference on Innovative Smart Grid Technologies, sponsored by the IEEE Power & Energy Society (PES) and hosted by the National Institute of Standards and Technology (NIST), will be held January 19 - 21, 2010 in Gaithersburg, Maryland, USA. The Conference will be a forum for the participants to discuss the state of the art innovations in smart grid technologies. The Conference will feature special sessions and tutorials by international experts on smart grid applications."

Paper presentation at the conference:

"Towards the Energy Web via Standards-enabled Smart Grid"

Authors:

Valeriy Vyatkin, Senior Member, IEEE,
Gulnara Zhabelova, non-member,
Neil Higgins, Member, IEEE,
Mihaela Ulieru, Senior Member, IEEE
Karlheinz Schwarz, Member, IEEE and
Nirmal-Kumar C Nair, Member, IEEE

Abstract -- In this paper we propose an information and control architecture for Smart Grid based on the combination of upcoming industrial standards and intelligent control methods. We make the case that an incremental approach is required for the transition to the Smart Grid and propose a way of doing that through **bringing intelligence down to the level of substation automation devices**. The architecture employs two strong international standards, **IEC 61850 and IEC 61499**, to enrich the applications that can be created using interoperable Smart Grid devices. Interoperability and open configurability - key enablers for efficient application of the revolutionary EnergyWeb ideas - are evident in this architecture. The utility network is **modelled as IEC 61850-compliant logical nodes, embedded in an IEC 61499 distributed automation framework**. The system is simulated in an IEC 61499 execution environment combined with Matlab, and is proven to achieve **simple fault location and power restoration goals through collaborative behaviour**.

Click [HERE](#) for the conference website.

Posted by [Karlheinz Schwarz](#) at 9:08 PM [1 comments](#) 

Labels: [Automation](#), [communication](#), [conference](#), [electric power system](#), [IEC 61499](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [NIST](#), [Smart Grid](#), [standards](#)

Tuesday, November 17, 2009

Active and Reactive Power Control with IEC 61400-25-2

The focus of the IEC 61400-25 series is on the communications between wind power plant components such as wind turbines and actors such as SCADA systems. IEC 61400-25-2 specifies the information model of devices and functions related to wind power plant applications. These models extend IEC 61850-7-x models. Almost all definitions, hardware and software solutions available for IEC 61850 can be used for IEC 61400-25-2. In particular, IEC 61400-25-2 specifies the compatible logical node names, and data names for communication between wind power plant components.

The standard IEC 61400-25-2 defines a comprehensive list of information models (Logical Nodes) for wind turbines, e.g.:

- WTUR - Wind turbine general information
- WROT - Wind turbine rotor information
- WTRM - Wind turbine transmission information
- WGEN - Wind turbine generator information
- WCNV - Wind turbine converter information
- WTRF - Wind turbine transformer information
- WNAC - Wind turbine nacelle information
- WYAW - Wind turbine yawing information
- WTOW - Wind turbine tower information

The most crucial Logical Nodes are likely the

- WAPC - Wind power plant **active power control** information
- WRPC - Wind power plant **reactive power control** information

These models describe the "interface" between a complete **park and the grid operator for control purposes**. These Logical Nodes can be used for other power resources like CHP, PV, ... The German EEG (Erneuerbare-Energien-Gesetz) accelerates the application of IEC 61400-25 tremendously, because the Grid Operator needs more information about the park and he needs to control the whole power system in cases of faults and critical conditions - wind power plants and other resources are an integrated part of the whole system. These resources cannot be treated just as negative loads.

The WAPC (active power control) comprises the following Data Objects:

Status information

- Actual number of wind turbines in operation
- Active Power Limitation Mode Enabled
- Active Power Control Mode Enabled controlling apparent power
- Gradient Function Enabled
- Delta Function Enabled

Measurements

- Wind Power Plant active power output capability
- Wind Power Plant active power output
- Wind Power Plant apparent power
- Wind Power Plant Gradient
- Wind Power Plant active power reserve utilizing the Delta function
–
the difference between active power generation capability and active power generated

Control information

- Activate active power control function
- Activate apparent power control function
- Activate gradient control function
- Activate delta control function
- Set reference value for the wind power plant active power output
- Set reference value for the wind power plant apparent power output
- Set reference value for gradient ramping up the wind power plant active power output
- Set reference value for gradient ramping down the wind power plant active power output
- Set reference value for the wind power plant active power reserve
–
also named as "spinning reserve"

The information provided by these models is crucial for a future stable power delivery system.

Posted by [Karlheinz Schwarz](#) at [8:11 AM](#) [0 comments](#) 

Labels: [active power control](#), [control center](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [reactive power control](#), [wind power](#), [wind turbine controller](#)

Seats for IEC 61850 Tutorial at the SPS/IPC/DRIVES available

The Tutorial "**IEC 61850 - Die universale Norm für die Informations-Integration**" during the SPS/IPC/DRIVES on Tuesday, 24.11.2009, 14:00 - 17:00 is approaching quite fast ... **just 7 days left to register!** The presentation is in German - presentation material is in English.

Please note that a real live demo will show crucial benefits of the new standard - for power automation and industrial automation. What is industrial automation without POWER (automation)?

Several manufacturers will show IEC 61850 connectivity ... one is Beckhoff.

Click [HERE](#) for the program and other details.

Click [HERE](#) for information on Beckhoff's support of IEC 61850/61400-25.

Posted by [Karlheinz Schwarz](#) at [3:48 AM](#) [0 comments](#) 

Labels: [beckhoff](#), [control center](#), [IEC 61400-25](#), [IEC 61850](#), [PLC](#), [Power Automation](#), [wind power](#)

Access to key O&M data by use of IEC 61400-25


Availability of online and historical data is a prerequisite for effective operation and maintenance (O&M) of wind power plants. This is where the standard series IEC 61400-25 "Wind turbines – Communications for monitoring and control of wind power plants" comes in. IEC 61400-25 is mainly an extension of the definitions of IEC 61850. A substation does not have a rotor - obviously. So we had to add a model for the rotor with **WROT** as the standard Logical Node and **WROT.RotSpd** as the data object for the rotor speed. Where ever a rotor of a wind mill turns it could be modeled as WROT.RotSpd. Since the publication of the standard series there is no need for vendor specific communication solutions and no need for myriads of Excel or Word tables of signal lists that specify the rotor speed with some kind of an index. What does "A2839" mean? May be it is the rotor speed of a turbine running in Buxtehude" - who knows. Of course it takes some time to have the standard implemented ... a couple of IEC 61400-25 conformant products are already available.

According to a presentation at the the European Offshore Wind 2009 Conference & Exhibition, 14 – 16 September, Stockholm (Sweden): "Vattenfall, Statkraft and DONG Energy have all **included the IEC 61400-25 series in their requirements specifications. Support for the standard is one of the evaluation criteria for the delivery of new wind power plants.**"

Click [HERE](#) for the poster presented in Stockholm.

Click [HERE](#) for a paper on the subject.

Click [HERE](#) for a presentation.

Posted by [Karlheinz Schwarz](#) at [12:43 AM](#) [0 comments](#) 

Labels: [communication](#), [condition monitoring](#), [IEC 61400-25](#), [IEC 61850](#), [SCADA](#), [Vattenfall](#), [wind power](#), [wind turbine controller](#)

Monday, November 16, 2009

OpenGrid uses IEC 61850 and IEC 60870-6-TASE.2

The Current Group developed a so-called "*OpenGrid*" *specification as a* "software foundation to enable Smart Grid applications deployed today and in the future. The *OpenGrid* platform provides the network and data management system to integrate any grid device, including intelligent sensors, capacitor banks, tap changers, reclosers, switches, substation devices and meters with a variety of low-latency IP based communications systems."

Key components are (many based on IEC standards developed by IEC TC 57) a "Smart Grid communication network using industry standard protocols such as **IEC 61850**, DNP3, IP and SNMP" and "SCADA integration adapters utilizing **ICCP TASE.2**, while GIS and OMS integration adapters are built using **IEC 61968-11 CIM**".

Click [HERE](#) to learn more about the OpenGrid.

Posted by [Karlheinz Schwarz](#) at [11:49 PM](#) [0 comments](#) 

Labels: [CIM](#), [communication](#), [DNP3](#), [IEC 61850](#), [IEC 61968](#), [IEC61850](#), [implementation](#), [TASE.2 ICCP](#)

Friday, November 13, 2009

RWE awarded Development of IEC 61400-25 for Wind Power Control System

RWE (second biggest German Utility) awarded Mr. Pascal Dresselhaus for the development of an **IEC 61400-25** compliant software for a Beckhoff PLC (Programmable Logic Controller). He implemented the mapping to MMS according to IEC 61850-8-1. Mr. Dresselhaus' Diploma-Thesis "Entwicklung einer Bibliothek für die Kommunikation von Windkraftanlagen nach IEC 61400-25" **won the highest award!** Congratulation!

The development is now available as a Product of Beckhoff.

Click [HERE](#) for some information related to the Development (English).

Click [HERE](#) for the press release of RWE (German only).

Click [HERE](#) for the press release of the Fachhochschule Südwestfalen (German only)

Posted by [Karlheinz Schwarz](#) at [10:44 PM](#) [0 comments](#) 

Labels: [communication](#), [IEC 61400-25](#), [IEC 61850](#), [PLC](#), [Power Automation](#), [wind power](#), [wind turbine controller](#)

Thursday, November 12, 2009

First Part of IEC 61850 Edition 2 Approved

The first part of Edition 2 of IEC 61850 has been approved for publication:


Communication networks and systems for power utility automation - Part 6: Configuration description language for communication in electrical substations related to IEDs (SCL).

Note that the application domain of the configuration language is much broader than for substations. Part 6 can easily applied to any IED that uses Logical Devices, Logical Nodes, Data Objects and common data classes. Only the Substation Section (describing the single line diagram)

is specific to electrical substations. The rest is quite common. Experts of IEC 61400-25 have recently discussed with IEC 61850-6 experts on how to add a corresponding wind power turbine model - as an extension - to IEC 61850-6. The work on such an extension is likely to start in 2010. The same is true for hydro power plants and DER.

Further parts of Edition 2 of IEC 61850 will follow in 2010.

Click [HERE](#) for the official webpage for IEC 61850-6.

Posted by [Karlheinz Schwarz](#) at [5:02 AM](#) [0 comments](#) 

Labels: [configuration](#), [engineering](#), [IEC 61850](#), [IEC61850](#)

Friday, November 6, 2009

General Electric to support University education

General Electric will donate an Innovation Lab for power systems and communications to The University of Western Ontario in London, Ontario.

The Lab will help in training on power system protection and automation of electrical substations, including the use of IEC 61850 and Ethernet communication. This is a major step in educating more young people in advanced information and communication technologies for the future power system.

Click [HERE](#) for the full press release.

Posted by [Karlheinz Schwarz](#) at [12:27 AM](#) [0 comments](#) 

Labels: [communication](#), [education](#), [electric power system](#), [IEC 61850](#), [IEC61850](#), [peopleware](#), [workforce](#)

Saturday, October 31, 2009

MMS and ASN.1 Tutorial

The basics of MMS (Manufacturing Message Specification, ISO 9506) and ASN.1 (Abstract Syntax Notation 1) are available at the NettedAutomation Website.

MMS is a messaging system for modeling real devices and functions and for exchanging information about the real device, and exchanging process data - under real-time conditions - and supervisory control information between networked devices and/or computer applications. MMS is an international standard (ISO 9506) that has been developed and maintained by the ISO Technical Committee 184 (TC184) - Industrial Automation - of the International Organization for Standardization (ISO).

The object models and messaging services provided by MMS are generic enough to be appropriate for a wide variety of devices, applications, and industries. Whether the device is a Programmable Logic Controller (PLC) or a robot, the MMS object models, services and messages are identical. Similarly, applications as diverse as material handling, fault annunciation, energy management, electrical power distribution control, inventory control, and deep space antenna positioning in industries as varied as automotive, aerospace, petro-chemical, electric utility, office machinery and space exploration have put MMS to useful work.

MMS is the base standard to communicate all client/server information

exchange for **IEC 61850**, **IEC 61400-25** (in addition to other protocols) and **IEC 60870-6 TASE.2 (ICCP)**. ASN.1 is used in MMS to specify the syntax of messages, ASN.1 BER defines the concrete encoding of the messages. Please note that **only a small subset of MMS and ASN.1** is needed by IEC 61850, IEC 61400-25 and TASE.2.

Click [HERE](#) to begin the Tutorial ... enjoy.

Posted by [Karlheinz Schwarz](#) at 5:44 AM [1 comments](#) 

Labels: [ASN.1](#), [communication](#), [IEC](#), [IEC 61850](#), [IEC61850](#), [message encoding](#), [MMS](#), [TASE.2](#), [TASE.2 ICCP](#)

Freely Available ISO and IEC Standards

A list of more than 300 ISO and IEC standards are made **available by ISO/IEC for free download**.

The list comprises many standards for information and communication technologies like:

ISO/IEC 7498-1:1994
Information technology -- Open Systems Interconnection -- Basic Reference Model: The Basic Model

ISO/IEC 7498-3:1997
Information technology -- Open Systems Interconnection -- Basic Reference Model: Naming and addressing

ISO/IEC 16448:2002
Information technology -- 120 mm DVD -- Read-only disk

ISO/IEC 23360-1..8:2006
Linux Standard Base (LSB) core specification 3.1-- Part 1 to 8

Click [HERE](#) for the full list of freely available standards.

Posted by [Karlheinz Schwarz](#) at 5:31 AM [0 comments](#) 

Labels: [ICT](#), [IEC](#), [interoperability](#), [ISO](#), [standards](#)

Thursday, October 29, 2009

US Smart Grid - \$8 Billion investment including \$4.3 from Government

The US Government and the power industry will invest more than US\$ 8,000,000,000 in improving the electric delivery system in the US. 100 private companies, utilities, manufacturers, cities and other partners received the Smart Grid Investment Grant awards on October 27, 2009.

The Government has awarded many groups with a total of \$3.4 Billion! These groups will invest an additional \$4.7 Billion.

Millions of Smart Meters, 850 Phase Measurement Units, more than 200,000 Smart Transformers, almost 700 automated substations, ... will be installed by these projects. There seems to be a high potential and need for the application of standardized information and information exchange.

Click [HERE](#) for the DoE press release October 27, 2009.

Click [HERE](#) for the list of grants awarded by category.

Click [HERE](#) for the list of grants awarded by state.

Click [HERE](#) for a map of the awards.

More to come in other countries.

Posted by [Karlheinz Schwarz](#) at 4:20 AM 0 comments 

Labels: [NIST Roadmap](#), [Obama](#), [Power Automation](#), [Power Plants](#), [Smart Grid](#), [Substation](#), [US president](#)

Wednesday, October 28, 2009

The "Semantic Web" in Power System Automation

Traditionally almost all communication solutions for automation and especially for power system automation is build on hundred and thousands of "Points" (Signals) organized in huge lists. Each "Point" has a type and a kind of a simple index (or identifier). Different vendors (or even different people) use different list. In one case the "Phase A Voltage to ground" may have the index "26717" in another case it may be "363.26". Do you know what these numbers mean?

This is comparable to the web of today: search engines are searching mainly for ASCII strings. If I search for "Guenther" "Wilhelm", I could not specify that "Guenther" is the first name and "Wilhelm" is the family name. Google returns 18,700,000 hits. Searching for "Guenther Wilhelm" returns just 30,000 hits. The second is closer to what I am looking for. I would like to search like this: "firstname = Guenther" and "familyname = Wilhelm". In this example we have added some semantic (meaning) to the names.

It would be nice to have **reasonable names for the "signals"** instead of **just numbers** and to have **semantic** added to the "signals". This would allow to interpret the list of signals - IF THE NAMES ARE CHOSEN TO MEAN SOMETHING USEFUL. IEC 61850 and IEC 61400-25 are standards that define semantic and names for each signal - like the Semantic Web does.


According to Wikipedia is "**The Semantic Web** an evolving development of the World Wide Web in which the **meaning (semantics) of information and services on the web is defined**, making it possible for the web to understand and satisfy the requests of people and machines to use the web content."

In IEC 61850 we have decided many years ago that the name for the three-phase electrical system should be the same all over (in principle) and the same for all voltage levels - because the electrical system is the same all over (with different voltages and frequencies). The following picture shows two voltage levels and a single model for the three-phase system. The name "**MMXU**" stands for a logical node defining all crucial information that describes a three-phase electrical system. The "**PhV**" (phase voltage) has a "**PhsA**" value etc. Each of the values has SI-Units, scaling factors etc. These names expose the same information all over, in all applications (in substations and in factories, on ships, on railways, ...). Why do we need myriads of different indices in current solutions for the same information?


Standard Logical Node Class **MMXU**

A	Phase currents
PhV	Phase to ground voltage
PhV.PhsA	
PhV.PhsB	
...	
PPV	Phase to phase voltage
W	Phase active power
VAR	Phase reactive power
VA	Phase apparent power
TotW	Total active power
TotVAR	Total reactive power
TotVA	Total apparent power
Hz	Frequency


400.000 Volt



400 Volt



What's the difference?
... don't touch the line to figure it out!!

Page 32
© 2009 Netted Automation


The communication based on simple lists seems to be simple. But if your company has **Millions of points to test and to manage** ... what then? Guess there is no need to discuss the **problems handling huge lists** - lists that are differently formatted and contained in Wordfiles, Spreadsheets, pdf files, just on paper, data bases, ... How could one make these lists machine readable? One of my customers told me that the have to maintain 1,300 documents containing signal lists - wow.

IEC 61850 is - to my knowledge - the only comprehensive standard that defines common and specific information models for the electric power industry and beyond. We had a proposal to add a "FishCounter" for hydro power plants ... why not? The standard also defines services to exchange the values and concrete protocols to serialize the services.

IEC 61850 could be understood as the "Semantic Web" of the power automation and protection world. Now you can read the Phase voltage of **MMXU1** of the logical device **SpyDER** under the address: **192.168.1.77**. In order to know where this device is located you just can talk to the device to retrieve some description or you can use the system configuration description file (according to IEC 61850-6). This file has all semantic information including the binding of the model to the real world.

Click [HERE](#) for an example of a device that implements the MMXU logical node and exposes the voltage of the power outlet it is connected to.

In this regard IEC 61850 is **MAYA** (Most Advanced Yet Accepted) -- [accepted all over](#).

Posted by [Karlheinz Schwarz](#) at 5:06 PM 0 comments 

Labels: [Automation](#), [communication](#), [engineering](#), [IED](#), [interoperability tests](#), [message encoding](#), [process control](#), [protection](#), [Smart Grid](#), [standards](#), [Substation Automation](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Wednesday, October 28, 2009

NIST Smart Grid Roadmap open for Comments

The Draft NIST Framework and Roadmap for Smart Grid Interoperability

Standards, Release 1.0 is open for Comments. The US National Institute of Standards and Technology (NIST) of the Department of Commerce invites you to comment on the crucial roadmap towards a smarter Grid.

The commenting period **ends on November 09, 2009**.

Click [HERE](#) for a description of the procedure and any other information needed to comment on this crucial document.

Please take a moment (or two) to review and comment the draft roadmap. This is your chance to contribute in this open process. Your opinion is crucial. If you have and comment you want to share with me please feel free to contact me.

Posted by [Karlheinz Schwarz](#) at [12:03 PM](#) [0 comments](#) 

Labels: [communication](#), [electric power system](#), [NIST](#), [NIST Roadmap](#), [Smart Grid](#)

Smart(er) Grids: US DoE spends \$ 100,000,000 on training - and you?

Smart Grids require smart engineers. Are there enough power engineers available to design, plan, build, operate, maintain, ... the Smart(er) Grids yet to be build? NO! So, what to do? The solution is as simple as this: **Educate more people interested** to keep the gras green, the sky blue and the **power flowing**.

The Billions of US\$ to be spent for the Smart(er) Grids during the next years require **skilled people that have already experience in power systems and power system automation** - but may not have been educated to use advanced information and communication technologies for:

- Self-healing mechanisms conducted by smart devices
- Demand response
- Handling physical and cyber attacks
- Providing high power quality
- Accommodating a mix of multiple generation and storage options
- Enabling new opportunities in the power delivery
- Optimizing asset usage and lifetime, and operation efficiency

The US Department of Energy (DoE) has realized that EDUCATION is key for the success in implementing a Smart(er) Grid. It spends \$ 100,000,000 for various measures to improve the **Knowledge, Understanding, and Application** of advanced information and

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communication technologies!! The earlier you start with the training - the better.

I have already started to train my grandson:

Long term education starts here

My grandson
Joern (5)
may become
an engineer
like his
grandfathers
and father ...



... he did not
inherit our
experience ...
so I started to
educate him

One crucial element in building the Samrt(er) Grid is the use of various international standards: IEC 61850, IEC 61400-25, IEC 61968/70 CIM, DNP3, IEC 61131-3 (PLC programming), IEC 61499 (Functionblocks), IEC 61158 (Field busses) etc.

After training of more than 2,000 experts from more than 400 companies and more than 50 countries NettedAutomation is ready to educate you and your people soon - in order to get the most comprehensive **Knowledge, Understanding, and Application** of the above mentioned standards. You'd get first-hand, very comprehensive, vendor neutral and up-to-date knowledge, experience, and guidance; learn how to reach interoperability of devices; You'd get best advice.

Often I have found this situation:

Bright future of utility engineers



That's good for vendors BUT not for Utilities and system integrators.

Click [HERE](#) for a brief statement of IEEE on the DoE plans.

Click [HERE](#) for a brand-new paper on "**Professional Resources to Implement the "Smart Grid"**" written by nine university and education experts.

Click [HERE](#) for a report on the latest training last week in Frankfurt/Germany where experts from 11 countries attended our IEC 61850 training.

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Contributors

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[Karlheinz Schwarz](#)

[CONTACT us by email](#) in case you have any question with regard to your education needs on advanced standard information and communication technologies for the Smart(er) Grids.

Posted by [Karlheinz Schwarz](#) at [5:51 AM](#) [0 comments](#) 

Labels: [communication](#), [education](#), [electric power system](#), [engineering](#), [hands-on Training](#), [IEC 61131-3](#), [IEC 61499](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC61850](#), [peopleware](#), [Smart Grid](#), [standards](#), [sustainable interoperability](#), [workforce](#)

Friday, October 23, 2009

Microsoft's Smart Energy Reference Architecture

Microsoft has published the other day a comprehensive "**Power and Utilities - Smart Energy Reference Architecture**". "Microsoft believes it's more accurate to refer to the new utility landscape as a "smart energy ecosystem" that's collaborative and integrated."

The Smartness comprises - of course - more than the Grid. The "**smart energy ecosystem**" describes the challenge very well.

Microsoft says that it "is committed to supporting these global efforts by taking a leadership role in the development of the smart energy ecosystem" as discussed in China, Europe, North America, ... by **IEC**, **IEEE**, ... IEC Standards (IEC 61968/70, IEC 61850, IEC 610870-6, ...) are referenced some 80 times in Microsoft's architecture!!

Click [HERE](#) for the full Microsoft Architecture [pdf, 6 MB].

The Smart Energy Ecosystem requires many **Smart People** defining, implementing and using the needed Standards to realize the vision.
Smart People are those that are well educated.

Click [HERE](#) for an opportunity (in San Antonio, 29-30 October 2009) to get **comprehensive education in the application of Standards like IEC 61850, IEC 61400-25, DNP3, ...** Click [HERE](#) for the program.

Posted by [Karlheinz Schwarz](#) at [11:02 PM](#) [0 comments](#) 

Labels: [CIM](#), [communication](#), [DNP3](#), [electric power system](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC61850](#), [implementation](#), [Microsoft](#), [NIST](#), [Power Automation](#), [security](#), [workforce](#)

Experts from 11 countries attended IEC 61850 training in Frankfurt

More than 20 experts from 11 countries attended the Comprehensive & Independent Hands-on Training on IEC 61850 in Frankfurt (Germany), 20.-23. October 2009 organized by NettedAutomation GmbH and [STRI](#):



Experts from: Belgium, Cyprus, Denmark, Germany, Hungary, Iceland, Ireland, Lithuania, Norway, Sweden, and USA

In order for users and system integrators to utilize the benefits of IEC 61850 it is **necessary for power utilities, integrators and vendors to education their most crucial asset – people.**

The attendees have been educated in most crucial aspects of IEC 61850. The **interoperability training (Client/Server and GOOSE)** was run using IEDs from ABB (Relay), AREVA (Relay), Beckhoff (PLC), Ingeteam (Bay Controller), QNE (Measuring Unit), SEL (Relay), Siemens (Relay), Hirschmann (Ethernet Switch) and RuggedCom (Ethernet Switch and Router):



The SCL Engineering training was conducted by Joerg Reuter (Helinks):



Click [HERE](#) to find the scheduled seminars and training opportunities.
Click [HERE](#) to see the list of the ratings by course participants (very high level of satisfaction).

Posted by [Karlheinz Schwarz](#) at [10:19 PM](#) [0 comments](#) 

Labels: [ABB](#), [electric power system](#), [hands-on Training](#), [hirschmann](#), [IEC 61850](#), [IEC61850](#), [interoperability tests](#), [peopleware](#), [seminar](#), [Siemens](#), [workforce](#)


New Tool for IEC 61850 and IEC 61400-25

Ingeteam Technology (Spain) released the INGESYS®energyFactorySuite 2.0: a comprehensive suite of tools for modeling, configuring and commissioning IEC 61850 and IEC 61400-25 systems.

Click [HERE](#) for a description of Ingeteam's IEDs for power system automation [pdf, 1.5 MB].

Click [HERE](#) for a description of Ingeteam's NEW Tool for IEC 61850 and IEC 61400-25 [pdf, 0.85 MB].

Click [HERE](#) to read more details on the tool and find link to download a demo version.

Posted by [Karlheinz Schwarz](#) at [9:26 PM](#) [0 comments](#) 

Labels: [engineering](#), [IEC 61400-25](#), [IEC 61850](#), [IEC61850](#), [IED](#), [Power Automation](#), [process control](#), [tools](#)

Wednesday, October 14, 2009

NIST Smart Grid Collaboration Site - News

The **Smart Grid Interoperability Panel** (SGIP) will be launched in Denver (Colorado) on 16 November 2009. This panel is being created to provide a more permanent structure and process—with stakeholder representation—to support the **Framework and Roadmap for Smart Grid Interoperability Standards**.

The standards development process is likely to be monitored and supported by the panel. It is crucial that the standardization groups closely cooperate together and with the members of the SGIP - in order to reach a high level of interoperability for the many devices and systems to be installed in the future Smart(er) Grid.

TEAMWORK is very crucial to reach sustainable interoperability: **Smart People for Smart Grids**.

Note that several standards developed and published by IEC TC 57, e.g., IEC 61850, CIM, ... and DNP3 are crucial for the Roadmap - in the

US and in many other regions and countries.

Click [HERE](#) for the website of the SGIP.

Click [HERE](#) for a **ONE page introduction** to IEC 61850 and IEC 61400-25.

Posted by [Karlheinz Schwarz](#) at [1:33 PM](#) [0 comments](#) 

Labels: [61850](#), [DER](#), [DNP3](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Smart Grid](#)

Tuesday, October 13, 2009

IEC61850-Tutorial während der SPS/IPC/Drives in Nürnberg

Was: Dreistündiges Tutorial "IEC 61850 - Die universale Norm für die Informations-Integration"

Die Norm IEC 61850 „Communication networks and systems for power utility automation“ ist die global anerkannte Integrationslösung für die Automatisierung in der elektrischen Energieversorgung und zunehmend in anderen Bereichen. Mittlerweile ist diese Norm ein wichtiger Baustein der weltweiten Aktivitäten zur Erneuerung der Energieversorgung hin zu einem Smart Grid. In dem Tutorial wird der Stand der Normung und der Anwendungen im In- und Ausland vorgestellt - möglicherweise sind Sie viel unmittelbarer von dieser Norm betroffen, als Sie glauben!

Wann: Tuesday, 24.11.2009, 14:00 - 17:00 hrs

Wo: Nürnberg (Germany)

Click [HIER](#) für weitere Informationen und das Anmeldeformular.

Posted by [Karlheinz Schwarz](#) at [1:39 PM](#) [0 comments](#) 

Labels: [61850](#), [Automation](#), [electric power system](#), [IEC 61850](#), [IEC61850](#), [Power Automation](#), [Smart Grid](#)


Friday, October 9, 2009

Interoperability, secure Investments and IEC

While some **50 IEC TC 57 experts** from all over were meeting in Los Angeles this week to work on **Interoperability Standards**, the US Government announced a Comprehensive Energy Plan. One objective of the plan is to "support **\$ 32 Billion** in loan guarantees and create **\$40-50 Billion** in project investments" another is to "providing \$750 million to accelerate conventional renewable energy projects" ... many dollars will be used to develop and use interoperable information and communication standards.

The information and communication technology for the Smart(er) Grids requires a high level of syntactic and semantic interoperability of the various products, solutions and systems that build up the future power system. Furthermore the specific requirements like **long term investment security** in existing interoperability standards (like IEC 61850, IEC 60870-5, IEC 61968/70, DNP3, ...) and **legacy systems** must be considered. These two rationales - **interoperability** and **investment security** - make it absolutely necessary to base all developments and investment of Billions of Dollar or Euros on a **sound framework of sustainable interoperability standards**. IEC and especially IEC TC 57 are developing crucial elements of this framework.

Click [HERE](#) for the US Government press release (2009-10-07)
Click [HERE](#) for the US Government presentation (2009-10-07)
Click [HERE](#) for IEC TC 57 Scope (Power systems management and associated information exchange)
Click [HERE](#) for the list of experts of WG 19 "Interoperability within TC 57 in the long term"
Click [HERE](#) for information on the IEC Special Group on Smart Grids (SG 3).

Posted by [Karlheinz Schwarz](#) at 6:44 AM 0 comments 

Labels: [communication](#), [DNP3](#), [electric power system](#), [IEC 61850](#), [IEC61850](#), [interoperability tests](#), [Smart Grid](#), [Transmission Grid](#)

Thursday, October 8, 2009

First PLC supporting IEC 61850 in comprehensive Hands-On Training

Beckhoff (Verl, Germany) provides an IEC 61850 compliant Standard PLC with a Server according to IEC 61850 for the comprehensive Hands-On Training in Frankfurt (Germany) on October 20-23, 2009:



The Seminar and Hands-on Training will cover all crucial aspects of the standards and common IEDs from ABB, Areva, Siemens, Omicron, Megger, ... and Beckhoff.

Click [HERE](#) for details of the program.
Click [HERE](#) for other training opportunities all over.
Click [HERE](#) for more details on the Beckhoff PLC with IEC 61850 support.

Posted by [Karlheinz Schwarz](#) at 7:02 AM 0 comments 

Labels: [61850](#), [communication](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [IEC61850](#), [IED](#), [PLC](#), [process control](#), [wind turbine controller](#)

Wednesday, October 7, 2009

Australia to invest AUD 43 Billion in communication

The Australian Government and other stakeholders will invest up to **AUD 43 billion** over eight years to build and operate a National Broadband Network to bring broadband communication to Australian homes and workplaces. This infrastructure is likely being used for Smart Grid applications.

Click [HERE](#) for more details.

The Government also announced the other day investment of up to **AUD 100 million** to develop the Smart Grid, Smart City demonstration project in partnership with the energy sector in 2010.

Click [HERE](#) for more details.

Smart Grids are the future Backbones of societies ... all over. No power - no communication; no communication - no power.

Posted by [Karlheinz Schwarz](#) at [6:41 AM](#) [0 comments](#) 

Labels: [Critical Infrastructure Protection](#), [Power Automation](#), [Smart Grid](#)

Monday, October 5, 2009

IEC 61850 IED Scout version 2.10 available


Omicron has posted a new version (2.10) of the IEC 61850 IED Scout on their website for download. There is also some information available on the use cases for the tool.

Be aware that the software runs in demo mode only. If you want to see the full functionality you need a dongle from Omicron.

In case you want to see this and many other tools fully functional in action, you may attend the upcoming IEC 61850 training opportunities in Frankfurt, San Antonio, Brisbane or Sydney.

Click [HERE](#) for information on IEC 61850 training opportunities.

Click [HERE](#) to visit the Omicron web page for more details on the IED Scout.

Posted by [Karlheinz Schwarz](#) at [4:48 AM](#) [0 comments](#) 

Labels: [COMTRADE](#), [electric power system](#), [hands-on Training](#), [IEC 61850](#), [IEC61850](#), [tools](#)

Friday, October 2, 2009

German E-Energy Projects presented at IEEE PES meeting in Calgary

Standards are crucial for the success of the future electric power delivery system - in Germany, Europe, and globally. A presentation of "The German program to manage future power supply" (E-Energy program) during the IEEE PES general meeting in Calgary in July 2009 provides some details of the base architecture and technologies of the German E-Energy Projects (see last but one page for the protocol architecture).

Click [HERE](#) to download the presentation.

Posted by [Karlheinz Schwarz](#) at [11:15 PM](#) [0 comments](#) 

Labels: [61850](#), [DER](#), [IEC 61850](#), [IEC61850](#), [Smart Grid](#)

Thursday, October 1, 2009

smart grid - Smart IEDs - SMART PEOPLE

Dalibor Kladar talks on his blog about substation integration benefits and starts with the statement: "The **intelligence of power system** (PS) is concentrated in **HW/SW products for substation automation and integration**. Those products common name is - Intelligent Electronic Devices (IED). The IED is the 'building block' of SG".

A statement: "This is an IED" does not mean that the HW and SW is really intelligent. In many cases the "I" in "IED" stands for "**Ignorant**" - **Ignorant Electronic Device**.

How does the intelligence come into devices to make them intelligent? By magic? No - there are hundreds of engineers, programmers, architects, accountants, managers, ... involved one way or the other. Many smart people help to make devices and systems really intelligent - others block even interested people to get involved, to get the needed knowledge, education and skills to build and use intelligent devices and systems!


A **lack of education or knowledge** in the area of information, information exchange and configuration of systems in the domain of Smart Grid will endanger our daily need for secure electric power.

During the last 5 years I have trained some 2.000 people from more than 350 companies and from some 50 countries in the area of advanced international smart grid standards for IEDs. It is quite obvious: **smart grids** are build by **smart IEDs** - that are developed by **SMART PEOPLE** - that are trained by **other SMART PEOPLE**.

We can help smart people to learn **the benefits of standards** like DNP2, IEC 60870-6-TASE.2 (ICCP), IEC 60870-5-101/104, IEC 61850, IEC 61968/70 CIM, ... and how to build smart(er) grids.

Click [HERE](#) to get more information on **education opportunities** in Frankfurt (Oct. 20-23), San Antonio (Oct. 29-30), Brisbane (Nov. 30), Sydney (Dec. 02).

Click [HERE](#) to read the Blog of Dalibor Klador.

Posted by [Karlheinz Schwarz](#) at 7:50 AM 0 comments 

Labels: [CIM](#), [DNP3](#), [education](#), [electric power system](#), [engineering](#), [hands-on Training](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [IEC61850](#), [peopleware](#), [Smart Grid](#), [Training](#)

Tuesday, September 29, 2009

100 million US Dollar for single Smart Grid Project!?

Yes! The U.S. government is spending some 4.5 billion US Dollar to smart grid development as part of the economic stimulus package. In San Diego (CA) a coalition of some 25 organizations is applying for **100 million US Dollar** of the stimulus funds! The coalition will increase renewable generation, ... store electricity and **use more sensors, communication technologies and automation** to interconnect the resources.

Click [HERE](#) to read the UCSD news release.

A portion of this money may be spend to develop several new communication solutions or it can be invested to apply available standards like DNP3, IEC 61850, ... TASE.2, BacNet.

Click [HERE](#) to get a copy of the 3rd edition of the "Comparison of IEC 60870-5-101/-103/-104, DNP3, and IEC 60870-6-TASE.2 with IEC 61850"

Posted by [Karlheinz Schwarz](#) at [11:50 PM](#) [0 comments](#) 

Labels: [DNP3](#), [IEC 61850](#), [Power Automation](#), [Smart Grid](#), [TASE.2 ICCP](#)

U.S. Smart Grid development gets support from Europe

AREVA's Transmission and Distribution division (T&D, based in France) announced the other day that it will deliver crucial components (IEDs - Intelligent Electronic Devices) to support Smart Grid research by the Electric Power Research Institute (EPRI).

AREVA provides 13 different IEDs, to be used in the Institute's labs. The devices will help EPRI to implementing the 'Smart Grid': distance protection, transformer protection, line current differential management, feeder management, phasor measurement and GPS time synchronization.

The devices provided by **AREVA and other companies**, will be used to build a small Smart Grid so that various scenarios and tests can be performed. **One of the building blocks will be the IEC 61850 process bus and station bus for system wide interoperability.**

"The goal of this project is to provide a test bed for new ideas to address the challenges facing the Smart Grid," noted Paul Myrda, Technical Executive at EPRI. *"Ultimately, we expect to couple this facility with our existing 'living lab' that primarily deals with end-user devices and with our 'Sensor' lab that is focused on **asset health assessment**."*


Smart Grids will be composed of devices, systems and tools from multiple vendors. The key issue in multi-vendor projects is the **Interoperability of all components** that provide or consume information for the many tasks.

An interoperability test lab based on the IEC 61850 station bus has been build up by STRI (Ludvika, Sweden):

Click [HERE](#) for an overview about the IEC 61850 Interoperability lab.

Click [HERE](#) for a story on "The true meaning of IEC 61850 - Interoperability!"

Click [HERE](#) to see what's next on the agenda of training for multi-vendor systems.

Posted by [Karlheinz Schwarz](#) at [10:15 PM](#) [0 comments](#) 

Labels: [Areva](#), [Automation](#), [communication](#), [condition monitoring](#), [education](#), [electric power system](#), [IEC 61850](#), [IED](#), [interoperability](#), [interoperability tests](#), [process bus](#), [protection](#), [Smart Grid](#)

Monday, September 28, 2009

E-Energy Jahreskongress 26.-27.11.2009 in Berlin

Das Bundesministerium für Wirtschaft und Technologie veranstaltet den **ersten E-Energy Jahreskongress** am Donnerstag 26.11. und Freitag 27.11. im Konferenzzentrum des BMWi in Berlin.

Mit den [E-Energy-Projekten](#) soll in Deutschland der "Durchbruch zum

intelligenten Elektrizitätssystem" (oder - wie die Angelsachsen sagen: **Smart Grid**) erreicht werden!

Laut Veranstalter "bietet der E-Energy Jahreskongress Gelegenheit, Ergebnisse, Akteure und das große Potenzial von E-Energy konkret kennenzulernen. Dem interessierten Fachpublikum bietet der Kongress die Möglichkeit, mit allen E-Energy Projektbeteiligten sowie prominenten Vertretern aus Politik, Wirtschaft und Wissenschaft zu diskutieren. Seien Sie dabei, wenn die Weichen für das Energieversorgungssystem der Zukunft gestellt werden."

Sie sollten sich unbedingt kurzfristig um eine Vorregistrierung bemühen!

Klicken Sie [HIER](#), um zum Programm und zur Anmeldeseite zu gelangen.

Posted by [Karlheinz Schwarz](#) at [11:44 AM](#) [0 comments](#) 

Labels: [E-Energy](#), [electric power system](#), [Smart Grid](#)

Friday, September 25, 2009

Security measures for IEC 60870-5-101 and -104

The standards IEC 60870-5-101 and -104 are in use for many years and will be applied during the next years. The security measures of these protocols need to be improved to meet the market requirements. These standards are used for the communication between control centers and underlying systems like substations or power plants.

A New Work Item (**Security Extensions to IEC 60870-5-101 and IEC 60870-5-104 protocols**; IEC document 57/1029/NP) has been proposed to apply the just published Technical Specification IEC 62351-5 for 101 and 104: The ballot for the NWP closes 2009-12-11. If you are interested to join that work, please contact your [national committee of the IEC TC 57](#).

IEC/TS 62351-5 Ed. 1.0 - Power systems management and associated information exchange - Data and communications security - Part 5: Security for IEC 60870-5 and derivatives

Click [HERE](#) for a preview of IEC/TS 62351-5.

Telecontrol equipment and systems – **Part 5-101**: Transmission protocols - Companion standard for basic telecontrol tasks

Click [HERE](#) for a preview of -101.

Telecontrol equipment and systems – **Part 5-104**: Transmission protocols – Network access for IEC 60870-5-101 using standard transport profiles

Click [HERE](#) for a preview of -104.

Posted by [Karlheinz Schwarz](#) at [11:48 PM](#) [0 comments](#) 

Labels: [control center](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [security](#)

Thursday, September 24, 2009

First Release of the NIST Framework and Roadmap for Smart Grid Interoperability Standards

Commerce Secretary Gary Locke today (2009-09-24) unveiled an accelerated plan for developing standards to transform the U.S. power distribution system into a secure, more efficient and environmentally friendly Smart Grid and create clean-energy jobs.

The NIST Draft Publication "**NIST Framework and Roadmap for Smart Grid Interoperability Standards Release 1.0 (Draft)**" published by the Office of the U.S. National Coordinator for Smart Grid Interoperability" is the result of **thousands of working-hours** of **hundreds of smart people** from many states and countries.

Smart Grids will be build on standards. The most crucial standards are required for the following areas:

- Demand Response and Consumer Energy Efficiency
- Wide Area Situational Awareness
- Electric Storage
- Electric Transportation
- Advanced Metering Infrastructure
- Distribution Grid Management
- Cyber Security
- Network Communications

NIST found that the market has reached already consensus on 16 standards. After review of this list, there are now 31 standards understood as crucial for the smart grid. Many crucial IEC standards like standards from IEC TC 57: IEC 60870-6 (TASE.2), IEC 61850, IEC 61969/61970 (CIM), IEC 62351; IEC TC 65: IEC 62541; other committees: ISO/IEC 15045, ISO/IEC 15067, ISO/IEC 18012, ... are members of the list of the 31 standards!

The experts identified some 70 gaps in the list of standards. 14 gaps have been identified as MOST CRUCIAL to be solved:

"For each, an action plan has been developed, specific organizations tasked, and aggressive milestones in 2009 or early 2010 established. One action plan has already been completed. The Priority Action Plans and targets for completion are (**in bold** = impact from/on standards of IEC TC 57):

1. Smart meter upgradeability standard (completed)
2. Common specification for price and product definition (early 2010)
3. Common scheduling mechanism for energy transactions (year-end 2009)
4. **Common information model for distribution grid management (year-end 2010)**
5. **Standard demand response signals (January 2010)**
6. **Standard for energy use information (January 2010)**
7. **IEC 61850 Objects / DNP3 Mapping (2010)**
8. **Time synchronization (mid-2010)**
9. **Transmission and distribution power systems models mapping (year-end 2010)**
10. **Guidelines for use of IP protocol suite in the Smart Grid(mid-year2010)**
11. **Guidelines for use of wireless communications in the Smart Grid (mid-year 2010)**
12. **Electric storage interconnection guidelines (mid-2010)**
13. **Interoperability standards to support plug-in electric vehicles (December 2010)**
14. **Standard meter data profiles (year-end 2010)**

Click [HERE](#) to read the press release of today (2009-09-24).

Click [HERE](#) to download the 90 page Draft Release 1.0 of the NIST Framework and Roadmap for Smart Grid Interoperability Standards

With that official Draft it is confirmed that crucial international Standards published by IEC TC 57, TC 65, and TC 88 are key for the sustainable interoperability of smart devices and smart systems in smart grids - developed by smart people.

Click [HERE](#) for a discussion on the availability of smart people.

Posted by [Karlheinz Schwarz](#) at [12:26 PM](#) [0 comments](#) 

Labels: [61850-7-420](#), [Automation](#), [CIP](#), [communication](#), [Critical Infrastructure Protection](#), [DER](#), [distribution automation](#), [electric power system](#), [electric vehicles](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-420](#), [IEC 61968](#), [IEC 61970](#), [IEEE 1588](#), [interchangeability](#), [interoperability](#), [interoperability tests](#), [Multispeak](#), [NIST](#), [OPC](#), [peopleware](#), [Power Automation](#), [standards](#), [sustainable interoperability](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Saturday, September 19, 2009

What do you expect from Smart(er) Grids?

Saifur Rahman has summarized in the September 2009 issue of the IEEE "power & energy" magazine what experts believe could be expected from Smart(er) Grids.

In the first paragraph he states: "The term "smart grid" is almost becoming a household name. From the U.S. president talking about the smart grid to television commercials on this topic, we have a plethora of activities around the world where engineers, policy makers, entrepreneurs, and businesses have shown a keen interest in various aspects of this technology. There are smart-grid-related funding opportunities, projects, seminars, conferences, and training programs going on in Europe, the United States, Japan, and China to name a few." There are millions of Dollars, Euro, ... waiting for "smart" managers to be spend by "smart" engineers.

Mr. Rahman's view on what is required for a Smart(er) distribution Grid is the implementation of:

- Automated Meter Reading
- Security and Privacy Issues
- Advanced Communication Infrastructure and Cybersecurity
- Ineroperability standards
- Greening of the Grid
- Business Model for Customer Level Integration

He asks, what is next? The answer is: "

I can see many nonutility players entering this smart-grid market and attempt to provide solutions. For example, many **computer networking companies** have plans to deliver an end-to-end, highly secure network infrastructure that helps utility customers take the most advantage of energy efficiency, demand reduction, and the integration of renewable energy sources in their homes and businesses. The end result may not be cost reduction but more value for the money spent and an environmentally friendly power grid."

Click [HERE](#) to read the view of Saifur Rahman as published in the IEEE "power & energy" magazine.

I took a photo of an interesting ad by IBM at the Berlin Tegel Airport (Germany) on 2009-09-15:

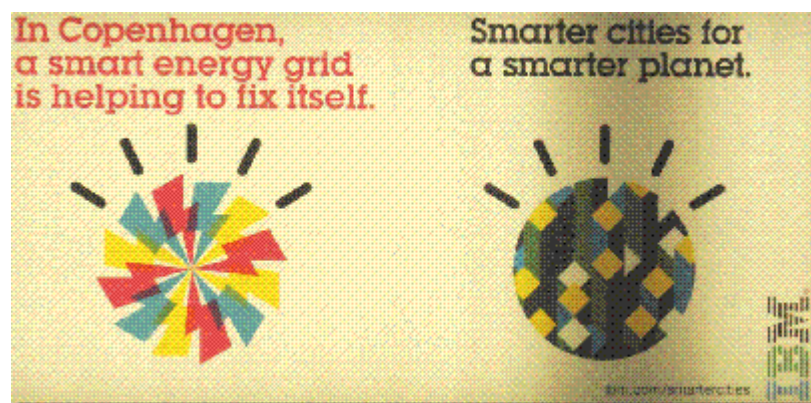
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What I see allover is that ICT (information and communication technology) is meeting the power distribution world. BUT: Where are the utility (automation and protection) experts that can understand the impact of ICT on the availability and stability of the grid? There is not much automation implemented in distribution networks today. So, the ICT companies will provide smart solutions for a market that uses very little automation. Usually ICT experts know the "I" and "C" in ICT very well - but the distribution grid is mainly a huge electrical system between the already smart transmission grid and many users.

I hope that the people in charge for the distribution grids have a good understanding of the real-time electrical network! The electrical grid is quite different compared to a business dealing with bananas, orange juice or books.

Smart(er) Distribution Grids require first smart (electrical) engineers! There are smart engineers for the transmission grid ...

Click [HERE](#) for some information regarding the **Lack of Power Engineers - A Risk for Smart Grids**.

Posted by [Karlheinz Schwarz](#) at 2:37 AM 0 comments 

Labels: [Automation](#), [Critical Infrastructure Protection](#), [distribution](#), [electric power system](#), [engineering](#), [Power Automation](#), [Power Plants](#), [process control](#), [Smart Grid](#), [US president](#)

Friday, September 18, 2009

IEC 61850 and IEC 61400-25: How to report errors, missing definitions or ambiguities

Standards like IEC 61850 and IEC 61400-25 are no exception when it comes to errors, missing definitions or ambiguities in the published documents. Most issues (called TISSUES - Technical issues) with regard to the first 14 parts have been solved during the last years. The edition 2 of the standard will be a "clean" version.

Recently new parts like IEC 61850-7-410 (Hydro Power extensions), IEC 61850-7-420 (DER extensions) and the standard series IEC 61400-25 (Wind Power extensions) have been published.

Click [HERE](#) if you have a TISSUE to report on IEC 61850-7-410 (Hydro)

Click [HERE](#) if you have a TISSUE to report on IEC 61850-7-420 (DER)

Click [HERE](#) if you have a TISSUE to report on IEC 61400-25 (Wind)

Before you post a new tissue you may first check if it has already been posted.

[measurements ...](#)

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Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Posted by [Karlheinz Schwarz](#) at [1:26 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61850-7-410](#), [IEC 61850-7-420](#), [tissues](#)

Thursday, September 17, 2009

PSI supports TASE.2 and CIM

PSI reports in the latest Magazine "energie manager" (1/2009) that they deliver a SCADA and DMS system for Enexis (Netherlands) supporting TASE.2 for inter-control center communication (IEC 60870-6) and CIM (Common Information Model, IEC 61968/70) for information exchange in the control center.

TASE.2, CIM along with IEC 61850 are crucial international standards published by [IEC TC 57](#) "Power systems management and associated information exchange" and used in utilities (Electric, Gas, Oil, ...). The scope of the IEC TC 57 is "To prepare international standards for power systems control equipment and systems ...". Power systems means **electric power** systems. So, how can you use these standards, e.g., for the Gas applications? IEC stands for "International Electrotechnical Commission". So the scope is to prepare and publish International Standards for all **electrical, electronic and related technologies**.

It is somehow "forbidden" to claim that IEC standards like IEC 61850 are applicable for **any other control equipment and systems outside the electrical world**. BUT - from a technical point of view -: IEC 61850 could be understood as a framework of (extensible) information models, information exchange methods, and configuration language for devices and systems in many application domains. The first edition of the standard models did not provide a model for a rotor - because substations do not have rotors. We extended the information models for wind turbines (published under IEC 61400-25). So, you can define (or standardize in another organization) an object for "**Gas pressure**" ... and use the whole communication and configuration infrastructure available for substation automation - and vice versa.

Some people (that do not like these standards) argue against their applications outside the electric world by saying: "You can not use these IEC standards, because their scope is restricted to the electric world." Fortunately, technical solutions based on these standards do not care about what some people say!

Click [HERE](#) to search for CIM related blog entries of this blog.

Click [HERE](#) to read a brochure on IEC 61400-25 [pdf]

Click [HERE](#) to read a paper on IEC 61850, IEC 61400-25 and CIM [pdf]

Posted by [Karlheinz Schwarz](#) at [10:45 PM](#) [0 comments](#) 

Labels: [applications](#), [Automation](#), [communication](#), [control center](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [Power Automation](#), [SCADA](#), [Substation Automation](#), [wind power](#)

Embedded controller exposes electric measurements through IEC 61850

A new, easy to install embedded device for electrical measurements provides crucial information on the status of the power system through the following information in (or near) real-time by an IEC 61850

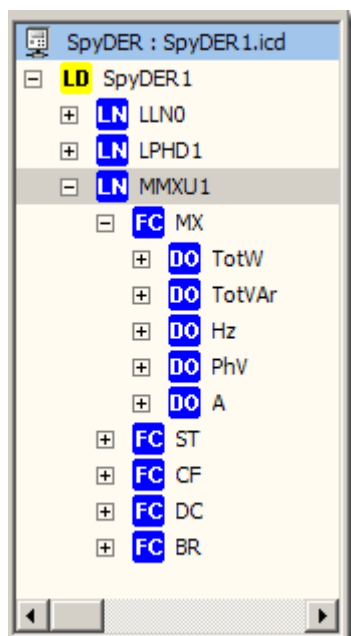
Server:

- Voltage L1 true RMS
- Voltage L2 true RMS
- Voltage L3 true RMS
- Current L1 true RMS
- Current L2 true RMS
- Current L3 true RMS
- Instantaneous Real Power
- Instantaneous Reactive Power
- Grid Frequency Power Angle (Cos Phi)



The IEC 61850 Server (build into the box shown above) provides the crucial MMXU Logical Node (3 phase Measurements) and COMTRADE formatted files of the values. The Server's Information model is shown below:





This Information model is derived from the real device (the server implemented at the device) via IEC 61850 self-description services. The model could be converted to an SCL file (according to IEC 61850-6):

```
<?xml version="1.0" encoding="UTF-8" ?>
<SCL xmlns="http://www.iec.ch/61850/2003/SCL"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.iec.ch/61850/2003/SCL SCL.xsd">
  <Header id="E-Energy" nameStructure="IEDName" />
  <Communication>
    <IED name="SpyDER" type="server" manufacturer="Quare Novum Enterprises" configVersion="1.06">
      <Services>
        <AccessPoint name="P1">
          <Server>
            <Authentication none="true" />
            <LDevice inst="1">
              <LN lnType="LLNO_0" lnClass="LLNO" inst="1">
                <LN lnType="LPHD_0" lnClass="LPHD" prefix="1" inst="1">
                  <LN lnType="MMXU_0" lnClass="MMXU" prefix="1" inst="1">
                    <ReportControl name="bcrb" datSet="1" intgPd="5000"
                      rptID="SpyDER1/MMXU1$bcrb" confRev="1" buffered="true"
                      bufTime="1000">
                      <DOI name="Mod">
                        <DAI name="Vendor">
                          <Val>Quare Novum Enterprises</Val>
                        </DAI>
                        <DAI name="swRev">
                          <Val>1.06</Val>
                        </DAI>
                        <DAI name="d">
                          <Val>High accuracy measurement and power flow supervision
                            of 3 phase system with a frequency of 6 values per
                            second</Val>
                        </DAI>
                      </DOI>
                    </LN>
                  </LDevice>
                </Server>
              </AccessPoint>
            </IED>
          <DataTypes>
            <LNType id="LLNO_0" lnClass="LLNO">
              <LNType id="LPHD_0" lnClass="LPHD">
                <LNType id="MMXU_0" lnClass="MMXU">
                  <DO name="Mod" type="INS_1" />
                  <DO name="Beh" type="INS_0" />
                  <DO name="Health" type="INS_1" />
                  <DO name="NamPlt" type="LPL_0" />
                  <DO name="TotW" type="MV_0" />
                  <DO name="TotVAr" type="MV_0" />
                  <DO name="Hz" type="MV_0" />
                  <DO name="PhV" type="WYE_0" />
                  <DO name="A" type="WYE_0" />
                </LNType>
              </LNType>
            </DataTypes>
          </SCL>
        </AccessPoint>
      </Services>
    </IED>
  </Communication>
</SCL>
```


A complete Substation Specification (.ssd and .scl file) according to IEC 61850-6 would provide also how the Information model is bound to the real electrical installation, e.g., where is the measurement taken etc.

The complete description contained in the SCL file could be used by any system (Gateway, SCADA database, ...).

Further information models (calculated in an application or from the physical input/output terminals) can be implemented. The platform could be used for many applications in power systems and other domains.

[QNE \(Oldenburg/Germany\)](#) is active in the domain of Smart Metering, Embedded Real-Time HW/SW Systems, SCADA, Analog and Digital Transducers, Technology Consulting, Research & Development

Click [HERE](#) to read a two page flyer [pdf].

Posted by [Karlheinz Schwarz](#) at [12:48 AM](#) [0 comments](#) 

Labels: [communication](#), [COMTRADE](#), [configuration](#), [electric power system](#), [engineering](#), [IEC 61400-25](#), [IEC 61850](#), [monitoring](#), [SCL](#), [Smart Grid](#)

Friday, September 11, 2009


Paper on IEC 61850 and IEC 61400-25 accepted for DistribuTech 2010

The abstract "MONITORING OF POWER SYSTEM AND COMMUNICATION INFRASTRUCTURES BASED ON IEC 61850 AND IEC 61400-25" (by Karlheinz Schwarz) has been accepted for presentation at the DistribuTech 2010 (Tampa, FL, USA).

The focus of the first edition of IEC 61850 was on substation operational aspects (mainly protection and control). Various groups have identified that IEC 61850 is the basis of further applications, e.g., monitoring of functions, processes, primary equipment, and the communication infrastructure in substations and other power system application domains. The second edition and other extensions provide new definitions to keep the high quality and availability of power systems, to reduce commissioning time and life cycle costs.

Track Assignment: Enterprise Information and Asset Management
Session Assignment: Case Studies of Advanced Applications Extending Benefits of Automation & Control Data
Date: 2010-03-24 (Wednesday)
Time of session: 9:30 AM
Type of Session: paper

Click [HERE](#) for the abstract.

Posted by [Karlheinz Schwarz](#) at [10:57 PM](#) [0 comments](#) 

Labels: [condition monitoring](#), [Critical Infrastructure Protection](#), [IEC 61400-25](#), [IEC 61850](#), [maintenance](#), [wind turbine controller](#)

Monday, September 7, 2009

Beckhoff's TwinCAT supports IEC 61850

Beckhoff opens up new opportunities by implementing this communication protocol in a software PLC: The user can use a cost-effective standard PLC for controlling his electrical installation, which not only offers the benefits of PC-based control technology but can also communicate externally via the IEC 61850 compliant communication. The basic standard defines a general transmission protocol for protective and control equipment in medium and high voltage electrical

substations. This means that time-consuming and costly special developments for the implementation of manufacturer-specific protocols are no longer required, and the associated engineering is simplified significantly.

Customers can utilize the complete communication stack developed by Beckhoff in the form of a PLC library.

As extension to the basic IEC 61850 standard, IEC 61400-25 defines the communication requirements for monitoring and controlling wind turbines. The integration of this standard into the TwinCAT library will simplify the control of heterogeneous wind farms significantly. The wind farm standard is characterized by a single wind power-specific dataset, so that TwinCAT users can use TcIEC61850Server.lib for communication purposes and TcIEC61400_25.lib for specific logical nodes and common data classes.

Click [HERE](#) for a two page brochure in English.

Click [HERE](#) for a two page brochure in German.

The TwinCat solution will be used during the next **Hands-on Training** in Frankfurt (Germany) on October 23, 2009.

Click [HERE](#) for the program of the training in Frankfurt.

Posted by [Karlheinz Schwarz](#) at [6:30 AM](#) [0 comments](#) 

Labels: [communication](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [PLC](#), [Power Plants](#), [wind power](#)

SystemCorp (Perth, Australia) offers new IEC 61850 IEDs

The IEC 61850 software stack PIS-10 accommodates client and server functionality. It is portable across various software platforms. Data throughput and other Ethernet related performance criteria are inherited from the operating system.

The stack supports MMS, GOOSE, Sampled Value functionality as well as buffered and unbuffered reporting. Data sets are defined using the WebCAN Designer Studio configuration software.

Protocol conversation from other SCADA protocols such as IEC 8750-5-10 or DNP3.0 require only the additional executable files to be downloaded and configured through WebCAN Designer Studio.

Products:

- Portable IEC 61850 Client and Server Software Stack PIS-10
- Fully Integrated Single Chip Solution IPC-10
- Compact Protocol Converter CFE-40
- Distribution Remote Terminal Unit MRU-10
- WebCAN Substation RTU and Data Gateway
- WebCAN Designer Studio Configuration Tool

Platforms:

- Microsoft Windows XP, 2003/2008 and Vista
- Ubuntu Linux (x86,x86-64)
- Embedded Linux (ARM, Coldfire)
- **Beck @Chip SC1x3 RTOS**
- Other platforms available on request

Click [HERE](#) for a two page description [pdf].

Posted by [Karlheinz Schwarz](#) at [6:23 AM](#) [0 comments](#)



Labels: [Australia](#), [communication](#), [configuration](#), [electric power system](#), [en](#), [IEC 61850](#), [IED](#), [RTU](#)

etz-Report 34 (IEC 61850) als E-Book erhältlich

Der etz Report 34 "Offene Kommunikation nach IEC 61850 für die Schutz- und Stationsleittechnik", 2004, 159 Seiten, DIN A4 ist jetzt auch als E-Book erhältlich:



Click [HIER](#), um das Vorwort zu lesen.

Click [HIER](#) für weitere Informationen zum E-Book (Inhalt, Bestellung, ...).

Posted by [Karlheinz Schwarz](#) at [2:28 AM](#) [0 comments](#)

Labels: [de](#), [IEC 61850](#), [schutztechnik](#), [Stationsleittechnik](#)

Saturday, September 5, 2009

IEC 61850-6 (SCL) - Final ballot on Configuration Language Edition 2

The most crucial part of the **second edition** of IEC 61850 "Communication networks and systems for power utility automation" - Part 6 "Configuration description language for communication in electrical substations related to IEDs" is available for **final (FDIS) Ballot until November 06, 2009**. This is the first part of Edition 2 that is out for Ballot.

The new edition fixes some technical issues of the first edition. Extensions are based on changes in other parts, e.g., Part 7-2 and 7-3; the engineering process, especially for configuration data exchange between system configuration tools, has been added.

Contact your [national TC 57 committee](#) for a copy if you want to do a final check of the document. The files distributed by IEC contain all xml schema files etc. needed to create and interpret SCL files.

Example [SCL file from AREVA](#) (.icd file), Edition 1 compliant.

Note that the **SCL** (**S**ubstation **C**onfiguration Language) would be better named: **System** Configuration Language. Main parts of the standard can be used for many other application domains. Any information that can be modeled with Logical Nodes and Data Objects according to IEC 61850 rules, can be used as domain specific "words".

The communication of these "words" from a "sender" (Server and Publisher) to a "receiver" (Client and Subscriber) can be described in SCL. The communication may be realized with MMS (Client/Server), or GOOSE and SMV (Publisher/Subscriber).

The new "words" may be a **"Fish Counter"** in a hydro power plant or a **"Bird Counter"** in a wind turbine. SCL can describe (without any modification) that a device (Server) provides this information and that it can automatically be communicated by IEC 61850 reporting to another computer (Client) every day or be stored locally in an IEC 61850 log. The CSL file can be used to automatically configure the server and/or the client!

Posted by [Karlheinz Schwarz](#) at 8:54 AM [2 comments](#) 

Labels: [communication](#), [configuration](#), [electric power system](#), [engineering](#), [icd file](#), [Areva](#), [IEC 61850](#), [IEC61850](#), [MMS](#), [Power Automation](#), [SCL](#), [wind turbine controller](#)

Thursday, September 3, 2009

Interoperable Standards for Smart Grid: US\$ 8.5 million for two year support to get there

The Smart Grid in the U.S. (and all over!) relies on **information and networking technologies** to allow **advanced control** and **communication** capabilities. "It is a key component of President Obama's plans to achieve energy independence and to address climate change.", according to [NIST](#).

NIST has awarded EnerNex (based in Knoxville, TN, USA) to help in developing "Smart Grid interoperability standards" and helping in standards "harmonization effort". Under the **US\$ 8.5 million contract**, [EnerNex will help NIST](#) during the next two years to reach a higher level of [interoperability of systems and devices](#) needed for a smart(er) electric power delivery system.

Many people in charge of the U.S. power delivery system - obviously - have understood the importance of a sustainable Interoperability in the utility domain.

Two crucial "interoperability projects" have been run by EPRI many years ago: UCA 1.0 and UCA 2.0. The UCA 2.0 was taken over by IEC TC 57 as the foundation of IEC 61850 and IEC 61400-25. The GREAT cooperation between the North American experts and experts from all over has let to the BIG success of UCA 2.0 - which is (of course) now IEC 61850.

Click [HERE](#) for a comparison of UCA 2.0 and IEC 61850.


I would appreciate if the history would repeat: The development of the many standards for a SMART(er) GRID will be done **by international cooperation for a global market!!** The need for smarter systems is an **international requirement** - to the good of human beings and the nature - in Russia, Germany, USA, Australia, ... Smart experts at TERNA (the Italian TSO) have already started to make the Italian Transmission Grid smarter with IEC 61850:



... and some 350 Indian experts have been trained on IEC 61850 in a [three day event in Bangalore](#):



And how are you getting involved? With the help of real experts you can speed up your knowledge in international smart grid standards very fast - ask the right experts during the upcoming IEC 61850 events in [Frankfurt](#), [San Antonio](#), [Nürnberg](#), [Brisbane and Sydney](#), ...

Posted by [Karlheinz Schwarz](#) at [12:07 PM](#) [0 comments](#) 

Labels: [education](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Obama](#), [seminar](#), [Smart Grid](#), [standards](#), [Transmission Grid](#), [UCA](#)

Wednesday, September 2, 2009

IEC 61850 Hands-on Training in Brisbane and Sydney (Australia) confirmed

The final program, locations, and dates for **two 3 day events in Australia** are now confirmed:

Brisbane (Australia): 30 November - 02 December 2009

Sydney (Australia): 02-04 December 2009

According to feedback from interested experts we have modified the program to have more practical exercises (1 1/2 days theory and 1 1/2 hands-on training with real IEDs).

Click [HERE](#) for the **final program, registration form and other details** [pdf].

Please note that the event in Brisbane is almost sold out. Several seats are available for the Sydney event.

We are confident, that our experience and service will meet all your

expectations! You'd get first-hand, very comprehensive, vendor neutral and up-to-date knowledge, experience, and guidance; learn how to reach interoperability of devices; You'd get best advice - for the best price.

I look forward to seeing you down under later this year.

Please feel free to forward this email to any colleagues who you think might be interested in the event.

Posted by [Karlheinz Schwarz](#) at [12:27 PM](#) [0 comments](#) 

Labels: [Australia](#), [communication](#), [condition monitoring](#), [DNP3](#), [education](#), [electric power system](#), [engineering](#), [Ethernet](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [interoperability](#), [Power Automation](#), [seminar](#)

Saturday, August 29, 2009

Technical Report IEC 61850-90-1 accepted

The Draft Technical Report "Communication networks and systems for power utility automation - Part IEC 61850-90-1: Use of IEC 61850 for the **communication between substations**" has been positively balloted.

The Technical report will be [published on Sept 15, 2009](#).

Click [HERE](#) for a list of applications contained in part IEC 61850-90-1.

Posted by [Karlheinz Schwarz](#) at [3:29 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [Substation](#), [Substation Automation](#), [telecommunication](#)


Sunday, August 23, 2009

Vendor-independent IEC 61850 Hands-on Training at Itaipu (Brazil)

To gain vendor-independent knowledge and experience is one of the crucial steps towards the implementation of IEC 61850 based multi-vendor projects. Itaipu (Brazil) has trained their substation experts in two courses. A comprehensive seminar at Itaipu was conducted in 2007 (Christoph Brunner and Karlheinz Schwarz). The hands-on training by STRI (Ludvika, Sweden) was run onsite in Itaipu last week ([brief report in Portuguese](#)).

The interoperability of IEDs (intelligent electronic devices) from different manufacturers needs to be tested. Experts have to understand the **standardized functions AND restrictions** build into the IEDs. How do IEDs use the standard? What are the constraints of limited resources in an IED? What are the functions (Reverse blocking, Auto reclosing, Switching with synchrocheck, Earthfault detection, ...) that use IEC 61850 and how are they using the standard?

STRI and NettedAutomation provide [comprehensive education](#) from understanding the Standards and Training with real IEDs - You'll get first-hand, very comprehensive, **vendor neutral** and up-to-date knowledge, experience, and guidance. You'll learn how to reach interoperability of devices.

Posted by [Karlheinz Schwarz](#) at [10:08 PM](#) [0 comments](#) 

Labels: [hands-on Training](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Power Automation](#), [Substation Automation](#)

Saturday, August 22, 2009

Interoperability in the context of IEC 61850

There are many efforts underway to define or extend standards that allow or support Interoperability between devices in the electric power delivery system. IEC 61850 is one of the crucial standards that is understood as to meet basic requirements.

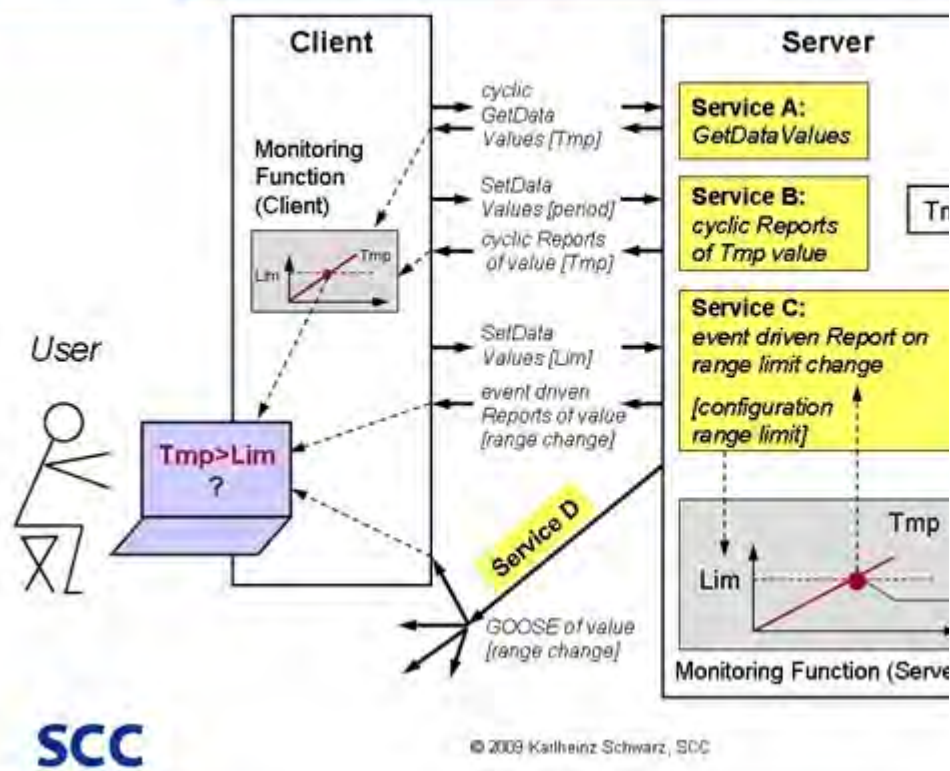
According to the "EICTA [White Paper](#) on Standardization and Interoperability, Brussels, November, 2006 (page 4)" Interoperability is defined as follows:

"The **capability** of two or more networks, systems, **devices**, applications, or components to **exchange information between them** and to **use the information so exchanged**."

What does this all mean for the application of IEC 61850? Currently there are some problems with the interoperability of real devices implementing one or the other option of IEC 61850. That is the challenge: Which option do the devices use that are intended to be interoperable?

We have to differentiate interoperability on different levels: physical, syntactical, services, devices, ... functions. In the following we will briefly focus on services and devices [Note: This discussion just points to the general issue of options; details on interoperability issues are presented and discussed during the seminars of [NettedAutomation GmbH \(Karlsruhe/Germany\)](#)].

The following slide summarizes some option of what Interoperability could mean for a simple use case. The **Purpose** of the use case is: *Monitor the Temperature (Tmp) and figure out when the Tmp exceeds the Limit (Lim)*. There are two devices involved (Client and Server). Depending on the functional distribution of the monitoring function (located in the client or in the server) we can use one or the other Service of IEC 61850. In the case of Services A and B we assume that the purpose is to implement the monitoring function in the client. In the other two cases (C and D) we assume that the monitoring function is provided by the device that acts as server.



The four services (associated with the functional distribution) are quite different. Once the "user" (usually the system integrator) of the client and the "user" of the server HAVE DECIDED WHICH APPROACH (A, B, C, or D) to use then we could talk about interoperability. **IEC 61850 DOES NOT constrain which approach to use.** IEC 61850 is scalable - that means YOU HAVE TO make decisions how to scale! Which option to use!

The **IEC 61850 services** do not constrain the behavior of an IEC 61850 client **application process**, except with respect to **valid sequences of service primitives**. Therefore a model of the IEC 61850 client application process is not (!) provided in the current standard.

If the two "users" decide to use the option with Service A then we could define, what is required to make the client and server interoperable. This is defined in IEC 61850 for all approaches shown in the figure.

Challenges with regard to interoperability are here: The "users" of both devices DO NOT define the exact approach (to use an approach with Service A or B, C, or D). **Just to expect that the vendors have implemented ALL approaches is dangerous: Usually the vendors implement the mandatory (M) requirements - which could also be translated to M=Minimum! Two devices conformant with IEC 61850 (with a Certificate) may or may not interoperate! Depending on the functional distribution and the services provided and used.**

Non-Interoperability could have many reasons:

1. Client and server might implement only a subset of the full specification. In some cases, there may be a mismatch in what features are supported, where one system sends a message that the other cannot process.
2. The IEC 61850 specification makes certain things optional. If one implementation assumes that specific information will exist on messages

it receives, it may not interoperate with another implementation that chooses not to send that information.

3. Two implementers may interpret parts of the standard, where the language of the specification is ambiguous.

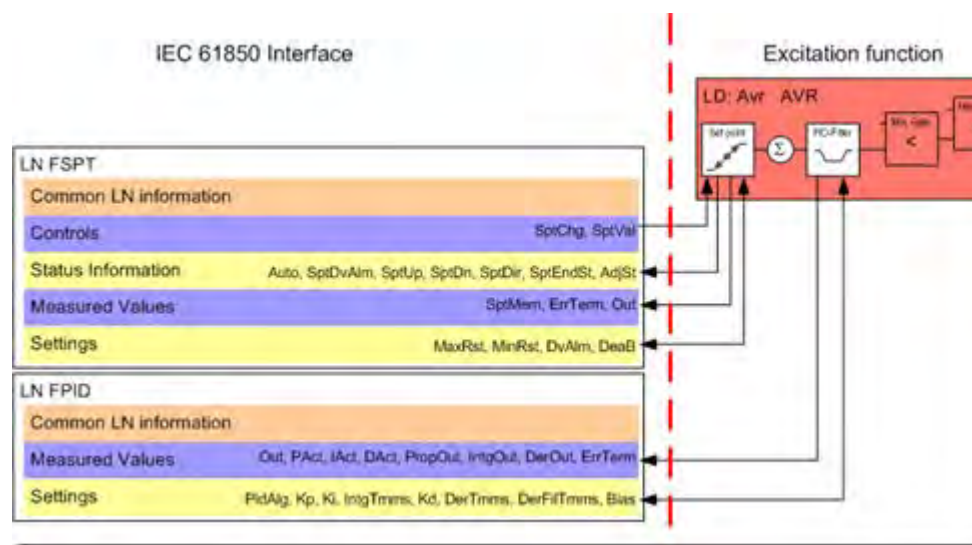
4. Finally, implementers may simply have bugs in their implementation that do not show up during standalone testing. Such bugs may also contribute to interoperability problems when two different implementations attempt to hook together.

To make devices interoperable requires (among other requirements) that the "users" of two devices specify exactly the distribution of the (application) functionality and which service to use for that functionality!

This specification (and the discussion of the involved people) is mainly outside of the standardization work. Some hints on the modeling approach (not that much on the use of services) will be given in new documents to be published by IEC, e.g., IEC 61850-7-510:

Hydroelectric power plants – Modeling concepts and guidelines. This Technical Report is intended to provide explanations on how to use the Logical Nodes defined in IEC 61850-7-410 as well as other documents in the IEC 61850 series to model complex control functions in power plants.

Example of working draft of IEC 61850-7-510 (2009-08) - Excitation function:



The document will provide general use cases of the models defined in IEC 61850-7-410.

Sustainable Interoperability of devices is a crucial challenge in the domain of Power Automation systems.

Posted by [Karlheinz Schwarz](#) at 1:30 AM 2 comments

Labels: [Automation](#), [communication](#), [condition monitoring](#), [distribution automation](#), [education](#), [electric power system](#), [GOOSE](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-410](#), [implementation](#), [interoperability](#), [interoperability tests](#), [models](#), [monitoring](#), [Power Automation](#), [Smart Grid](#)

Tuesday, August 18, 2009

Revised Input to NIST Interoperability Roadmap available

The input from EPRI to NIST was out for public review until end of July 2009. The team has received 83 comments that have been used to revise the EPRI input to NIST.

Many IEC Standards are referenced in the document: IEC 61968/70 (CIM), IEC 61850, IEC 61400-25, IEC 61499, ...

Click [HERE](#) to download the Report to NIST on the Smart Grid Interoperability Standards Roadmap **After Comments were addressed** [pdf].

Click [HERE](#) to download the **Consolidated Comments** August 10, 2009 [pdf].

Click [HERE](#) to check **results of the Workshop**, August 3-4, 2009.

Click [HERE](#) to check the **latest Priority Action Plans** (PAPs) that has been updated on August 10; after the August 3-4, 2009, Workshop.

Posted by [Karlheinz Schwarz](#) at [10:37 PM](#) [1 comments](#) 

Labels: [CIM](#), [CIP](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [interoperability](#), [standards](#)

Friday, August 14, 2009

IEC 61131-3 SPS-Programmierung und IEC 61850

Zunehmend findet IEC 61850 Eingang in die Welt der Steuerungen. Neben anderen namhaften deutschen Herstellern hat jetzt auch WAGO (Minden) einen IEC-61850-Server in die Steuerungssoftware integriert.

Aufbauend auf der Codesys Version 3 bietet WAGO eine IEC-61850-Bibliothek an, mit der die Vorteile der Objektorientierung unter Verwendung der Objektmodelle der Normenreihe IEC 61850 und IEC 61400-25 genutzt werden können.

Click [HIER](#) für eine einseitige Einführung in IEC 61850 und IEC 61400-25 [pdf]

Click [HIER](#) für einen weiterführenden Artikel zur WAGO-Lösung im Heft 8-2009 der Zeitschrift *Computer & Automation*.


Im Artikel wird noch davon ausgegangen, dass IEC 61850 **nur eine Abbildung** der Objekte und Kommunikation unterstützt: [MMS \(Manufacturing Message Specification, ISO 9506\)](#). Seit einem Jahr gibt es eine internationale Norm mit weiteren Abbildungen: IEC 61400-25-4:

IEC 61400-25 umfasst die folgenden fünf Abbildungen:

- SOAP-based web services,
- a mapping to OPC/XML-DA,
- a mapping to MMS (IEC 61850-8-1),
- a mapping to IEC 60870-5-104,
- a mapping to DNP3.

Click [HIER](#) für weitere Details zu den Mappings (Abbildungen).

Unter dem Titel "IEC 61850 - Die universale Norm für die Informations-Integration" wird am Dienstag, 24.11.2009, 14:00 - 17:00 Uhr, [während der SPS/IPC/Drives in Nürnberg ein Tutorial durchgeführt](#); Vortragssprache ist Deutsch.

Posted by [Karlheinz Schwarz](#) at [11:54 PM](#) [0 comments](#) 

Labels: [de](#), [DNP3](#), [electric power system](#), [IEC 61131-3](#), [IEC 61400-25](#), [IEC 61499](#),

[IEC 61850, implementation, OPC, wind turbine controller](#)

IEC 61850 Hands-on Training in Australia (December 2009)

IEC 61850 is the global standard for Power System Automation (generation, transport, distribution ... high, medium and low voltage levels). It allows for an open and "future proof" design, different architectures and possibilities to combine products from multiple vendors. In order for users and system integrators to utilize the benefits of IEC 61850 it is necessary for power utilities, integrators and vendors **to educate their most crucial asset – People**; and to start the migration to IEC 61850.

The popular STRI and NettedAutomation hands-on training provides both theory and practice on the application of IEC 61850 in a substation. During the training we follow the planning, design and engineering process for real applications all the way to configuration and testing on a real multivendor test installation. We believe real understanding is the result of both knowledge and hands-on experience. Therefore the training offers a unique combination of presentations, demonstrations and practical workshops in smaller groups.

Many utility experts have been trained, as TERNA (Italy):



The interest in performing such an event in Australia is high. We are right now negotiating with some utilities to fix the content, dates and locations.

Tentative locations and dates for 3 day events:

Brisbane (Australia): 30 November - 02 December 2009

Sydney (Australia): 02-04 December 2009

Click [HERE](#) for the tentative program and other details [pdf].

By end of August 2009 it is expected to announce the final contents, locations and dates.

Posted by [Karlheinz Schwarz](#) at [5:50 AM](#) [0 comments](#) 

Labels: [applications](#), [communication](#), [electric power system](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [IEC61850](#), [interoperability](#), [low voltage](#), [medium voltage](#), [peopleware](#), [Power Automation](#), [seminar](#), [Substation](#), [Substation Automation](#)

Updated FERC Smart Grid Policy and Interoperability

The US Federal Energy Regulators Commission (FERC) has published recently an updated Smart Grid Policy (Docket No. PL09-4-000, Issued July 16, 2009).

Excerpt from the summary of the report: "This Policy Statement provides guidance regarding the development of a smart grid for the nation's electric transmission system, focusing on the **development of key standards to achieve interoperability and functionality of smart grid systems and devices**. In response to the need for urgent action on potential challenges to the bulk-power system, in this Policy Statement the Commission provides additional guidance on standards to help to realize a smart grid. ...".

The essential term used is "Interoperability" (Interoperability is described as exchanging meaningful information between two or more systems and achieving an agreed expectation for the response to the information exchange while maintaining reliability, accuracy, and security; according to GridWise). The term "Interoperability" is used 89 times throughout the policy statement.

One of the crucial standards that supports interoperability in power system automation, protection and control is the standard IEC 61850 ... also referred to in the policy statement: "The Commission stated that IEC Standards 61970 and 61968 (together, Common Information Model), along with IEC 61850 (Communications Networks and Systems in Substations), could provide a basis for addressing this issue."

Interoperability is impacted by many aspects (standard definition, implementation, subsetting, resources available in a device, ...). Two IEDs that are fully compliant may not be able to talk together, because of resource restrictions. A Server IED may support 3 TCP connections. A fourth client that wants to retrieve some information from that server cannot even open a TCP connection - due to the resource restriction. From an application point of view the two devices cannot interoperate.


There is a crucial difference in the use of TCP for general web applications and IEC 61850 (and other close to real-time applications). Usually a client opens a TCP connection posts a request, gets some responses, and closes the TCP connection. Web browsers, in their simplest mode of operation, would just connect to download a page and then disconnect. This simple transactions use very little resources. The resources are free after each transaction. But connecting and disconnecting repeatedly to the same server does carry an overhead and slows the communication down.

To allow close to real-time information exchange over TCP requires to keep the connection open all time. This has the drawback that the server needs to reserve resources for each client - independent if there is little or high traffic. For that reason IEDs in power systems (often with very limited resources) have a limited number of clients that can communicate with them at the same time. Once resources are consumed, there is no interoperation with one additional client possible at all.

This kind of limited resources in automation devices makes interoperability a challenge. If two devices do not operate: please do not start to blame it to the standard or to the implementation ... A system integrator needs to know many details on limitations. Be aware: Everything is limited!

The discussed challenge is independent of the upper layer protocols like DNP3, IEC 60870-5, IEC 60870-6, IEC 61850, ... it is typical for all protocols in the automation domain that use TCP.

Click [HERE](#) for the complete FERC Smart Grid Policy.

Posted by [Karlheinz Schwarz](#) at [3:52 AM](#) [0 comments](#) 

Labels: [Automation](#), [communication](#), [electric power system](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [real-time](#), [TCP](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Wednesday, August 12, 2009

Webservices for IEC 61850 or IEC 61850 LE (Lite Edition) are here

From time to time there is a discussion on the protocol stack for IEC 61850 - which is based on TCP/IP, upper OSI layers and MMS (ISO 9506). Some people today are looking for a lite edition that may use DNP3, IEC 60870-5-10x, or even Webservices.

Is there a need to define these protocol stacks during the years to come? NO!! The Standard IEC 61400-25-4 defines these stacks (published 12 months ago, 2008-08). No, I am not kidding. The Standard has been published by IEC TC 88 (Wind Turbines):

Wind turbines – IEC 61400-25-4: Communications for monitoring and control of wind power plants – Mapping to communication profile

Click [HERE](#) for the preview of the standard.

The stacks specified in this part of IEC 61400-25 comprise:

- SOAP-based web services,
- a mapping to OPC/XML-DA,
- a mapping to MMS (IEC 61850-8-1),
- a mapping to IEC 60870-5-104,
- a mapping to DNP3.

All mappings are optional, but at least one optional mapping shall be selected in order to be compliant with this part of IEC 61400-25.

The stacks in IEC 61400-25-4 are covering **all** or **parts** of the abstract services in IEC 61400-25-3 (IEC 61850-7-2, ACSI) - excerpt of the list of mappings and services supported:

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[Updated FERC Smart Grid Policy and Interoperabilit...](#)

[Webservices for IEC 61850 or IEC 61850 LE](#)

Table 1 – Mapping overview of IEC 61400-25-3 services

Mapping capability overview						
IEC 61400-25-3 Services	M/O	Web-services	OPC XML-DA	IEC 61850-8-1 (MMS)	IEC 60870-5-104	DNP3
Associate	M	Y	Y	Y	Y	Y
Release	O	Y	Y	Y	Y	N
Abort	O	Y	Y	Y	N	N
GetServerDirectory	O	Y	Y	Y	N	Y
GetLogicalDeviceDirectory	O	Y	Y	Y	N	Y
GetLogicalNodeDirectory	O	Y	Y	Y	N	N
GetDataValues	M	Y	Y	Y	Y	Y
SetDataValues	M	Y	Y	Y	Y	Y
GetDataDirectory	O	Y	Y	Y	N	N
GetDataDefinition	O	Y	Y	Y	N	N
GetDataSetValues	M	Y	P ^a	Y	N	Y
SetDataSetValues	O	Y	N	Y	N	Y
CreateDataSet	O	Y	N	Y	N	N
DeleteDataSet	O	Y	N	Y	N	N
GetDataSetDirectory	O	Y	N	Y	N	N
Report	O	Y	Y	Y	Y	N

Example of a service for the Webservice stack (excerpt):

A.5.5.2 GetDataValues

A.5.5.2.1 GetDataValuesRequest

The GetDataValuesRequest service shall be defined as follows:

```
<!-- element name="GetDataValuesRequest" -->
<complexType>
  <sequence>
    <element name="Ref" type="ews:tFcdFcdaType" />
  </sequence>
  <attribute name="UUID" type="ews:tstring36" use="optional"/>
  <attribute name="AssocID" type="ews:tAssocID" use="required"/>
</complexType>
</element>
```

The Tag Names shall be defined according to Table A.21

Table A.21 – GetDataValuesRequest

Tag Name	Description
GetDataValuesRequest	Retrieve values of DataAttributes of the referenced DATA made visible and thus accessible to a client by the referenced Logical-Node.
Ref	The parameter Reference shall define the functional constrained data (FCD) or functional constrained data attributes (FCDA) of the DATA whose DataAttribute value is to be written. The Reference shall be FCD or FCDA.
UUID	Universal Unique ID is used as a unique service identification for a request/response relationship. The UUID details shall be as specified in RFC 4122.
AssocID	AssocID is used to identify the association originator – the specific client. The AssocID shall be used to identify e.g. established subscriptions and loggings on the server.

The mapping of services to DNP3 is depicted for one example (excerpt):

LOGICAL-DEVICE			Data link address
	GetLogicalDeviceDirectory	O	Read Object Group 0 ^b
LOGICAL-NODE			
	GetLogicalNodeDirectory	O	n.a. ^a
DATA			
	GetDataValues	M	Read (Function Code 1)
	SetDataValues	M	Write (Function Code 2)
	GetDataDirectory	O	n.a. ^a
	GetDataDefinition	O	n.a. ^a

[\(Lite Ed...](#)

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- July (11)
- June (9)
- May (25)

The mapping of Common Data Classes to DNP3 is depicted for one example (excerpt):

E.4.3 CDC Measured Value (MV)

Table E.3 defines the mapping for data attributes in the IEC 61850-7-3 common data class MV. The data attributes [mag + t + q] shall map to a DNP3 data set prototype.

Table E.3 – CDC: Measured Value (MV) mapping

Attribute Name	Attribute Type	DNP3 Data Specification	DNP3 Data Element Mapping
-	-	UUID:OSTR	{29787E10-484F-4B22-A7BF-1C669D3748E8}
-	-	NSPC:VSTR	"IEC 61400-25-2"
-	-	NAME:VSTR	"MV"
mag	AnalogueValue	DAEL:FLT32	32-bit floating point value
q	Quality	DAEL:BSTR	SQ2 – Object coding (refer Table E 2)
t	TimeStamp	DAEL:TIME	Six octet binary time – Time of occurrence

The ancillary value associated with each DNP3 data element shall be the IEC 61850-7-Attribute Name e.g. "mag".

- April (11)
- March (16)
- February (11)
- January (13)

- 2008 (82)

Contributors

[Karlheinz Schwarz](#)
[Michael Schwarz](#)

So: Why waiting for an IEC 61850 LE or for IEC 61850 Webservices - Here they are: IEC 61400-25-4.

If there is a need to revise or improve the stacks, visit the [Tissue Data Base for IEC 61400-25](#).

Posted by [Karlheinz Schwarz](#) at [12:30 PM](#) [0 comments](#) 


Labels: [communication](#), [DNP3](#), [electric power system](#), [en](#), [IEC](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [mapping](#), [standards](#), [Substation](#), [wind power](#), [wind turbine controller](#)

You are experienced with IEC 61850? - Looking for a new job in the U.S.?

The Public Service Company of New Mexico (USA) is looking for an engineer with experiences in IEC 61850.

The job description asks for: "... Provide direction to improve the reliability of subtransmission and transmission electrical facilities, and **design of electrical substation automation under IEC 61850**. ... and experience working with large consulting firms in the power industry and large industrial users, and must also have **experience with or have researched IEC 61850 substation automation**.

Click [HERE](#) for the full text of the job description.

Posted by [Karlheinz Schwarz](#) at [3:43 AM](#) [0 comments](#) 

Labels: [electric power system](#), [en](#), [engineering](#), [IEC 61850](#), [Substation Automation](#)

Tuesday, August 11, 2009

COPALP supports IEC 61850


The French company COPALP (focused on IEC 61131-3 based provide software tools and components for embedded systems) has integrated the Standard IEC 61850 into their architecture.

According to COPALP: "The Energy and Water industries require more and more complex protocols and control applications to meet the

growing demands for more information, more often. ... The IEC 61850 is one new component to the COPALP offer that comes in addition to the existing one like IEC60870-101 slave, IEC60870-104 server and DNP3 slave protocols."

Click [HERE](#) for their full news release.

The next step after IEC 61131-3 will be [IEC 61499 \(Function Blocks\) with IEC 61850 information exchange](#).

Posted by [Karlheinz Schwarz](#) at [12:48 PM](#) [1 comments](#) 

Labels: [Automation](#), [communication](#), [electric power system](#), [IEC](#), [IEC 61131-3](#), [IEC 61499](#), [IEC 61850](#)

NIST reports progress in transforming the power grid into a Smart Grid

The other day George W. Arnold (National Coordinator For Smart Grid Interoperability) reported to the House Committee on Science and Technology Subcommittee on Energy and Environment United States House of Representatives on the progress in transforming the U.S. power grid into a Smart Grid.

Mr. Arnold reported that "Modernizing and digitizing the nation's electrical power grid—the largest interconnected machine on Earth—is an enormous challenge and a tremendous opportunity. Success requires a combination of quick action and sustained progress in implementing and **integrating the components, systems, and networks that will make up the Smart Grid**. ... it is important that we base our standards, wherever possible, on **international standards** or work to get our approaches adopted as international standards. This will maximize the opportunities for U.S. suppliers to address a large, global market opportunity. **Fortunately, we are well-connected to International Electrotechnical Commission (IEC), IEEE and other international organizations** and are pursuing those connections vigorously in our effort. ... it is essential that we base the **Smart Grid on open standards**."

Click [HERE](#) for the full (10 page) Testimony.

NettedAutomation GmbH (Karlsruhe/Germany) believes that the Net(works) will automate the future power generation, transmission, distribution and power consumption: **The Net is the Automation**.

The driving force behind the standardization is to effectively and efficiently perform **seamless device data integration** and **sharing information** based on a rich, fine-grained data-stream about the state of the "power world" in any given instant. **Every node in the network would have to be awake, responsive, flexible, and – most important – interconnected with everything else: A distributed energy web**.

(from "Seamless Communication with IEC 61850 for Distributed Power Generation" by Karlheinz Schwarz, SCC, Karlsruhe, Germany)

Click [HERE](#) for a copy of the full paper on Seamless Communication with IEC 61850 for Distributed Power Generation presented at the 2002 DistribuTech in Miami (FL).

Posted by [Karlheinz Schwarz](#) at [12:13 PM](#) [0 comments](#) 

Labels: [communication](#), [Critical Infrastructure Protection](#), [distribution automation](#), [electric power system](#), [en](#), [IEC](#), [interoperability](#), [interoperability tests](#), [NIST](#), [Power Automation](#), [Smart Grid](#), [standards](#)

Monday, August 10, 2009

New version of the CIMTool for IEC 61968/70 CIM available

The CIMTool is an open source tool supporting the IEC TC 57 Common Information Model (CIM) standards (IEC 61968 and IEC 61970) used in the electric power industry.

The latest CIMTool release 1.6.1. is available for download. CIMTool is a plugin for the [eclipse](#) platform.

Click [HERE](#) for more information on the new release of the CIMTool.

Click [HERE](#) if you need help with the CIM.

Posted by [Karlheinz Schwarz](#) at 2:06 AM 0 comments 

Labels: [CIM](#), [electric power system](#), [IEC 61968](#), [IEC 61970](#), [tools](#), [Training](#)

IEC opened a website for Smart Grid Standards


IEC (International Electro-technical Commission) has launched a new website supporting "Global Standards for Smart Grids".

The areas of interest are:

- About Smart Grid
- Regional Concerns
- Need for Smart Grid Standards
- Interoperability and Standards
- Framework for Standardization
- IEC Leadership and Expertise
- Relevant IEC Standards

Click [HERE](#) to visit the new site.

The site is intended to provide (step by step) support in building the future smart power delivery infrastructure. Some key standards like IEC 61968, IEC 61970, IEC 61850, ... are already listed. More to come.

Posted by [Karlheinz Schwarz](#) at 12:45 AM 0 comments 

Labels: [CIM](#), [DER](#), [distribution automation](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [interoperability](#), [Smart Grid](#), [Substation](#), [Substation Automation](#), [wind power](#)

Friday, August 7, 2009

2nd IEC 61850 Training Session in Moscow NOW WITH Hands-on Training, 01.-04. September 2009

The second comprehensive training on IEC 61850 in Moscow (Russia) has been **extended from three to four days** - adding a **hands-on training** with real IEDs from Areva, Siemens, SEL, GE, ... the event will be held in Moscow (Russia) from 01.-04. September 2009. The the first three days will be conducted by NettedAutomation (Karlsruhe, Germany), the hands-on training will be performed by [STRI](#) (Ludvika, Sweden).

Click [HERE](#) [pdf in Russian] for program details and registration form.

Click [HERE](#) for a brief report on the the first event in March 2009.

I look forward to meeting you soon in Moscow.

Posted by [Karlheinz Schwarz](#) at 7:19 AM 0 comments 

Labels: [Automation](#), [education](#), [IEC 61850](#), [IEC 61850-7-420](#), [IEC 61968](#), [IEC 61970](#), [Power Automation](#), [process control](#), [Substation](#), [Transmission Grid](#), [wind power](#)

Tutorial IEC 61850 während der SPS/IPC/Drives in Nürnberg, 24.11.2009

Unter dem Titel "IEC 61850 - Die universale Norm für die Informations-Integration" wird von Karlheinz Schwarz (SCC) am Dienstag, 24.11.2009, 14:00 - 17:00 Uhr, ein Tutorial durchgeführt; Vortragssprache ist Deutsch.

Die Norm IEC 61850 „Communication networks and systems for power utility automation“ ist die global anerkannte Integrationslösung für die Automatisierung in der elektrischen Energieversorgung und zunehmend in anderen Bereichen. Sie definiert im Wesentlichen:

- **Informationsmodelle** (dreiphasiges Stromnetz, Leistungsschalter, Temperaturwerte, ...)
- **Services für den Informations-Austausch** (Client-Server, Echtzeitkommunikation, ...)
- **System-Konfigurationssprache** (Anlage, Informationsmodelle, Datenfluss, Geräte, ...)

Mittlerweile wird die Normenreihe in Transport- und Verteilnetzen (von der Hochspannung bis zur Niederspannung), in der konventionellen und dezentralen Energieerzeugung sowie für Condition-Monitoring-Systeme eingesetzt. Die bedarfsgerechte und zuverlässige Bereitstellung elektrischer Energie für fertigungs- und verfahrenstechnische Prozesse hat einen zunehmenden Einfluss auf die gesamte Automatisierung. Die durchgängige Informations-Integration von Produktions- und Energieversorgungsprozessen mit IEC 61850 senkt die Kosten der Automatisierung und hilft, Energie effizient zu nutzen!

In dem Beitrag werden die Normenreihen IEC 61850 und IEC 61400-25 (Erweiterung für Windenergieanlagen), ihre globale Akzeptanz und Einsatzbeispiele vorgestellt.

In acht von 14 Anwendungsbereichen der amerikanischen [Smart-Grid-Aktivitäten](#) wird [IEC 61850](#) als Lösung gesehen ... more to come.

Click [HIER](#) für weitere Details zum Tutorial in Nürnberg.

Posted by [Karlheinz Schwarz](#) at 1:02 AM 0 comments 

Labels: [condition monitoring](#), [de](#), [DER](#), [education](#), [electric power system](#), [engineering](#), [IEC 61850](#), [monitoring](#), [standards](#), [Substation](#), [Training](#), [wind power](#)

Wednesday, August 5, 2009

Batteries and Electric Vehicles - U.S. Government spends \$2.4 Billion in Grants

According to the White House press release (2009-08-05) President Obama "announced 48 **new advanced battery and electric drive projects** that will receive **\$2.4 billion in funding** under the American Recovery and Reinvestment Act. These projects, selected through a

highly competitive process by the Department of Energy, will accelerate the development of U.S. manufacturing capacity for batteries and electric drive components as well as the deployment of electric drive vehicles, helping to establish American leadership in creating the next generation of advanced vehicles."

The award winners will invest **another \$2.4 Billion**.

One of the biggest deployment projects will be implemented by ETEC in cooperation with Nissan. According to ETEC: "The Project will install **electric vehicle charging infrastructure** and **deploy up to 1,000 Nissan battery electric vehicles** in strategic markets in five states: Arizona, California, Oregon, Tennessee, and Washington. ... To support the Nissan EV, the Project will install approximately **12,500 Level 2** (220V) charging systems and **250 Level 3** (fast-charge) systems."

Click [HERE](#) for the full White House press release.

Click [HERE](#) for the ETEC press release.

Posted by [Karlheinz Schwarz](#) at [11:27 PM](#) [1 comments](#) 

Labels: [batteries](#), [education](#), [electric power system](#), [electric vehicles](#), [Smart Grid](#)

Priority Action Plans for NIST Smart Grid Interoperability Standards Roadmap

EPRI has provided a list of prioritized actions on the "Smart Grid Interoperability Standards Roadmap" to NIST on July 30, 2009.

The plans cover 14 areas of interest. Excerpt from the Overview:

"On the basis of stakeholder input received at two public workshops as well as its reviews of research reports and other relevant literature, the National Institute of Standards and Technology (NIST) is proposing a **set of priorities for developing standards necessary to build an interoperable Smart Grid**. Among the criteria for inclusion on this initial list were immediacy of need, relevance to high-priority Smart Grid functionalities, availability of existing standards to respond to the need, state of the deployment of affected technologies, and estimated time frame to achieve an effective solution.

To facilitate timely and effective responses to these needs, NIST has drafted a preliminary Priority Action Plan (PAP) for each need. The PAPs are intended to scope out problem areas and to begin clarifying the steps required for achieving solutions."

The 14 prioritized areas (text in bold indicates involvement of IEC 61850 for that area):

1. IP for the Smart Grid
2. Wireless Communications for the Smart Grid
3. Common Pricing Model
4. Common Scheduling Mechanism
5. Standard Meter Data Profiles
6. **Common Semantic Model for Meter Data Tables**
7. **Electric Storage Interconnection Guidelines**
8. **CIM for Distribution Grid Management**
9. Standard DR Signals
10. **Standard Energy Usage Information**
11. **Common Object Models for Electric Transportation**
12. **IEC 61850 Objects/DNP3 Mapping**
13. **Time Synchronization, IEC 61850 Objects/IEEE C37.118 Harmonization**
14. **Transmission and Distribution Power Systems Model**

Mapping

Click [HERE](#) for the complete action plans.

Posted by [Karlheinz Schwarz](#) at [1:28 AM](#) [1 comments](#) 

Labels: [CIM](#), [communication](#), [condition monitoring](#), [Critical Infrastructure Protection](#), [DNP3](#), [electric power system](#), [en](#), [IEC 61400-25](#), [IEC 61850](#), [IEC61850](#), [interoperability](#), [interoperability tests](#), [Power Automation](#), [Smart Grid](#)

Monday, August 3, 2009

German E-Energy Projects go International

The seven German E-Energy Projects opened an International website with many useful information in English. "The primary goal of E-Energy is to create E-Energy model regions that demonstrate how the immense potential for optimization presented by information and communication technologies (ICT) can best be harnessed to enhance the efficiency and environmental compatibility of the power supply and to ensure supply security."

Click [HERE](#) for the content in English.

Posted by [Karlheinz Schwarz](#) at [11:35 PM](#) [0 comments](#) 

Labels: [E-Energy](#), [electric power system](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [Smart Grid](#)

Wednesday, July 29, 2009

Remote 2009 Conference & Expo, October 29-30, 2009 - San Antonio (TX)

The Remote 2009 Conference and Expo will focus on the leading advancements for the monitoring and management of distributed equipment and facilities, remote assets, automated process & system controls and device networks. Large-scale users and industry experts will speak on SCADA, remote networking technology, security (cyber and physical), control, automation, onsite and back-up power, M2M, emerging wireless technology, telemetry and condition monitoring.

IEC 61850 will be discussed in a paper from Prosoft Technology, Inc. Click [HERE](#) for the conference program.

There will also be a **2 day workshop on IEC 61850, IEC 61400-25, DNP3** ... crucial building blocks also for smart grids. Click [HERE](#) for the program of the workshop.

Posted by [Karlheinz Schwarz](#) at [10:04 PM](#) [0 comments](#) 

Labels: [communication](#), [condition monitoring](#), [conference](#), [Critical Infrastructure Protection](#), [DNP3](#), [IEC 61400-25](#), [IEC 61850](#), [monitoring](#), [Smart Grid](#)

Tuesday, July 28, 2009

IEEE 1588 - Precision Clock Synchronization realized in Hirschmann Ethernet Switches

Hirschmann (Neckartenzlingen, Germany - a leader in Industrial Ethernet) claims to be one of first vendors that has implemented IEEE 1588 Precision Clock Synchronization.


Accurate time information is crucial for distributed automation systems in factories and power systems. The Precision Time Protocol (PTP) defined in IEEE 1588, supports synchronization of distributed clocks with an **accuracy of less than 1 microsecond** in an Ethernet networks.

Click [HERE](#) [pdf, 800KB, 20 pages] for a very helpful White Paper from Hirschmann that explains the synchronization basics ... in case you want to understand how IEEE 1588 functions.

The definition of a specific profile for power system (IEC 61850, especially IEC 61850-9-2) is currently under discussion and is expected to be available by end of 2009.

Click [HERE](#) [pdf] for a nice presentation by SEL (January 2008)

Click [HERE](#) [pdf] for a further reading on Why do we need time in Power Systems?

Posted by [Karlheinz Schwarz](#) at [10:34 PM](#) [0 comments](#) 

Labels: [Ethernet](#), [hirschmann](#), [IEC 61850](#), [IEC 61850-9-2](#), [IEEE 1588](#), [real-time](#), [synchronization](#)

Tuesday, July 21, 2009

U.S. 2010 Energy and Water Appropriations: some \$27 billion

According to a recent press release of the U.S. Committee on Appropriations the U.S. **Department of Energy will have some \$27 billion funding for 2010**: "The Energy and Water Appropriations Bill is a key part of ongoing efforts to meet the infrastructure needs of the country and, after years of neglect, addressing the inadequacies of our national energy policies. This bill **invests in new technologies**, scientific research, and conservation efforts that will provide **long term solutions to our energy needs and create jobs**. ... And it continues to invest **in the development of a new "smart grid" to ensure electricity delivery and energy reliability**."

Excerpt of the Summary:

Total funding: DEPARTMENT OF ENERGY = \$26.9 billion !!

- Energy Efficiency and Renewable Energy: \$2.25 billion

- Electricity Delivery and Energy Reliability : \$208 million:


- **Smart Grid Technologies: \$62.9 million**, \$30 million above 2009, for smart grid research and development.
- **Energy Storage: \$15 million**, more than triple 2009, for research and development of grid-connected energy storage technologies.
- **Cyber Security: \$46.5 million for energy delivery cyber security**, an increase of \$34.5 million from 2009, to develop secure grid technologies as cyber attacks increase worldwide and the grid becomes increasingly network-connected.
- **Clean Energy Transmission and Reliability: \$42 million** to increase the efficiency of the grid and enable the widespread deployment of clean, domestic renewable energy.

- ...

Click [HERE](#) for the complete official Summary.

What is your Government providing? The German Government funds many projects. E.g., the E-Energy projects ... project budgets of some € 140 million for a 4-year term ... some € 35 million per year.

Click [HERE](#) for executive information on the E-Energy projects.

Posted by [Karlheinz Schwarz](#) at [1:35 PM](#) [0 comments](#) 

Labels: [Critical Infrastructure Protection](#), [education](#), [electric power system](#), [security](#), [Smart Grid](#), [Transmission Grid](#)

Thursday, July 16, 2009

First German Offshore Wind Turbine - with IEC 61400-25

EWE, E.ON and Vattenfall have successfully completed the construction of the **first wind turbine for the alpha ventus offshore wind farm in the North Sea ... using IEC 61400-25**. The 5-megawatt turbine is located 45 kilometres north of the island of Borkum. A total of 12 turbines are scheduled to be in running by year's end.

Click [HERE](#) for more details on the offshore park (press release).

The communication with the turbines uses the new standard IEC 61400-25.

Click [HERE](#) for some details on the communication with IEC 61400-25 from a SCADA viewpoint.

Click [HERE](#) for a description of Beckhoff PLC supporting IEC 61400-25 for Wind Turbines in alpha ventus (GERMAN only).

Posted by [Karlheinz Schwarz](#) at [2:35 AM](#) [0 comments](#) 

Labels: [condition monitoring](#), [control center](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [Vattenfall](#), [wind power](#), [wind turbine controller](#)

Saturday, July 11, 2009

German contribution to Smart Grids: E-Energy Flyer in German, English and Japanese

Several German E-Energy projects focus on ICT-based energy system of the future Smart Grid ... by spending an overall budget of some € 140 million for a 4-year term.

Initiated by the German Federal Ministry of Economics and Technology (BMWi) and implemented in collaboration with the German Federal Environment Ministry (BMU) the projects will deal with problems of the current German power delivery system. "New integral system solutions are called for, in which information and communication technologies (ICTs) will play a key role.", according to a new 2 page flyer that is available in three languages:

Click [HERE](#) for the German version.

Click [HERE](#) for the English version.

Click [HERE](#) for the Japanese version.

A Chinese version will be available soon.

Click [HERE](#) for an example of the use of IEC 61850 and IEC 61400-25 in an E-Energy projects.

Click [HERE](#) for further presentations discussing Smart Grid issues and some IEC Standards supporting Interoperability of devices and systems ... the slides were provided and discussed during the IEC TC 57 WG 17 DER Workshop in Fredericia (Denmark, 2008-02) and [HERE](#) for presentations of the Workshop in Oldenburg (Germany, 2007-06).

Posted by [Karlheinz Schwarz](#) at [8:43 AM](#) [0 comments](#) 

Labels: [distribution automation](#), [E-Energy](#), [electric power system](#), [en](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [Power Automation](#), [Smart Grid](#)

EPRI Input to U.S. Smart Grid Roadmap open for Comments

The next crucial step towards the U.S. Smart grid Roadmap is the **public review and commenting** of the EPRI "*Report to NIST on the Smart Grid Interoperability Standards Roadmap*".

The commenting phase is open **until July 30, 2009**.

Click [HERE](#) for more details on how to comment.

The federal Register Notice announced the availability of the report on June 30.

Click [HERE](#) for the federal announcement.

The "Report to NIST on the Smart Grid Interoperability Standards Roadmap (Contract No. SB1341-09-CN-0031—Deliverable 7) prepared by the Electric Power Research Institute (EPRI), June 17, 2009, is available at: www.nist.gov/smartgrid/

I hope that many experts reading this news blog will provide comments on the Report to NIST.

I will provide comments taking my experience in interoperability issues into account.

Click [HERE](#) to see my experience profile. If you have any comments you want to share with me, please send a copy of your comments to schwarz@scc-online.de

Posted by [Karlheinz Schwarz](#) at [4:59 AM](#) [0 comments](#) 

Labels: [communication](#), [electric power system](#), [en](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Power Automation](#), [Power Plants](#), [Smart Grid](#)

Thursday, July 9, 2009

IEC 61850 - Hands-On Training in Sao Paulo (Brazil) on 19-21 August 2009

The details of the program for the planned NettedAutomation/STRI - vendor independent!! - **Hands-On Training on IEC 61850** to be held in Sao Paulo (Brazil) on 19-21 August 2009 are available.

Click [HERE](#) to download the program and registration information for the Sao Paulo event [pdf, 650 KB].

Click [HERE](#) to see the list of upcoming Training opportunities.

Posted by [Karlheinz Schwarz](#) at [12:35 AM](#) [0 comments](#) 

Labels: [ABB](#), [communication](#), [education](#), [electric power system](#), [Ethernet](#), [GOOSE](#), [hands-on Training](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [peopleware](#), [Power Automation](#), [Power Plants](#), [Relays](#), [RTU](#), [SCADA](#), [seminar](#), [Siemens](#), [wind turbine controller](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Wednesday, July 8, 2009

ENTSO-E: European Network of Transmission System Operators for Electricity

The organizations ATSOI, BALTSO, ETSO, NORDEL, UCTE and UKTSOA have been fully integrated into ENTSO-E since July 2009. The [ENTSO-E](#) is now fully operational.

The objectives of the new organization is: "Promote the reliable operation, optimal management and sound technical evolution of the **European electricity transmission system** in order to ensure security of supply and to meet the needs of the Internal Energy Market."

42 TSOs from 34 countries are members in the ENTSO-E.

Posted by [Karlheinz Schwarz](#) at [11:55 PM](#) [0 comments](#) 

Labels: [RWE](#), [Transmission Grid](#), [TSO](#)

ENTSO-E – EC Workshop on “Critical Infrastructure Protection” for Transmission Grid

The workshop on Critical Infrastructure Protection (CIP) for electricity transmission networks was held on 15/16 June 2009 in Cologne, Germany. ENTSO-E and the European Commission jointly organized the workshop. This workshop was an important platform for experts of European TSOs and other organizations involved in security issues.

Click [HERE \[pdf\] to download the agenda](#) and [HERE to download the presentations \[zip\]](#).

Posted by [Karlheinz Schwarz](#) at [11:41 PM](#) [0 comments](#) 

Labels: [CIP](#), [Critical Infrastructure Protection](#), [security](#), [Transmission Grid](#), [TSO](#)

CIM Users Group met at UCTE (ENTSO-E)

The CIM Users Group presented and discussed recently in Brussels (Belgium) the current status of IEC 61968 (CIM - Common Information Model) and the application in Europe.

The ENTSO-E reported: "About 70 experts from more than 40 companies worldwide attended the meeting, partly focused on the UCTE CIM profile. UCTE's migration policy towards CIM standards for exchange of operational and planning data is expected to lead to wide-spread adoption of the CIM standard for many additional applications in Europe."

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Click [HERE](#) to access the presentations of the event.

Posted by [Karlheinz Schwarz](#) at 10:36 PM 0 comments 

Labels: [CIM](#), [communication](#), [control center](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [Smart Grid](#), [standards](#), [Substation](#)

Wednesday, July 1, 2009

IEC 61850 - Hands-On Trainings in Buenos Aires and Sao Paulo

Dear expert interested in the standard IEC 61850 for Substations and other Power Automation Systems,

NettedAutomation GmbH (Germany) and STRI (Sweden) are proud to announce possibility for **two 3-day Hands-On Training sessions in Buenos Aires (12-14 August 2009) and Sao Paulo (19-21 August 2009)**.

This training has the objective to provide both theory and practice on the application of IEC 61850 in a substation or a smart grid. We cover the planning, design and engineering process for real applications all the way to configuration and testing based on a real multivendor test installation. The 3 day course consists of:

Module 1 gives a level 1 introduction to the IEC 61850 standard together with a summary with real applications and the demonstration of STRI facilities for multivendor interoperability testing.

Module 2 gives an independent and more detailed update on the IEC 61850 standard for substation and device modelling as well as communication principles with real examples.

Module 3 provides a IEC 61850 hands-on workshop demonstrating interoperability of protection and control devices from ABB and Siemens as well as testing techniques communicating over a substation Ethernet network.

The program will be similar to the Training session scheduled for Frankfurt (Germany) on October 20-23, 2009 - mainly the Modules 1, 2, and 4a (of the Frankfurt event) will be used for the events in Buenos Aires and Sao Paulo:

[Program and registration for the Frankfurt event](#) [pdf]

The training is subject to minimum number of some 10 attendees. As we are traveling to South America for other events, we can offer these training sessions for a high discounted price of EURO 930 per person plus tax.

Please let us know by July 13, 2009 if you are interested to attend. Your feedback is essential in order to run the events.

We are confident, that our experience and service would meet all your expectations! You'd get first-hand, very comprehensive, vendor neutral and up-to-date knowledge, experience, and guidance.

Our experience profile can be found here:

http://nettedautomation.com/download/Netted-Schwarz-Profile-en_2009-01-21.pdf

<http://www.stri.se/iec61850>

[\(Brazil...](#)

[ENTSO-E: European Network of Transmission System O...](#)

[ENTSO-E – EC Workshop on “Critical Infrastructure ...](#)

[CIM Users Group met at UCTE \(ENTSO-E\)](#)

[IEC 61850 - Hands-On Trainings in Buenos Aires and...](#)

- ▶ June (9)
- ▶ May (25)
- ▶ April (11)
- ▶ March (16)
- ▶ February (11)
- ▶ January (13)

▶ 2008 (82)

Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

We look forward to greeting you at one of our next training events.

If you are interested in a special in-house training for you and your people, please contact us.

Please feel free to forward this email to any colleagues who you think might be interested in one of the events.

Best Regards,

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Posted by [Karlheinz Schwarz](#) at [1:31 PM](#) [0 comments](#) 

Labels: [ABB](#), [communication](#), [education](#), [en](#), [engineering](#), [Ethernet](#), [hands-on Training](#), [hydro power](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Power Automation](#), [real IEDs](#), [Relays](#), [Siemens](#)

Wednesday, June 24, 2009

First Substation with IEC 61850 compliant Devices in Australia

According to ABB, the first substation with IEC 61850 conformant Devices (Protection and Control) has been commissioned in Australia in August 2008. "The system formed part of the \$10-million turnkey construction of the Juna Downs 220kV substation, and is part of Rio Tinto Pilbara Iron's extensive power upgrade in the Pilbara region of WA."

[Click HERE](#) to read the news report from ABB.

Posted by [Karlheinz Schwarz](#) at [10:32 PM](#) [0 comments](#) 

Labels: [ABB](#), [communication](#), [electric power system](#), [en](#), [IEC 61850](#), [Power Automation](#)

PAC World Magazine digs into Smart Grid

PACWorld magazine discusses some crucial aspects of the Smart Grid in the Spring 2009 issue. SmartGrids are discussed all over and on all levels: from Presidents to kids in the Kindergarten. Kindergarten in Germany are quite advanced in education of Physics and Technology:

[Click HERE](#) for a presentation which shows some kids in the Kindergarten trained ... even on Substation Automation in my office (on page 21).

Different people have different opinions what Smartgrids mean - it is not just to save money. SmartGrids require smart Hardware, smart Software and (in the first place) SMART Peopleware! No smart people - no smart grids.

The latest issue of the PAC World magazine discusses several crucial aspects of the protection of smart grids:

[Click HERE](#) to get to the list of contents ... that let you access and download the well written papers and other useful information. Enjoy.

Posted by [Karlheinz Schwarz](#) at [5:41 AM](#) [0 comments](#) 

Labels: [Automation](#), [education](#), [electric power system](#), [en](#), [IEC 61850](#), [peopleware](#), [Power Automation](#), [Smart Grid](#)

IEC 61850-3 compliant Computer for Substations and Power Plants

Moxa has announced the Moxa's DA-681 x86-based embedded computer line, that has just passed IEC 61850-3 power certification. This specially designed IED (embedded system) is intended for any power automation and substation application that require to be compliant with the IEC 61850-3 standard.

The general purpose IED has six Ethernet Ports and many other serial ports! It runs Embedded Linux, WinCE 6.0, or WinXPe.

[Click HERE](#) for more details.

Posted by [Karlheinz Schwarz](#) at [2:05 AM](#) [0 comments](#) 

Labels: [Automation](#), [electric power system](#), [en](#), [Ethernet](#), [IEC 61850](#), [IEC 61850-3](#), [IED](#), [Power Automation](#)

Standard IEC 61850-7-420 (DER) now available

A further part of IEC 61850 "Communication networks and systems for power utility automation" has been published:

Part 7-420: Basic communication structure – **Distributed energy resources logical nodes**


This standard in conjunction with other standards of the series IEC 61850 and IEC 61400-25 provide a comprehensive set of standardized means to engineer, monitor, operate and maintain distributed energy systems.

One of the key issues to understand is the fact that many tools, software and IEDs (like programmable controller, HMI clients, etc.) developed for IEC 61850 can be used for distributed energy applications.

[Click HERE](#) for a 12 page preview of the standard including the introduction and table of contents.

You may also **re-use** the knowledge and experience you obtained by one of our IEC 61850 Training sessions.

[Click HERE](#) [pdf] for a list of training modules on IEC 61850 and other Standards.

Posted by [Karlheinz Schwarz](#) at [1:53 AM](#) [1 comments](#) 

Labels: [DER](#), [electric power system](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-420](#), [interoperability](#), [Smart Grid](#), [standards](#), [wind power](#)

Friday, June 19, 2009

EPRI Provided Crucial Input to the U.S. Smart Grid Interoperability Roadmap

NIST (U.S. National Institute of Standards and Technology) released on June 18, 2009, a report that identifies issues and proposes priorities for developing technical standards and an architecture for a U.S. Smart Grid. The report is out for public review.

The nearly 300-page report, developed and delivered to NIST by the Electric Power Research Institute (EPRI), is now publicly available:

[Click HERE](#) to download the Report [pdf, 5,7 MB].

[Click HERE](#) for the NIST press release.

A similar report has been written for the German projects "E-Energy" (the report is available in German only!):

[Click HERE](#) for more information on the German report.

The report refers to many Standards published by IEC TC 57 (Power System Management) and IEC TC 88 (Wind Power). Even this report is focusing on the U.S. power system, it is applicable for other regions as well. Contributions have come from non-U.S. experts. The IEC standards referenced in the report are TRUE International Standards.

The open **review process is quite crucial** because the final Roadmap will become a more or less official guideline for the whole power delivery system!

Standards like IEC 61968/70 (CIM), IEC 61850, IEC 62351, IEC 60870-6-TASE2, DNP3, IEC 61588, ... are important parts of the power system and recommended in the report to be included in the Final Roadmap. It could be expected that these standards will need extensions, and new standards may be needed as well.

The standardization work in the years to come requires that all the IEC Standardization groups closely cooperate together and with U.S. and other related standardization groups like IEEE, ISO and others. It could be expected that the resources needed for the global standardization work is at least as high as during the last 10 years.

In addition, there are several crucial regional and national R&D and other Smart Grid related projects going on, just started or planned that have also an influence on the International Standardization. It is highly recommended that the successful cooperation of U.S. activities (UCA 1.0, UCA 2.0) and e.g., the European initiated activities like IEC 61850 and IEC 61400-25 will be continued during the next decade in International Standardization!

The [press release](#) states that "NIST will use the EPRI report in drafting the **NIST Smart Grid Interoperability Standards Framework**. The NIST document will describe a high-level architecture, **identify an initial set of key standards**, and provide a roadmap for **developing new or revised standards** needed to realize the Smart Grid. Release

1.0 of the NIST Smart Grid Interoperability Standards Framework is planned to be available in September.

A third public EPRI-sponsored Smart Grid interoperability-standards workshop will be held in early August to engage standards-development organizations in responding to unaddressed, high-priority needs identified in the draft standards roadmap.

Ultimately, the Federal Energy Regulatory Commission (FERC) determines whether sufficient consensus has been reached to implement final standards and protocols necessary for Smart Grid functionality and interoperability. NIST's role is to identify and submit to FERC recommendations for the final product."

Posted by [Karlheinz Schwarz](#) at [2:31 AM](#) [0 comments](#) 

Labels: [61850-7-420](#), [communication](#), [control center](#), [DER](#), [distribution automation](#), [electric power system](#), [en](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-420](#), [IEC 61968](#), [IEC 61970](#), [Smart Grid](#)

Monday, June 8, 2009

2nd IEC 61850 Training Session in Moscow (01.-03. September 2009)

The second comprehensive training on IEC 61850 in Moscow (Russia) will be held from 01.-03. September 2009.

Click [HERE](#) [pdf in Russian] for the first announcement and contact details for the course on 01.-03. September .

Click [HERE](#) for a brief report on the the first event in March 2009 and [HERE](#) for the program of the first event (this is tentatively the program for the next event in September 2009).

Posted by [Karlheinz Schwarz](#) at [7:01 AM](#) [0 comments](#) 

Labels: [communication](#), [education](#), [electric power system](#), [en](#), [IEC 61850](#), [seminar](#), [Training](#)

Sunday, June 7, 2009


RWE and Siemens: IEC 61850 for Power Plant MV Power Supply

RWE Power and Siemens Implement IEC 61850 in a huge medium voltage substation in German Power Plant. IEC 61850 is used to integrate the information of the medium voltage substation (for the power supply of all power needs within the Power Plant) into the power plant control system.

"IEC 61850 is a comprehensive standard that defines the communication platform and the specific requirements for the network structure, network components, data models, interoperability criteria and the engineering process. Proprietary protocols, specialised bus systems and manufacturer specific solutions are a thing of the past. The new standard offers improved possibilities for the standardisation of E-Technology structures and their integration into the whole process, **without being tied to one single manufacturer.**"

Click [HERE](#) for a full paper on the project [the abstract is in English and German; the main body is in German].

Click [HERE](#) for a information on ABB's application of IEC 61850 in Power Plants.

Posted by [Karlheinz Schwarz](#) at [11:51 AM](#) [0 comments](#) 

Labels: [ABB](#), [communication](#), [DCS](#), [de](#), [electric power system](#), [Ethernet](#), [IEC 61850](#), [Power Plants](#), [Siemens](#)

Advanced Information Exchange for Ontario's Green Energy Act

Ontario's Green Energy Act asks for more clean, renewable sources of energy, like wind, solar, hydro, biomass and biogas. One of the "back bones" of the future power system is a "Smart Grid" to facilitate and maximize the development of new renewable energy projects.

Click [HERE](#) and [HERE](#) to read more about the Green Energy Act.

A **Smart Grid** means: The "advanced information exchange systems and equipment that when utilized together improve the flexibility, security, reliability, efficiency and safety of the integrated power system and distribution systems"

Click [HERE](#) for the Bill 150 [pdf, 3 MB].

A new amendment of the 1998 Electricity act requires standards:

§ 53.0.1 "The Lieutenant Governor in Council may make regulations governing the smart grid and its implementation, including regulations, (a) in respect of the timeframe for the development of the smart grid; (b) assigning roles and responsibilities for the development, **implementation and standardization** of the smart grid; (c) **prescribing the standards for communications and any other aspects in respect of the operation of the smart grid.**"

Posted by [Karlheinz Schwarz](#) at [7:55 AM](#) [0 comments](#) 

Labels: [DER](#), [electric power system](#), [en](#), [Smart Grid](#), [standards](#), [wind power](#)

Thursday, June 4, 2009

Distribution Automation or Remote Control?

Distribution Automation is one of the crucial technologies that build the backbone of the "SmartGrid" or "SmarterGrids". The future power delivery system will be based on more Automation at the lower voltage levels than before. Substation Automation is in place for High and Medium Voltage networks - usually **Low Voltage networks are not really automated**. They are protected by Protection Relays and controlled remotely by RTUs (Remote Terminal Units).

The automation functions for distribution networks is now being added to remote control either as local automation through auto-recloser and self-sectionalizing or via decision support tools. Distributed monitoring and control is the foundation to Distribution Automation - to improve the reliability of the network and to keep the aging infrastructure running. An aged transformer needs special attention to extend his life time, e.g., by preventing over loads and other stress situations.

The basis of automation are sensors that provide precise measurements - mainly of the ac current. There are first IEC 61850 compliant IEDs available that provide measurements and calculated values for LV and

MV automation applications.

Click [HERE](#) [pdf] for information of Powersense or [HERE](#) for measurement units from Camille Bauer. More to come ...

Posted by [Karlheinz Schwarz](#) at [1:26 AM](#) [0 comments](#) 

Labels: [communication](#), [condition monitoring](#), [control center](#), [distribution automation](#), [en](#), [IEC 61850](#), [low voltage](#), [medium voltage](#), [protection](#), [RTU](#), [Smart Grid](#), [Substation](#), [Substation Automation](#)

Tuesday, May 26, 2009

ABB and others push IEC 61850 all over

According to a news letter dated 2009-05-04 "ABB has introduced and exploited the benefits of IEC 61850 for customers in **55 countries** and supplied **hundreds of systems** and **thousands of products** for new substation installations, as well as retrofit and migration projects. ... ABB **played a key role** in developing and verifying this global standard, and actually commissioned the world's first IEC 61850 multi-vendor project in 2004 at the 380 kilovolt (kV) Laufenburg substation in Switzerland – one of the largest and most important substations in Europe."

[Click HERE](#) for the ABB news report.

All big vendors like ABB, AREVA, GE, SEL, Siemens, and several others, utilities and several independent consultants have heavily contributed to the standard - and are still contributing!

During today's one-day seminar on IEC 61850 organized by Asia iKnowledge Sdn. Bhd. here in Kuala Lumpur (Malaysia) it was interesting to see the huge interest of power, gas and oil utilities in the new standard! It was clearly reported and confirmed by key people that attended that the education of "smart" engineers in the new standards is one of the crucial pre-requisite for smarter grids!

[Click HERE \[pdf, 600 KB\]](#) for today's program and the program of the conference tomorrow and Thursday.

Posted by [Karlheinz Schwarz](#) at [8:05 AM](#) [0 comments](#) 

Labels: [ABB](#), [Areva](#), [conference](#), [education](#), [engineering](#), [IEC 61850](#), [implementation](#), [interoperability tests](#), [security](#), [Siemens](#), [Smart Grid](#), [Substation](#), [Substation Automation](#)

DDS NETCOM lädt zu IEC-61850- Informationsveranstaltung nach Volkstswil bei Zürich ein (4. Juni 2009)

Die Normenreihe IEC 61850 "Communication networks and systems for power utility Automation" ist die global anerkannte, einheitliche Integrationslösung für die Automatisierung in der elektrischen Energieversorgung. Sie definiert im Wesentlichen:

- Informationsmodelle (Ströme und Spannungen in Dreiphasen-Systemen, Leistungsschalter, ...)
- Services für den Informations-Austausch (Ereignisübertragung, Archive, Steuern, Echtzeit, ...)
- System-Konfigurationssprache (Konfiguration einer gesamten Anlage)

Mittlerweile wird die Norm in Transport- und Verteilnetzen, in Windenergieanlagen, in Wasserkraftwerken und dezentralen Energieversorgungssystemen eingesetzt.

Die durchgängige "Vernetzung" von Produktions- und Energieversorgungsprozessen mit IEC 61850 senkt die Kosten der Automatisierung und hilft, Energie effizient zu nutzen!

Um die wesentlichen Aspekte der Normenreihe und ihre Akzeptanz zu vermitteln, lädt DDS NETCOM für Donnerstag, 4. Juni 2009 um 12:30 Uhr nach [Fehraltorf/Volketswil \(Schweiz\)](#) zur folgenden Info-Veranstaltung ein:

„Norm IEC 61850 im industriellen Umfeld“

[Klicken Sie hier](#) für weitere Einzelheiten und das Programm.

Posted by [Karlheinz Schwarz](#) at [6:46 AM](#) [0 comments](#) 

Labels: [de](#), [electric power system](#), [hydro power](#), [IEC 61400-25](#), [IEC 61850](#), [interoperability tests](#), [Smart Grid](#), [wind power](#)

Sunday, May 24, 2009

MMS Reports with or without Segmentation?

A utility specified for IEC 61850 conformant IEDs, that all the data of FC=SG are referenced in a single dataset, to make the setting group value easily read in one GetDataSetValues service. But once the data objects are too many so that one MMS PDU can't carry the values of all members, is there any method to help transmit the values of all members of such a huge dataset? The MMS standard (ISO 9506) does not have a parameter like "more follows" or "continue after". Is there a possibility at the level IEC 61850-7-2?

One can use an IEC 61850 report control block, refer to the "big" data set and run the "general interrogation" issued by a client. The reporting model provides segmentation! It is - of course - optional. So the server and the client need to support segmentation.

The IEC 61850 report message has the following parameter:

MoreSegmentsFollow (More report segments with the same sequence number follow).

Posted by [Karlheinz Schwarz](#) at [4:22 PM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#), [MMS](#), [SCADA](#)

Power Plant DCS - Incorporating IEC 61650

A nice summary of the development of open Distributed Control Systems (DCS) for Power Plants since the eighties was written by Ralph Porfilio (ABB Power Generation).

One of crucial solutions for Open Systems is IEC 61850:

"DCS controller connectivity is currently under development for integrated IEC-61850. IEC-61850 uses Ethernet as backbone communication and will enable DCS controller integration for medium and high voltage electrical equipment. Used with electrical power distribution and substation equipment, IEC-61850 is being deployed within medium and high voltage drives, switchgear, motor starters, relay protection, generator and transformer protection, excitation and

synchronization. **DCS integration with IEC-61850** will include control, monitoring, asset monitoring, time stamp and integrated configuration tools to program the Intelligent Electrical Devices. With Profinet and IEC-61850 and an industrial Ethernet, it is expected that the DCS will be able to tightly integrate electrical system packages along with instrumentation for process control into a common system."

Click [HERE](#) for the complete paper.

Click [HERE](#) for an excerpt.

Posted by [Karlheinz Schwarz](#) at [4:21 PM](#) [0 comments](#) 

Labels: [ABB](#), [communication](#), [DCS](#), [electric power system](#), [en](#), [engineering](#), [Ethernet](#), [fieldbus](#), [IEC 61850](#), [Power Plants](#), [SCADA](#), [standards](#), [Substation](#)

Thursday, May 21, 2009


Additional 50 Million Euro funding for Electro Mobility in Germany

The German Government (Bundesministerium für Wirtschaft und Technologie BMWI) has decided to fund further R&D activities (2009-2011) with some 50 Million Euro in the domain of Information and Communication Technology (ICT) for Electro Mobility.

Five projects out of 36 proposals have been awarded. These five projects are closely related to the funded E-Energy projects.

[Click HERE](#) for the official press release (in German).

[Click HERE](#) for the "Studie zum Normungsumfeld von E-Energy" (in German)

Posted by [Karlheinz Schwarz](#) at [10:36 PM](#) [0 comments](#) 

Labels: [communication](#), [control](#), [de](#), [E-Energy](#), [electric power system](#), [electro mobility](#), [ICT](#), [Smart Grid](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Wednesday, May 20, 2009

Australian Government to support communication for Smart Grids

ZDNet Australia reported that "The Federal Government has announced an **up to \$100 million investment in the 2009 Budget to assist the development of smart grid technology** to create a "smarter and more efficient energy network". ... Smart grid technology monitors electricity supply across distribution networks **using communications technology**."

The Australian "Information and communication technology" research will get also more funding (AUD 185.5 million over four years).

[Click HERE](#) for the ZDNet Report.

Posted by [Karlheinz Schwarz](#) at 9:42 PM 0 comments 

Labels: [Australia](#), [communication](#), [electric power system](#), [en](#), [Smart Grid](#), [Substation](#), [Substation Automation](#)

US DOE supports IEC 61850 for Smart Grids

The US government directly supports the application of IEC 61850 for Smart Grids in the USA. According to a ABB we have a very famous supporter for the standard: DOE Secretary Chu and Commerce Secretary Locke:

"As announced by DOE Secretary Chu and Commerce Secretary Locke on Monday, IEC 61850 will serve as **the initial smart grid interoperability standard** for substation automation and protection."

[Click HERE](#) for the full ABB Press Release.

[Click HERE](#) for a Press release of U.S. Commerce Secretary Gary Locke and U.S. Energy Secretary Steven Chu (dated May 18, 2009)

[Click HERE](#) for the NIST - Recognized Standards for Inclusion In the Smart Grid Interoperability Standards Framework, Release 1.0

Excerpt of standards from the list:

DNP3
Substation and feeder device automation

IEC 60870-6 / TASE.2
Inter-control center communications

IEC 61850
Substation automation and protection

IEC 61968/61970

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Application level energy management system interfaces

IEC 62351 Parts 1-8

Information security for power system control operations

Posted by [Karlheinz Schwarz](#) at 9:30 PM 0 comments 

Labels: [CIM](#), [DNP3](#), [electric power system](#), [en](#), [IEC 61850](#), [interoperability](#), [Smart Grid](#), [Substation](#), [Substation Automation](#), [TASE.2](#)

Sunday, May 17, 2009

IEC 61850 for condition monitoring diagnosis and analysis

The [IEC TC 57](#) (document: 57/1007/DC) has invited for a new project to extend IEC 61850 and use it for CMD (Condition Monitoring Diagnosis) to diagnose the power grid health status to improve the reliability of the power system by preventing a potential failure in advance. Too many different CMD solutions in various forms from many vendors are currently used - there is need to standardize the basic information models and information exchange within IEC TC57.

It is intended to first write a report that addresses communication aspects related to specific sensor networks that are widely used as well as information exchange towards asset management systems. It is proposed to publish that report as IEC 61850-90-3.

A task force within TC57 WG10 will prepare this report. The proposed project leader is: Mr Hyuk Soo Jang, Department of Computer Software, Myong Ji Univ. Yongin, 449-728 Korea.

The TC57 P-members are invited to submit comments to this proposal and nominate experts willing to participate in that work by **2009-07-03**.

Please contact your TC 57 National Committee to receive a copy of the Invitation (57/1007/DC).

The work will address condition monitoring of equipment handled by the following technical committees of IEC: TC11 (Overhead lines), TC14 (Power Transformers), TC17 (Switchgear), TC20 (Electrical cables) and TC38 (Instrument transformers).

In addition, coordination with the work done in TC88, IEC 61400-25-6 (Condition monitoring for wind power plants) is required.

Proposed Architecture:

[IEC 61850 for condition monitoring diagnosis and a...](#)

[What would Smart Grids be without Microsoft?](#)

[Brunei - First Substation with IEC 61850](#)

[IEEE Project 2030 for Smart Grids](#)

[IEC 61850 IEDScout Version 2.0 available](#)

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[Lack of Power Engineers - A Risk for Smart Grids](#)

[Draft IEC 62351-7 - Network and System Management ...](#)

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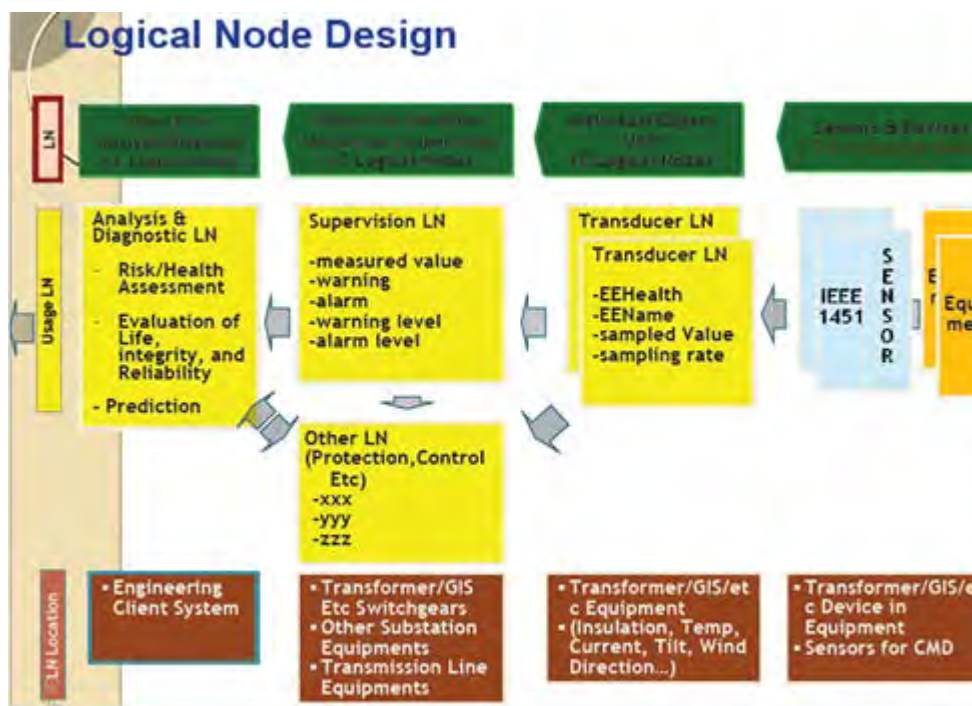
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[Role-based access control for IEC 61850, ...](#)

[Two day seminar on IEC 61850, IEC 61400-25, DNP3; ...](#)



- March (16)
- February (11)
- January (13)
- 2008 (82)

Posted by [Karlheinz Schwarz](#) at 8:40 AM 0 comments

Labels: [condition monitoring](#), [electric power system](#), [en](#), [IEC 61400-25](#), [IEC 61400-25-6](#), [IEC 61850](#), [IEC 61850-7-420](#), [interoperability](#), [Power Plants](#)

Friday, May 15, 2009

What would Smart Grids be without Microsoft?

AREVA T&D (Transmission and Distribution division) announced on May 12, 2009, the extension of a 3-year long collaboration with Microsoft to develop Smarter Grid Management solutions to help the worldwide power industry to provide reliable power. AREVA T&D sees Microsoft as a strategic partner for smart grid solutions.

[Click HERE](#) for AREVA's press release.

I am not surprised that Microsoft tries to stick the nose into the tent of the electric power system's automation and control solutions. By the way, Microsoft has taken a very active role already: There are so many **Microsoft Office Power Point slides** discussing the Smart Grids and Smarter Grids available on the Web - paper doesn't blush.

In some years we will see how much smarter the grid will be as today. The smartness has to be found first at the side of human beings - then we may use tools (like ...) for devices and systems.

Do all these myriads of tools help us? Yes, if ... No, if ...

You may like the following sayings (I read some time ... I do not know who wrote it first) which I use very often:

**A fool with a tool is still a fool; and
A fool with a tool can foul up projects faster than a fool without a tool.**

One of the crucial challenges in the domain of power delivery systems is to get more "non-fool" experts for the development of tools and for the use of tools. That requires EDUCATION. Isn't it?

Power delivery systems have provided us with reliable power for


Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

decades - without many "soft" tools ... talk to some well experienced senior engineers. The future of reliable and affordable power delivery systems will mainly depend on smart engineers that can judge to do the right things. Smart engineers are those that are well educated or got experience with bad judgements:

Tools are not a substitute for good judgment, and Good judgment comes from experience. Experience comes from bad judgment.

Posted by [Karlheinz Schwarz](#) at [12:14 PM](#) [0 comments](#) 

Labels: [Areva](#), [education](#), [en](#), [Microsoft](#), [Smart Grid](#), [tools](#), [Training](#)

Thursday, May 14, 2009

Brunei - First Substation with IEC 61850

A 66kV substation located near the Lumut Power Station (LPS) at Jalan Kecil Lumut with IEC 61850 compliant substation automation system (SAS) has been energized recently. This is claimed the first IEC 61850 based SAS in Brunei.

"This new system is flexible and 'open', enough for all power utility and industrial applications, and applicable at all voltage levels."

[Click HERE](#) for the news.

Posted by [Karlheinz Schwarz](#) at [11:25 PM](#) [0 comments](#) 

Labels: [electric power system](#), [en](#), [IEC 61850](#), [Power Plants](#), [protection](#), [Substation](#), [Substation Automation](#)

IEEE Project 2030 for Smart Grids

IEEE announced the other day an additional smart grid initiative for the **power engineering, communications and information technology industries**: IEEE 2030 "Guide for Smart Grid Interoperability of Energy Technology and Information Technology Operation with the Electric Power System (EPS) and End-Use Applications and Loads".

Intel will host the first P2030 meeting, open to individuals and organizations interested in smart grids, at its headquarters in Santa Clara, CA, June 3-5, 2009.

[Click HERE](#) for more information.

"Intel is honored to host the first meeting of the IEEE P2030 Committee, because the time to take action on smart grids is now," said Lorie Wigle, general manager of Intel's Eco-Technology Program Office. "To accelerate deployment of a smart energy infrastructure, the industry must work **toward interoperability and the creation of standards**. Intel's Open Energy Initiative is committed to supporting the development of **open standards** that will empower energy consumers and drive rapid integration of renewable energy sources, smart buildings, electric vehicles and other intelligent systems." Source: IEEE Website.

What does "smart" or "intelligent" mean in the context of the electric power delivery system?

I guess we can state that "smart" and "intelligent" are synonyms in this context. The [FreeDictionary](#) states the following:

"[smart](#): Characterized by sharp quick thought; bright. See **Synonyms at intelligent**: second definition below.

[intelligent](#) (*Adjectiv*):

1. having or showing intelligence: an intelligent child, an intelligent guess
2. (of a computerized device) able to initiate or modify action in the light of ongoing events"

The second definition can be applied to the power automation system IEDs (Intelligent Electronic Devices). These IEDs consume information received **from** other IEDs or the process input, **process** the information based on **algorithms and settings**, and generate information **for** other IEDs or the process output.

Information needs to be defined (information models, example: IEC 61850-7-4, IEC 61400-25-2, ...) and communicated (information flow, example: IEC 61850-7-2, 8-1, IEC 61400-25-4). The information flow needs to be configured (Example: IEC 61850-6).

IEC 61850 and IEC 61400-25 are standards that provide crucial features of **intelligent devices** used to build **smart grids** - developed by SMART people!! Data and information in the hands of smart human beings make a system smart! The algorithms and settings may be defined using the "Function Block" standard IEC 61499. [Click HERE](#) to learn more about IEC 61499.

Before we can develop Smart Grids, we need smart (or intelligent and well experienced) PEOPLE. [Click HERE](#) to learn more about Peopleware (i.e., about you and me).

Posted by [Karlheinz Schwarz](#) at 1:51 PM 1 comments 

Labels: [engineering](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [interoperability](#), [peopleware](#), [Smart Grid](#), [workforce](#)

Wednesday, May 13, 2009

IEC 61850 IEDScout Version 2.0 available

The following updated/new features have been added:


- * New, improved Data View
Easier navigation between devices.
- * New Polling Window
Shows all polled data together, easy to use.
- * Recording of GOOSE traffic into COMTRADE files
Captures GOOSE traffic for in-depth offline analysis.

You can download IEDScout Version 2.00 from <http://www.omicron.at/iedscout>

The software you can download runs in demo mode. With an USB dongle the software runs in full mode. The demo version can be used to connect to any IEC 61850 compliant IED. The IEDScout is an IEC 61850 client, and GOOSE publisher and subscriber.

It can also be used to visualize an .icd or .scd file (IEDs in the .scd).

NettedAutomation uses the fully functional IED Scout in IEC [61850 hands-on training](#) - with dongles for the attendees.

Posted by [Karlheinz Schwarz](#) at [11:11 AM](#) [0 comments](#) 

Labels: [education](#), [en](#), [engineering](#), [GOOSE](#), [hands-on Training](#), [IEC 61850](#), [Substation](#), [Substation Automation](#)

IEC 61850-9-2 LE - Process Bus Support by ABB and others

The IEC 61850-9-2 LE (Lite Edition) is key for the first implementations of the IEC 61850 Process Bus. The 9-2 LE edition defines two specific profiles for the exchange of sampled values:

- 80 samples per nominal period for protection applications; one set of samples is sent immediately in one SMV message.
- 256 samples per nominal period for metering applications; eight sets of samples are sent in one SMV message.

[Click HERE](#) to download the IEC 61850-9-2 LE (Users Guide) from the UCA International Usersgroup.

ABB stated that "Based on the new technologies ..., the substation footprint can be reduced by more than 50 percent, while at the same time increasing its availability and reliability."

[Click HERE](#) for a report from ABB on first experiences with the IEC 61850 Process Bus.

It could be expected that sampled values and GOOSE messages on a process bus will be used in larger scales in about two to four years.

[Click HERE](#) for some information of the process bus pilot under way at RWE (Germany - the second biggest German utility). SCC/NettedAutomation is involved with HesoTech (Germany) in the [transformer monitoring system based on IEC 61850](#).

[Click HERE](#) for a Paper on the pilot project (in German).

Posted by [Karlheinz Schwarz](#) at [5:57 AM](#) [0 comments](#) 

Labels: [ABB](#), [electric power system](#), [en](#), [GOOSE](#), [HesoTech](#), [IEC 61850](#), [IEC 61850-9-2](#), [process bus](#), [sampled value](#), [SMV](#)

Tuesday, May 12, 2009

Lack of Power Engineers - A Risk for Smart Grids

If you are working in the domain of Power Systems in utilities or industrial plants, look around your workplace. Almost half of the people may walk out of the door during the next five to ten years - may be even you!

There is a need to replace the "heads" - let's say for every one that leaves there is a replacement (we are far away from that - but let's assume it). Does this help? To some extend. The people that leave are often the most experienced people. New people help to keep the "Head Count" at a reasonable level - but what's about the "Head Content"? It seems to be required to do more than to keep the numbers of engineers and other experts at the same amount as today.

There is another issue to mention: All the new technologies walking into the power systems: Smart Grid, Smarter Grid, renewables, PHEV, information and communication technologies (ICT), monitoring the Grid and ICT infrastructure, ... Engineers have to manage the existing

system and get prepared for the many changes to come very soon.


Utilities and all other stake holders need to keep an eye on the planning of the recruitment of their future work force AND **training in these new technologies** of the people still there for the next 10 to 20 years! While universities partly start to get involved in the advanced ICT for power systems it seems to be crucial to also use other education possibilities: **The training offered by independent and well experienced experts.**

International standards like IEC 61968 (CIM), IEC 60870, IEC 61850, IEC 61400-25, ... are a pivotal point for the interoperability in the future electric power systems – they can make the system smarter than it was in the past, and keep the number of incompatible solution very low.

Massachusetts-based utility NSTAR is getting prepared they can replace the people about to walk out the door. [Click HERE for a podcast at Pennet.](#)

IEEE PES is also concerned about the situation. They have published recently a Report on the crucial issue:

"Preparing the U.S. Foundation for Future Electric Energy Systems: A Strong Power and Energy Engineering Workforce" [Click HERE](#) to download the IEEE report [PDF].

Posted by [Karlheinz Schwarz](#) at [11:43 PM](#) [0 comments](#) 

Labels: [education](#), [en](#), [engineering](#), [IEC 61850](#), [IEC 61968](#), [interoperability](#), [peopleware](#), [power systems](#), [Training](#), [workforce](#)

Monday, May 11, 2009

Draft IEC 62351-7 - Network and System Management objects

The IEC TC 57 Committee Draft for IEC 62351-7 TS Ed.1 has been published the other day (document 57/1003/DTS):
Power systems management and associated information exchange – Data and communication security – **Part 7: Network and system management (NSM) data object models**

Closing date for comments: **2009-08-07**
(contact your [national TC 57 committee](#) for a copy).

These NSM data objects will be used to monitor the health of networks and systems, to detect possible security intrusions, and to manage the performance and reliability of the information infrastructure in power systems.

Scope and Objectives

Power systems operations are increasingly reliant on information infrastructures, including communication networks, intelligent electronic devices (IEDs), ... Therefore, management of the **information infrastructure** has become crucial to providing the necessary high levels of security and reliability in power system operations. Using the concepts developed in the IETF Simple Network Management Protocol (SNMP) standards for network management, IEC 62351-7 defines Network and System Management (NSM) data object models that are **specific to power system operations**. These NSM data objects will be used to monitor the health of networks and systems, to detect possible security intrusions, and to manage the performance and reliability of the information infrastructure. These data objects are defined as

abstract data objects. These abstract data objects will be mapped to specific standards, such as IEC 61850, IEC 60870-5, IEC 60870-6, IEC 61968/61970 (CIM), web services, SNMP. These mappings will be defined later.

The utility industry should take these activities very serious - the many objects that will be standardized have a crucial impact on the **power system monitoring**! It is likely that the infrastructure will provide much more status information (provided by many "software" sensors) than the power delivery process (breaker status, voltage, current, oil pressure of a transformer, ...). Be aware that the ICT (information and communication technology) infrastructure will become very comprehensive (!!); may no too complex - but providing hundreds or thousands of new "Signals" not needed today! **Get involved in the future of YOUR power system.**

Posted by [Karlheinz Schwarz](#) at [2:14 AM](#) [0 comments](#) 

Labels: [DNP3](#), [electric power system](#), [en](#), [IEC 61850](#), [interoperability](#), [mapping](#), [SNMP](#)

Saturday, May 9, 2009

Training Opportunities 2009

NettedAutomation GmbH holds three public seminars/trainings in 2009:

Kuala Lumpur (Malaysia): 26-27 May 2009
Frankfurt (Germany): 20-23 October 2009
San Antonio, TX (USA): 29-30 October 2009

1. Kuala Lumpur (Malaysia)

A two day International Conference (27-28 May 2009) and a one day Pre-Conference Seminar (26 May 2009) will be held at PWTC in Kuala Lumpur (Malaysia)

The program and registration form [pdf, 530 KB] can be downloaded [HERE](#)

2. Frankfurt (Germany)

The third four (three) day Comprehensive & Independent Hands-on Training by NettedAutomation and STRI will be held in Frankfurt (Germany) on 20-23 October 2009

The program and registration form [pdf, 500 KB] can be downloaded [HERE](#)

3. San Antonio, TX (USA)

Two-Day Special Course on IEC 61850, IEC 61400-25, and DNP3 will be held at the Remote 2009 Conference and Expo in San Antonio, TX (USA) on 29-30 October 2009

The program and registration form can be accessed [HERE](#)

This event will educate you in the latest development of the Backbone for the "Smart Grid": The advanced Automation of the power generation, transmission and distribution systems and process Automation systems with standard compliant devices and systems.

These events make you, the experts - the most crucial asset! - smarter.

Posted by [Karlheinz Schwarz](#) at [2:01 AM](#) [0 comments](#) 

Labels: [conference](#), [DER](#), [electric power system](#), [en](#), [hands-on Training](#), [IEC 61850](#), [peopleware](#), [Smart Grid](#), [Substation Automation](#), [Training](#), [wind power](#)

Friday, May 8, 2009

IEC 61850: German-Korean Cooperation

The Korean Electrical Manufacturers Association (KOEMA), and DKE (Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE) signed a MoU (Memorandum of Understanding) to cooperate in the domain of power system standardization: especially with regard to IEC 61850 and SmartGrid. DKE K 952 mirrors the IEC TC 57 activities on IEC 61850. DKE has published several documents on the use of IEC 61850 [[web page with use cases in English](#)].

[Click HERE](#) for press release on the MoU in German.

Posted by [Karlheinz Schwarz](#) at [10:36 PM](#) [0 comments](#) 

Labels: [electric power system](#), [IEC 61850](#), [Smart Grid](#)

Thursday, May 7, 2009

Interoperability - Key for Smart Grid

NIST to Receive \$610 Million Through Recovery Act

"The National Institute of Standards and Technology (NIST) will receive \$610 million in funds as part of the American Recovery and Reinvestment Act of 2009. The agency will use the funds for programs that support U.S. innovation and industrial competitiveness, key factors in spurring economic growth.

The Act provides \$220 million in direct appropriations for NIST laboratory research, competitive grants, research fellowships, and advanced research and measurement equipment and supplies. ... Additional funding transferred to NIST from other federal agencies includes ... **\$10 million for collaborative efforts to develop a comprehensive framework for a nationwide, fully interoperable smart grid for the U.S. electric power system.**"

[Click HERE](#) for more details from NIST.

What is Interoperability? According to [IEC 61850](#) it is the **ability of two or more IEDs** (Intelligent Electronic Devices) from the same or different vendors, to exchange information and use that information for correct execution of a specified function. Interoperability needs to be tested - just claiming that a device is conformant to a standard is not sufficient. [STRI](#) (Ludvika, Sweden) provides [interoperability tests](#) for IEC 61850 and IEC 61400-25 compliant devices.

Posted by [Karlheinz Schwarz](#) at [11:39 AM](#) [0 comments](#) 

Labels: [electric power system](#), [en](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [standards](#)

Wednesday, May 6, 2009

Smart People - The most crucial asset for Smart Power Systems

As a consultant for Power Automation Systems I am traveling all over educating utility people to better understand the paradigm shift from today's - some times electromechanical - solutions to the use of ICT (Information and Communication Technologies) in the power world. I

am very concerned that the most crucial Asset - the PEOPLE - is often understood to save money: less people, less education, less ... leads to better profits - yes, in the Short Term!

This morning I read a very interesting (not surprising) viewpoint written by the Editor Emeritus of the [Hydro Power Magazine HRW](#) (May 2009 issue, Vol. 17, No 2) with the title:

Dams and Hydropower Endure ...
Yet, the Right **People** Are Needed!

"Dams and hydropower facilities are almost uniquely enduring ... in a world too often focused on the "next quarter" (or, perhaps, the next election). Many beneficial facilities exceed 50 -and some 100 -years of age.

While such facilities can seem ageless, the people who tend to them are not. In fact, multiple generations of **educated, trained, and experienced individuals** are required to care for these facilities. As things continually change, it's important that personnel needs not be minimized. It must remain a top priority to do what's necessary to ensure that people are available and **well-trained** to provide needed stewardship. ... Today there is a heightened concern over adequate staffing and technical support, as policy-and decision-makers often have quite limited knowledge of the needs, associated risks, and possible consequences of failing to appropriately address "people" needs."

Low and high level investments in the power industry are really challenging. In the recent years you could see many companies cutting personal - often the well educated and experienced experts left their firm in the age of 55 to 60. Many experts are still available. Some of them are really not looking for the paradigm shift because this would require to learn a lot of new stuff. I have heard that a manager said: "If you want to use this new technology, you have wait until I have retired!"

Some two years ago I did some education on IEC 61850 at a small utility. Some six months later I asked about the progress they made in the meantime. The answer was: "We are still two retirements away from IEC 61850!"

The years to come may provide huge investments (many billions of USD or EUR or ... for the Smart Grid). Check the announcements of the last days or weeks.

How could the relatively few engineers spent this huge amount of money? Often the utilities will just buy what's available - to keep the power flowing. There is usually not much time at all to get the key people trained in order to become able to use the new technology for the benefit of the utility. Investing huge amounts of money without a solid and well thought plan will lead to this: **Today's solution will become tomorrow's problems.**

The Power Delivery Systems Endures ...
Yet, the Right **People** Are Needed - people educated and experienced!

Education is when you study the new ICT solutions based on International Standards -- **Experience** is what you get if you don't. Human beings learn only by experience - but only by their own experience. Benefit from the experienced senior engineers that are open to the use of advanced ICT.

Read the following paper discussing the "Impact of IEC 61850 on System Engineering, Tools, Peopleware and the Role of the System Integrator" [[full paper](#)] and [[slides](#)]

Finally, let me briefly discuss "Smart Grids":

"Data" becomes "Smart Data"

"Smart Data" becomes "Smarter Data"


"Grid" becomes "Smart Grid"

"Smart Grid" becomes "Smarter Grid"

"People" need to become "Smart People"

"Smart People" need to become "Smarter People"

Smart (well educated) People are the prerequisite to use data, software, devices, tools, and the grid to **build Smart Power Systems!**

Posted by [Karlheinz Schwarz](#) at [12:39 AM](#) [0 comments](#) 

Labels: [education](#), [en](#), [IEC 61850](#), [peopleware](#), [Smart Grid](#), [Training](#)

Tuesday, May 5, 2009


Testing IEC 61850 Relays and Substations

Megger provides a test device to monitor GOOSE messages, e.g., messages to trip a circuit breaker etc.

The test device can be configured using a SCL file.

[Click HERE](#) for more information on the MPRT test tool.

Test sets from Omicron, Doble and Megger are in action during the Hands-on Training sessions of STRI & NettedAutomation. [Click HERE](#) for information on the Hands-on Training scheduled for Frankfurt, 20-23 October 2008.

Posted by [Karlheinz Schwarz](#) at [10:12 PM](#) [0 comments](#) 


Labels: [en](#), [GOOSE](#), [IEC 61850](#), [Relays](#), [SCL](#), [Substation Automation](#), [test set](#), [testing](#), [Training](#)

Hands-on Training on IEC 61850 in Frankfurt

NettedAutomation and STRI offer the next Comprehensive & Independent Hands-on Training to be held in Frankfurt (Germany) on 20-23 October 2009:

The Future of Power Systems Requires Comprehensive Know-how IEC 61850 is the global standard for Power System Automation (generation, transport, distribution ... high, medium and low voltage levels). It allows for an open and "future proof" design, different architectures and possibilities to combine products from multiple vendors. In order for users and system integrators to utilize the benefits of IEC 61850 it is necessary for power utilities, integrators and vendors to education their most crucial asset – people, and start the migration to IEC 61850.

[Click HERE](#) for the program and other details.

Posted by [Karlheinz Schwarz](#) at [11:44 AM](#) [0 comments](#) 

Labels: [en](#), [engineering](#), [Ethernet](#), [GOOSE](#), [hands-on Training](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61850-7-420](#), [IEC 61850-9-2](#), [IEC61850](#), [interoperability](#), [interoperability tests](#), [process bus](#), [Substation](#), [Substation Automation](#), [wind power](#)

US President's commitment to energy research and education

US President Obama has committed to high increase in funding for the future of the US energy supply. In a speech to the National Academy of Sciences he made a very strong commitment to support R&D, education, ... to "enlist the **talents and skills of the very best American scientists and engineers** to address current fundamental scientific roadblocks to **clean energy** and **energy security**."

"In the 1950s and 1960s, Sputnik and the space race inspired young people to pursue careers in science and engineering. The average age of NASA's Mission Control during the Apollo 17 Mission, for example, was 26.

President Obama believes that we have a similar opportunity to inspire today's young people to tackle the single most important challenge of their generation – the need to develop cheap, abundant, clean energy and accelerate the transition to a low carbon economy." ...

"The President's initiative will empower young men and women to invent and commercialize advanced energy technologies such as efficient and cost effective methods for converting sunlight to electricity and fuel, carbon capture and sequestration, stationary and portable advanced batteries for plug-in electric cars, advanced energy storage concepts that will enable sustained energy supply from solar, wind, and other renewable energy sources, high-efficiency deployment of power across **"smart grids"** and carbon neutral commercial and residential buildings."

[Click HERE](#) for the complete ARPA-E news letter.

[Education on international standards](#) is one of the pillars of the future "smart grids" - education of people that **want to become engineers** and education of **engineers that are already working for years**. In some years down the road most young engineers are likely to have a solid knowledge of modern information and communication technologies. In the meantime many well experienced power engineers need to understand better the change in power system automation: the shift from wires to smart networks: to the **distributed energy web**. Every node in the network would have to be awake, responsive, flexible, and – most important – interconnected with everything else!

[Click HERE](#) for a comprehensive paper on "*Seamless Communication with IEC 61850 for Distributed Power Generation*" (presented in 2002 at the DistribuTech 2002, Miami)

Posted by [Karlheinz Schwarz](#) at [10:20 AM](#) [2 comments](#) 

Labels: [DER](#), [en](#), [engineering](#), [Obama](#), [Smart Grid](#), [standards](#), [US president](#)

Sunday, May 3, 2009


IEC 61968 (CIM) - Large scale interoperability test in Europe

UCTE (Union for the Co-ordination of Transmission of Electricity) and the Electric Power Research Institute (EPRI, Palo Alto, CA, USA), along with European and American vendors and Transmission System Operators (TSO) organized a large CIM (Common Information Model) interoperability test. The test, held on March 23rd – 27th in Paris, was organized by UCTE, directed by EPRI and hosted by RTE (TSO of France).

[CLICK here](#) for the UCTE press release.

[CLICK here](#) to learn about CIM.

UCTE is the association of transmission system operators in continental Europe, providing a reliable market base by efficient and secure electric "power highways". An "electronic highway" for ITC (information technology and communication) is under way.

Posted by [Karlheinz Schwarz](#) at [10:36 AM](#) [0 comments](#) 

Labels: [CIM](#), [en](#), [IEC 61968](#), [IEC 61970](#), [interoperability](#), [interoperability tests](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Sunday, May 3, 2009

Role-based access control for IEC 61850, ...

The IEC TC 57 Committee Draft for **IEC/TS 62351-8** Ed. 1.0 has been published the other day (document 57/1001/CD):

Power systems management and associated information exchange -
Data and communications security - Part 8: Role-based access control.

Closing date for comments: **2009-08-07**
(contact your [national TC 57 committee](#) for a copy).

This document provides a technical specification for access control in power systems. The power system environment supported by this specification is enterprise-wide and extends beyond traditional borders to include external providers, suppliers, and other energy partners.

This specification defines role-based access control (RBAC) for enterprise-wide use in power systems. It supports a distributed or service-oriented architecture where security is distributed service and applications are consumers of distributed services.

The access control for IEC 61850 data objects is to implement by the virtual access view with the following roles:

- VIEW right: Allows the user/role to discover what objects are present within a Logical Device. If this right is not granted to a user/role, the Logical Device for which the View privilege has not been granted shall not appear.
- READ right: Allows the user/role to obtain the values of objects that are present within a logical device.
- DATASET right: Allows the user/role to have full management rights for both permanent and non-permanent DataSets.
- REPORTING right: Allows a user/role to use buffered reporting as well as un-buffered reporting.
- FILE right: Allows the user/role to have restricted rights for File Services.
- CONTROL right: Allows a user to perform control operations.
- CONFIG right: Allows a user to remotely configure certain aspects of the server.
- SETTINGGROUP right: Allows a user to remotely configure Settings Groups.
- MNGT right: Allows the role to transfer substation configuration language files and other files, as well as delete existing files.
- SECURITY: Allows a user/role to perform security functions at both a Server/Service Access Point and Logical Device basis.

Posted by [Karlheinz Schwarz](#) at [7:43 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#), [IEC61850](#), [MMS](#), [RBA](#), [security](#)

Saturday, May 2, 2009

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[US DOE supports IEC 61850 for Smart Grids](#)

Two day seminar on IEC 61850, IEC 61400-25, DNP3; October 29-30, San Antonio (TX)

A Two-Day Special Course on IEC 61850, IEC 61400-25, DNP3 will be held during the "Remote 2009 Conference and Expo", October 29th & 30th, 2009 in San Antonio, Texas (USA).

The reality of the world-wide retiring process of the most valuable assets (the senior engineers in the utilities) the aging systems, the companies tightening budgets and lowering sales expectations could bring some great opportunities for everyone involved in information management of local and remote devices and processes. Less people means less proprietary solutions could be supported. This is the time for a single, internationally standardized and accepted solution: IEC 61850.

In this comprehensive 2-day workshop students learn the fundamental concepts and vision of the IEC 61850 standard series. Students compare traditional solutions like DNP3 and the new OPC UA to IEC 61850 and discuss the strength each method offers. All the IEC 61850 standards, their extensions, and many application domains are briefly discussed and the class delves into IEC 61850 real-time and client/server solutions.

Click [HERE](#) for full details and registration information.

Posted by [Karlheinz Schwarz](#) at [12:32 AM](#) [0 comments](#) 

Labels: [conference](#), [DNP3](#), [en](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850-7-420](#), [OPC](#), [questions](#), [RTU](#), [seminar](#), [Training](#), [wind power](#)

Wednesday, April 29, 2009

Industrial Plants - Easier Integration of Automation and Electrical Systems

Usually the **automation of production processes** (DCS - Distributed Control System) and the **electrical distribution system** in an industrial plant are two - more or less - independent systems. The electric energy is a very crucial raw material that needs be taken into account in the automation system of the production process.

ABB has focused on this integration during last week's Hanover Industrial Fair (HMI, Hanover Germany) pointing to **IEC 61850** as an **universal integration standard**:

Excerpt from the news letter: "... What has been standard in the sector of power generation and supply is now also coming to effect in the process automation sector. The **international standard IEC 61850** allows the integration of automation and electrification as well as energy distribution and management, thus providing operators and other users with essential information on the overall system. If, for example, the targeted productivity of a plant does not tolerate process interruptions, the integrated communication allows to implement optimized failure scenarios for load shedding. The operator can quickly respond and optimally use the energy available. Particularly for industries with high energy demand, the production capacities can be geared towards optimized consumption – costly peak loads can thus be avoided. ..."

ABB news letter [PDF: [English](#) - [German](#)]

Power plant projects that use IEC 61850 for system integration ... [PDF: [English](#)]

[IEC 61850 for condition monitoring diagnosis and a...](#)

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► April (11)

► March (16)

Use of IEC 61850 in Power Plants (hydro, wind, ...) [PDF: [English](#)]

Posted by [Karlheinz Schwarz](#) at 9:48 PM 0 comments 

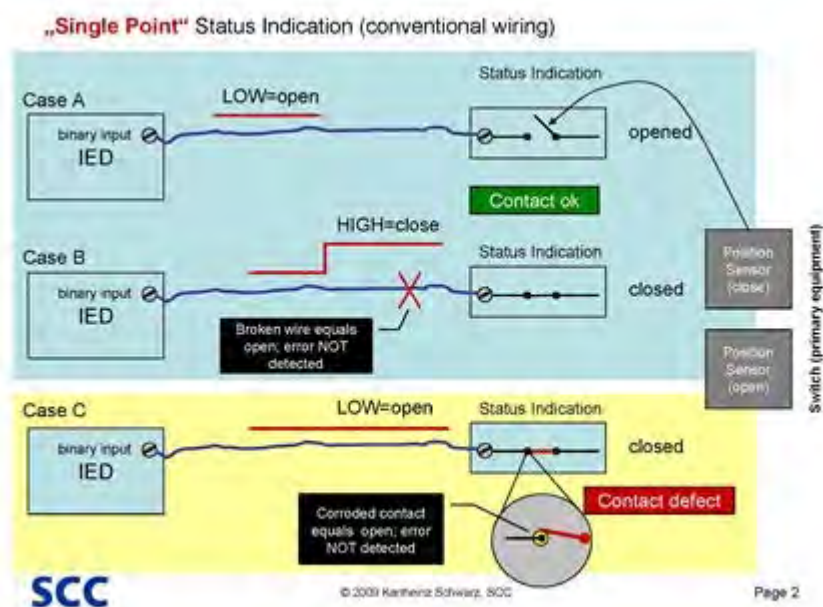
Labels: [ABB](#), [DCS](#), [de](#), [en](#), [IEC 61850](#), [IEC61850](#), [integration](#), [power distribution](#), [Power Plants](#), [process control](#), [Substation Automation](#)

Tuesday, April 28, 2009

Why do we need Single Point and Double Point Status?

The Single Point signals and Double Point signals for Status monitoring of e.g. circuit breaker switch positions in substations are quite special in process control systems. The basic definitions have been made in fifties of the last century - when remote monitoring was realized with electro-mechanical relays, contacts, wires and relay inputs.

The most simplest approach was to use a single contact to signal a switch position: 110 V on the input contact = Switch closed; no voltage = Switch open. This single contact is called "a Single Point Signal":



This solution was not very safe. Think of broken wire that was not detected. Or of a contact that was not closed for a long time. After that time the contact may have been corroded so that after closing the contact mechanically there is no electrical contact! The receiving device would not be informed that the switch has been closed!

Engineers found solutions to solve the problem: They invented the "Double Point Signal":

► February (11)

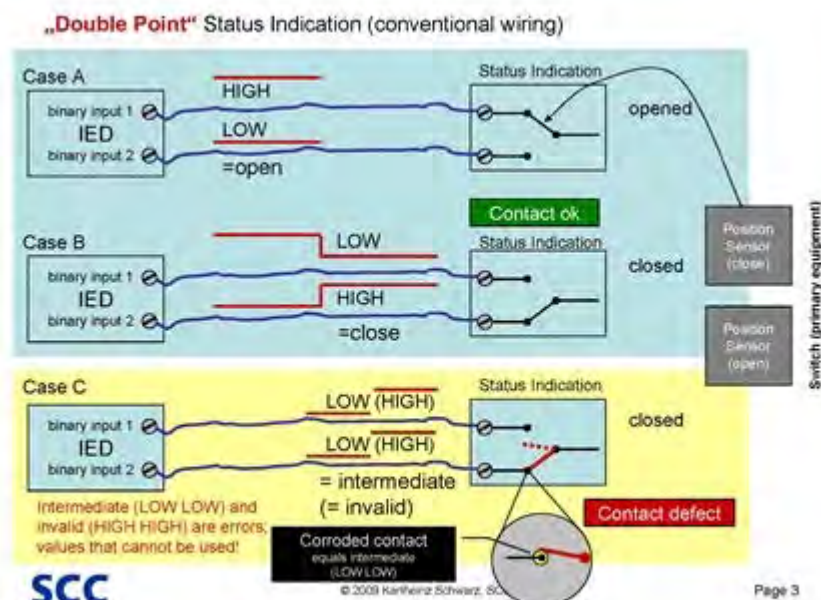
► January (13)

► 2008 (82)

Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)



Single Point and Double Point Data Types are still in use in serial communication systems like DNP3, IEC 60870-5-104 or IEC 61850. The IEC 61850-7-3 defines these types -- so-called Common Data Classes (CDC).

The reason for Double Point Status in serial communication systems (like the IEC 61850-7-3 CDC DPS) is quite different: the two bits for the representation of "open" and "close" make the status message secure. A single bit error does not cause a wrong interpretation of the value! The value will not be valid anymore.

More details on the basic modeling approach of process information and information exchange is provided in the comprehensive and neutral seminars and training classes of NettedAutomation GmbH ([details](#)). Now is the time to get more education.

Posted by [Karlheinz Schwarz](#) at 7:46 AM 0 comments

Labels: [control](#), [control center](#), [DNP3](#), [double point](#), [I/Os](#), [IEC 60870-5-104](#), [IEC 61850](#), [models](#), [single point](#), [status message](#)

Q&A on IEC 61850 from attendees of seminar in Moscow

The attendees of the IEC 61850 seminar held in Moscow (Russia) recently provided more than [10 questions on IEC 61850 that have been answered in written form](#) [pdf, 47 KB] ... the questions have been discussed during the class. Usually attendees provide questions prior to the classes.

Posted by [Karlheinz Schwarz](#) at 6:33 AM 0 comments

Labels: [en](#), [Ethernet](#), [IEC 61850](#), [interoperability](#), [questions](#), [redundancy](#), [RTU](#), [SCADA](#), [Substation](#), [Training](#)

Monday, April 27, 2009

Protocol Message Repository

If you are looking for traces of packets (e.g, [MMS](#) messages) you can find a huge and growing repository provided by [Mu Dynamics](#): [Pcap](#).

Have a look - it has many features. [MMS message traces ...](#)

Posted by [Karlheinz Schwarz](#) at [11:13 PM](#) [1 comments](#) 

Labels: [en](#), [message encoding](#), [MMS](#), [pcap](#)

Saturday, April 25, 2009


Green Power Superhighway

US FERC (Federal Energy Regulatory Commission) supports a proposed 3,000-mile regional "green power superhighway" designed to deliver wind-powered renewable energy from the upper Midwest to consumers in and around Chicago, Minneapolis and other load centers.

The cost for the new 765 kV transmission system is estimated at \$10 - 12 billion and deliver up to 12,000 megawatts. [News letter \[pdf\]](#)

Under the assumption of 3 MW wind turbines it would require some 4,000 wind turbines to be installed!

What do these systems need? Information and communication systems ... a bright future for today's communication standards.

Posted by [Karlheinz Schwarz](#) at [12:36 AM](#) [0 comments](#) 

Labels: [DER](#), [en](#), [IEC 61400-25](#), [monitoring](#), [wind power](#), [wind turbine controller](#)

Friday, April 24, 2009

Mit oder ohne Gateway - geschlossen oder offen?

Seit Mitte der achtziger Jahre des letzten Jahrhunderts wird immer wieder über offene und geschlossene Informations- und Kommunikationssysteme diskutiert. Während einer der ersten öffentlichen Konferenzen zu offenen Systemen (etwa 1983) habe ich gehört, wie Kritiker offener Systeme die Lokalen Netzwerke (LAN) und offene Systeme wie folgt kommentierten:

LAN = **L**eidvolle **A**nwender-**N**euorientierung

Offene Systeme - **"Wer offene Systeme will, der ist nicht ganz dicht!"**

Wie sieht nach 25 Jahren im industriellen Automatisierungsbereich die Situation aus?

Offene Systeme werden sich global - mal mehr und mal weniger - in vielen Anwendungsbereichen durchsetzen! Ohne Zweifel!

Damit offene Systeme **"dicht"** bleiben, müssen angemessene Sicherheitsmaßnahmen ergriffen werden! **Viele Systeme sind nicht "ganz dicht"** - sie laden regelrecht zu einem "Besuch" ein! Wenn der Zugriff auf viele Informationen möglich ist, dann ist es sehr wahrscheinlich, dass bald jemand davon Gebrauch macht! Aus Neugierde oder zum Schaden des Systembetreibers!

Ethernet-Lösungen, mit denen **"Das Ende der Gateways"** (die totale Offenheit) verkündet wird ([Artikel in der C&A 03/2009](#)), können sinnvoll

eingesetzt werden, wenn angemessene Security-Maßnahmen ergriffen werden, die das Gesamtsystem (traditionelle IT **und** Prozess-IT) **"dicht"**, das heißt, sicher machen".

*Auszug aus dem C&A-Artikel: "Ein Ethernet-Netzwerk für alle Applikationen eines Unternehmens – ohne Bruch zwischen Echtzeit- und Standard-Anwendung! Diese Vision beschäftigt seit Anfang des Jahrtausends intensiv die Automatisierungstechniker. Harting zeigt zur Hannover Messe erstmals Switches, die nun beide Welten zusammenführen – **ohne die bis dato notwendigen Gateways.**"*

Offenheit ist bei machen schon zur Religion geworden: "Echelon is agnostic about modems, Lund explained as he stood for a 30-minute interview. "Our **only religion is it must be IP.**" (Quelle: [SmartGridToday](#))

Die notwendigen IT-Security-Maßnahmen werden in vielen Prozess-Automatisierungssystemen sehr oft (zu oft!) als Aufgabe der IT-Abteilung gesehen! Mit der zunehmenden Ethernet- und IP-Vernetzung muss in Automatisierungssystemen eine vernünftige Balance zwischen einer **notwendigen funktionalen Offenheit** und einer **hinreichenden System-Sicherheit** gefunden werden.

Haben Sie Fragen zur IT-Sicherheit von Systemen, in den offene Kommunikationsnormen wie IEC 61850, IEC 61400-25, IEC 60870-5-10x angewendet werden? [Kontakt.](#)

Posted by [Karlheinz Schwarz](#) at 8:48 AM 0 comments 

Labels: [de](#), [Ethernet](#), [Gateway](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#), [security](#)

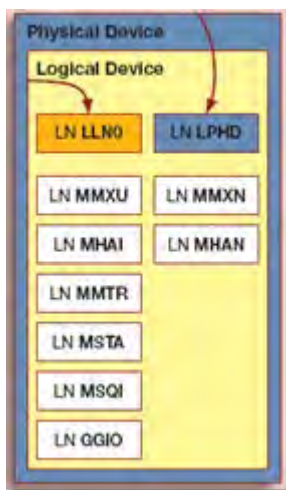
Low voltage electrical measurements and general I/O's with IEC 61850

Camille Bauer (Switzerland) offers a **measurement** IED for electric distribution systems or industrial facilities compliant with IEC 61850. The IED can also be used as a **Gateway** for many other input and output signals. SINEAX CAM-POWER is designed for measurements in electric distribution systems or in industrial facilities.

The following Logical Nodes are supported:

- [SINEAX CAM Universal measuring unit for heavy current variables \[en\]](#)
- [SINEAX CAM Universelle Messeinheit für Starkstromgrößen \[de\]](#)
- [Installation \[en/de\]](#)
- [General information](#)

The IED is a good example that demonstrates that advanced IEDs can run several applications: measurements, general I/O's or logic functions. The classical PLC (programmable logic controller) with its special hardware has been converted to a software that can run on almost any hardware platform with Ethernet, TCP/IP and upper layer protocols.



Protection IEDs have integrated Ethernet switches ... it is likely that classical Ethernet Switches will soon provide general I/O's and logic

function. IEDs will become more multifunctional!

Upper layer protocols and other definitions like information models and configuration language according to IEC 61850 will play a crucial role in future automation systems.

Posted by [Karlheinz Schwarz](#) at 7:21 AM 0 comments 

Labels: [control](#), [Data concentrator](#), [de](#), [en](#), [Gateway](#), [GGIO](#), [IEC 61850](#), [RTU](#), [Substation](#), [Substation Automation](#)

Friday, April 17, 2009

NERC refers to IEC 61400-25

The North American Electric Reliability Corporation (NERC) has published a special report "Accommodating High Levels of Variable Generation" on April 16, 2009. The report discusses the planning and **operation** of the future power system with high volume of flexible grid resources like wind power or plug-in hybrid electric vehicles. A crucial element in the future power delivery system will be the **information and communication technology**.

IEC TC 57 and TC 88 have published International Standards for most crucial aspects of future power delivery systems: IEC 61850 and IEC 61400-25 (extending IEC 61850 for wind power). The NERC report refers to IEC 61400-25 in clause 2.4.3:

"2.4.3. Power Management

For variable generation to provide power plant control capabilities, it must be visible to the system operator and able to respond to dispatch instructions during normal and emergency conditions. Real-time wind turbine power output, availability, and curtailment information is critical to the accuracy of the variable generation plant output forecast, as well as to the reliable operation of the system. It is critical that the Balancing Area operator have **real-time knowledge of the state of the variable generation plant and be able to communicate timely instructions to the plants**. In turn, variable generation plant operators **need to respond** to directives provided by the Balancing Area in a timely manner. The need for this information was clearly illustrated during the restoration of the UCTE system following the disturbance of Nov. 9, 2006 **when there was a lack of communications between distribution system operators (DSOs) and transmission system operators (TSOs)** delayed the TSO's ability to restore the bulk power system.

Therefore, as small variable generation facilities grow into significant plants contributing significantly to capacity and energy, **balancing areas will require sufficient communications for monitoring and sending dispatch instructions to these facilities**. *(Foot note: An international standard communications protocol has been prepared, **IEC 61400-25**, Wind turbines – Communications for monitoring and control of wind power plants – Overall description of principles and models, International Electrotechnical Commission, December, 2006).*

Further, Balancing areas and generator owner/operators must ensure procedures, protocols, and **communication** facilities are in place so dispatch and control instructions can be **communicated** to the variable generation plant operators in a timely manner. **Adequate communication** of data from variable generation and **enhanced system monitoring** is not only a vital reliability requirement, but is also necessary to support the data analysis posed by other recommended NERC and Industry actions."

[\[Press Release\]](#)

[\[Executive Summary\]](#)

[\[Full Report\]](#)

Posted by [Karlheinz Schwarz](#) at [2:18 AM](#) [0 comments](#) 

Labels: [condition monitoring](#), [control](#), [control center](#), [DER](#), [en](#), [IEC 61400-25](#), [IEC 61850](#), [integration](#), [interoperability](#), [monitoring](#), [wind power](#)

Thursday, April 16, 2009

Process and Power Automation use ONE Integration Standard - IEC 61850

Comprehensive automation systems are in use in many application domains like:

- Factories (factory automation),
- Chemical and power plants (process automation),
- Electrical transmission and distribution substations (substation automation)
- ...

Usually these domains have their **own** solutions - there are many reasons (often historical reasons). They even have their own standardization bodies: Factory automation: ISO TC 184, process automation: IEC TC 65, and substation automation: IEC TC 57.

From a system integration point of view this is non-productive. Very often the electrical system was understood as somehow special - may be because of the danger of dealing with high voltage!!

The above mentioned automation domains need solutions to exchange the huge amount of information for control and monitoring. In the past very often these domains used their own communication solutions. There was no consensus between the different domains to define a seamless solution that makes integration easier - to save time and money, ...

The first approach to overcome the many proprietary solutions was the project MAP (manufacturing automation protocol) some 25 years ago. It failed - because it was simply too early. Just a few people understood the need of seamless integration. ISO TC 184 has published the system integration standard ISO 9506 (MMS) in 1990 - but it is used since the mid nineties all over in the electric power world: in IEC 60870-6-TASE.2, IEC 61850, and IEC 61400-25.

After the "fieldbus war" we still have the domain specific approaches, solutions and products. The fieldbus discussion has focused too long on the best approach of the field instrumentation - now we have tens of normative fieldbus standards! A seamless solution for system integration was developed by IEC TC 57: IEC 61850 "Communication networks and systems for power utility automation". The restricted scope on power utility automation has been chosen because IEC TC 57 has the scope electric power systems. Most experts outside the "dangerous" electrical world have not (yet) thought to use an "electrical" standard for non-electrical applications.

In fact the solution IEC 61850 can be used in almost all application domains of automation. At least for the three domains: factory automation, process automation, and substation automation. AND: All these application domains use a lot of electric power!! Electric power is one of the most crucial raw material for any application. Any plant manager has to pay more attention to the electric power system!

ABB has realized the crucial integration needs cross several application

domains: "We still have separate work spaces for **power people** and **process people**, but everyone does more of their work the same way, using the same paradigm. This means more and better optimization, lower total costs and more minimization of risk." according to Stefan Bollmeyer, ABB fieldbus product manager for its System 800xA. He says also: "Many users have their own department and kingdoms, and they want them to stay just as they are."

"To help process control and power staffs cooperate on achieving better electrical integration, ABB recommends they adopt a unified integration method based on a single system environment, use a **fieldbus** network to handle electrification control and management, and use the **IEC 61850 standard to tie together process instrumentation, process electrification and power distribution networks**." according to a report about ABB's March 23-25, 2009 event in Orlando, Florida (USA). [Read Report.](#)

With the Ethernet, TCP/IP and XML based information exchange in most of the application domains it could be expected that IEC 61850 will be used as the standard for seamless information, information exchange and system configuration. The information model of IEC 61850 "MMXU" (electrical measurements) providing objects of three phase AC voltages (PhaseA, PhaseB, PhaseC or PhaseAB, PhaseBC, PhaseCA) or three AC currents (PhaseA, PhaseB, PhaseC) can be used where three phases are installed: in any application domain.

The same AC electrical system can be found in power plants, power transmission and distribution, and any other plant. Some companies have realized that IEC 61850 could be used as the single seamless solution in most application domains. Nobody would come up with a special 5 phase AC system for his application domain! IEC 61850 could play the same standard role as does the three phase seamless AC electrical system - even we have 50 Hz or 60 Hz systems!

IEC 61850 will be accepted some time down the road as the **seamless international integration standard** like the three phase AC electrical system is the **international standard for electric power**.

Posted by [Karlheinz Schwarz](#) at [10:34 PM](#) [0 comments](#) 

Labels: [ABB](#), [en](#), [engineering](#), [Ethernet](#), [fieldbus](#), [IEC 61850](#), [integration](#), [MMS](#), [Power Plants](#), [process control](#), [seamless](#), [Substation Automation](#), [TASE.2](#)

IEC 61850-9-2 Edition 2 out for CDV ballot

The Committee Draft for Vote for IEC 61850-9-2 Ed.2 has been published the other day (document 57/996/CDV):
Communication networks and systems for power utility automation -
Part 9-2 Specific Communication Service Mapping (SCSM) – Sampled values over ISO/IEC 8802-3

Closing date for commenting and voting: **2009-09-11**
(contact your [national TC 57 committee](#) for a copy).

The following are two extensions in the CDV of Edition 2:

- Link Redundancy: Parallel Redundancy Protocol and High Availability Seamless Ring (according to IEC 62439-3) - optional
- Sample Mode has been added to the control block and sample value message:
 - 0 = samples per nominal period (DEFAULT)
 - 1 = samples per second
 - 2 = seconds per sampleIf not available (backward compatibility) the

default value is 0.

Posted by [Karlheinz Schwarz](#) at [3:32 AM](#) [0 comments](#) 

Labels: [en](#), [Ethernet](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61850-9-2](#)

Wednesday, April 15, 2009

Full day seminar and two day Conference on IEC 61850 in Kuala Lumpur, May 26-28, 2009

International experts will present and discuss the latest development in the domain of IEC 61850 for power systems ... especially for substation protection and automation.

A full day pre-conference workshop on IEC 61850, IEC 60870-5, DNP3, CIM, Security, Decentralized Energy, Smart Grids, ... will take place on May 26.

The event will take place in Kuala Lumpur (Malaysia) on May 26-28, 2009.

[Program and registration information \[pdf, 530 KB\]](#)

Posted by [Karlheinz Schwarz](#) at [10:21 PM](#) [0 comments](#) 

Labels: [CIM](#), [conference](#), [DNP3](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [protection](#), [seminar](#), [Substation](#), [Substation Automation](#)

Tuesday, March 31, 2009

3 day IEC 61850 Substation Automation and Control Event in Kuala Lumpur on 26-28 May 2009

This technical event provides a national and regional platform for exposures and practical case studies on successful implementations of IEC 61850 around the globe. The event also shares world class substation automation, protection and control practices on IEC 61850. Delegates will gain in-depth insights and updates in the latest trends on IEC 61850. Attendees will be exposed to an innovative approach of IEC 61850 that will result in significant improvements in both costs and performance of electric power systems.

Dates:

26th May:
pre conference course on IEC 61850, IEC 61400-25, IEC 61968 CIM, IEC 60870-5-10x, DNP3, ... by Karlheinz Schwarz

27th and 28th May 2009: conference

Venue: PWTC, Kuala Lumpur, Malaysia

Delegates will gain in-depth insights and updates in the latest trends on IEC 61850. Attendees will be exposed to an innovative approach of IEC 61850 that will result in significant improvements in both costs and performance of electric power systems. "IEC 61850 - Substation Automation, Protection and Control" technical event aims to integrate the new international communication standard in substation automation and to expand your professional networks in the industry:

- Featuring presentations from IEC 61850 experts in the region:
- One day Pre-event Workshop on IEC 61850, IEC 6087-5, DNP3, CIM,

Security, Decentralized Energy, Smart Grids... @ 26 May 2009 by Karlheinz Schwarz

- IEC 61850 – The Information Exchange Standard for Energy Supply Systems
- IEC 61850 and IEC 61400-25 – General Monitoring and Condition Monitoring in Power Systems
- More, Faster, Less, Less – The Business Drivers for IEC 61850
- Engineering Process for IEC 61850
- Evaluation of Substation Automation with IEC 61850
- The Single, Global and Future Proof Automation Standard - IEC 61850
- Reliability and Availability Calculation for Substation Automation in IEC 61850
- IEC 61850, A New Engineering Perspective in Malaysia
- And More...

*Please contact for full event brochure (+603 78057905) or email info@iknowledge.com.my

Posted by [Karlheinz Schwarz](#) at 9:05 PM 0 comments 

Labels: [CIM](#), [DER](#), [DNP3](#), [engineering](#), [Ethernet](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61499](#), [IEC 61850](#), [IEC 61850-7-420](#), [IEC 61968](#), [IEC 61970](#), [Relays](#), [RTU](#), [SCADA](#), [Smart Grid](#), [Substation](#), [Training](#)

Studie zum Normungsumfeld von E-Energy

Die Studie zur Untersuchung des Normungsumfeldes zum BMWi-Förderschwerpunkt "e-Energy - IKT-basiertes Energiesystem der Zukunft" wurde im Auftrag des Bundesministeriums für Wirtschaft und Technologie (BMWi) von OFFIS - Institut für Informatik, SCC Schwarz Communication Consult (Karlheinz Schwarz) und mpc management project coaching erstellt.

Ziel dieser Studie ist primär die konsistente Bereitstellung von Informationen über bestehende, in Arbeit befindliche und zusätzlich notwendige Normen für IKT-basierte Energiesysteme und deren Verwendung im Kontext der sechs geförderten Konsortialprojekte von E-Energy. Die einzelnen Projekte werden individuell über die Ergebnisse der Studie informiert. Im Rahmen der Begleitforschung zu E-Energy wird gemeinsam der Handlungsbedarf bei der Umsetzung vorhandener Normen (wie beispielsweise IEC 61850, IEC 61400-25, IEC 61499, IEC 61968, IEC 61970) und Standards und bei der Zuarbeit zu den Normungsgremien festgestellt.

Inhalte:

1. Zusammenfassende Empfehlungen der Studie für die Modellregionen
2. Aufbau der Studie
3. Einführung und Problemstellung
4. Methodisches Vorgehen
5. Standards zur Softwareerstellung
6. Softwarearchitekturkonzepte für e-Energy
7. TR IEC 62357: TC 57 Seamless Integration Architecture
8. Normenfamilie IEC 61968 und IEC 61970: CIM
9. Normenreihe IEC 61850: Schaltanlagenautomatisierung
10. Normenreihe IEC 60870-5 für die Fernwirktechnik
11. Normenreihe IEC 60870-6 TASE.2 für die Kommunikation zwischen Netzleitstellen
12. IEC 61131-3 und IEC 61499 für die funktionale Interoperabilität
13. Vernetzung in der elektrischen Energieversorgung

14. Norm IEC 62361: Harmonisierung von Qualitätscodes
15. Standards zur Marktkommunikation in der Energiewirtschaft
16. Standards im Bereich Sicherheit
17. Standards zur Home Automation
18. Kommunikationsstandards für Smart Metering
19. Mit e-Energy vergleichbare internationale Programme
20. Normungsorganisationen und Gremien

[Download der Zusammenfassung](#) [PDF, 0.8 MB]

[Download der Studie](#) [PDF, 5.4 MB]

Posted by [Karlheinz Schwarz](#) at [8:39 PM](#) [0 comments](#) 

Labels: [de](#), [DER](#), [E-Energy](#), [IEC 61400-25](#), [IEC 61499](#), [IEC 61850](#), [IEC 61850-7-420](#), [Smart Grid](#)

Sunday, March 29, 2009

Application of IEC 61850-9-2 for non-conventional sensors

Dear supporter of IEC 61850-9-2 for non-conventional sensors,

There is a growing interest in the application of IEC 61850-9-2 for non-conventional sensors. I have been asked several times, when mature products will be available etc.

Have you any information about (pilot) installations (planned, under commissioning or in operation)?

If you could share some information with me I would highly appreciate your response.

Thanks a lot!

Some industry statements: Areva [\[pdf, 200 KB\]](#) , [\[pdf, 250 KB\]](#)

Email feedback to: [Karlheinz Schwarz](#)

Posted by [Karlheinz Schwarz](#) at [9:20 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#), [IEC 61850-9-2](#), [merging unit](#), [synchronization](#)

Saturday, March 28, 2009

Emerson Process Management applies IEC 61850 for power plants

Emerson Process Management announced on March 26, 2009, that it will use IEC 61850 in power plants to be build for EDF in France and UK.

"Emerson's PlantWeb architecture will make extensive use of HART Communications to connect the I/O. IEC 61850 modules will interface to Intelligent Electronic Devices (IED) used within the switchyard."

[Full press release.](#)

Posted by [Karlheinz Schwarz](#) at [9:56 PM](#) [0 comments](#) 

Labels: [EDF](#), [en](#), [IEC 61850](#), [Power Plants](#), [process control](#)

Wednesday, March 25, 2009

IEC 61850-90-1 Communication between substations


The Draft Technical Report for the communication between substations has been published by IEC TC 57 for the final vote. Original project number was IEC 62445.

Document: 57/992/DTR
Distributed: 2009-03-13
Voting terminates: 2009-05-15

Use Cases

1. Distance line protection with permissive tele-protection scheme
2. Distance line protection with blocking tele-protection scheme
3. Directional comparison protection
4. Transfer/Direct Tripping
5. Interlocking
6. Multi-phase auto-reclosing application for parallel line systems
7. Current differential line protection
8. Phase Comparison Protection
9. Fault locator system (2, 3 terminals)
10. System Integrity Protection Schemes (SIPS)
11. Real time predictive generator shedding
12. Out-of-step detection
13. Synchrophasors
14. Remedial Action Schemes (RAS)

If you want to comment on these document, please contact your national IEC committee. [Member bodies of IEC TC 57.](#)

Posted by [Karlheinz Schwarz](#) at [12:25 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#), [protection](#), [Substation](#), [Substation Automation](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Monday, March 23, 2009

Report on Distributech 2009, San Diego

The DistribuTECH covers automation and control systems, energy efficiency, engineering, demand response, renewables integration, power delivery equipment and water utility technology.

The 19th DistribuTECH and Transtech Conference & Exhibition was held from February 03 to 05, 2009 at the Sand Diego Convention Center in San Diego (California, USA). It is a key event in North America. The event offered many opportunities to electric power system professionals to learn about the latest offerings in technology, share experience with existing solutions and exchange ideas about the challenging future of the power industry. The event was well attended by vendors, utilities, system integrators and other experts. The number of exhibitors has grown since 2008.

The domains covered by the conference and exhibition comprise automation and control systems, information technology, transmission and distribution engineering, power delivery equipment and water utility technology. One crucial focus was on the many facets of the Smart Grids. Many of the three hundred exhibitors offered solutions for **smarter or intelligent Grids**. The new US government is expected to support alternative and renewable energy and to accelerate rebuilding the whole electric network and to make the power delivery system a Smart Grid. The event showed that many **companies and groups are prepared (or waiting) to receive the "Obama Dollars"** – to build the system of the future.

[Download full report](#) [pdf, 24KB]

Posted by [Karlheinz Schwarz](#) at [5:36 AM](#) [1 comments](#) 

Labels: [AMI](#), [en](#), [IEC 61850](#), [IEC61850](#), [SCADA](#), [Smart Grid](#)

Sunday, March 22, 2009

CDV of IEC 61850-8-1 Edition 2 published

The Committee Draft for Vote for IEC 61850-8-1 Ed.2 has been published the other day (document 57/994/CDV):
Communication networks and systems for power utility automation - Part 8-1: Specific Communication Service Mapping (SCSM) - Mappings to [MMS \(ISO 9506-1 and ISO 9506-2\)](#) and to ISO/IEC 8802-3

Closing date for voting: **2009-09-04**
(contact your [national committee](#) for a copy).

This document is based on the experiences made after the publication of the first Edition of 8-1. The crucial changes made are according to the Tissues (Technical Issues) posted at the Tissue database (www.tissue.iec61850.com).

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[3 day IEC 61850 Substation Automation and Control ...](#)

[Studie zum Normungsumfeld von E-Energy](#)

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[IEC 61850-90-1 Communication between substations](#)

The following tissues have been solved in this CDV:

Tissues for clauses 1-6 – General, Communication stack:

[122](#) [235](#) [290](#) [292](#) [299](#) [430](#) [459](#)

issues for clause 7-8, 11-14:

[109](#) [110](#) [111](#) [112](#) [115](#) [116](#) [119](#) [120](#) [123](#) [128](#) [144](#) [165](#) [168](#) [183](#) [222](#) [314](#)
[368](#) [377](#) [422](#) [433](#)

Tissues for clause 16 (Setting Group):

[33](#) [34](#) [36](#) [37](#) [38](#) [39](#) [40](#) [41](#) [52](#) [53](#) [172](#) [333](#) [417](#)

Tissues for clause 17 (Reporting model):

[114](#) [177](#) [198](#) [344](#) [438](#)

Tissues for clause 18-Annex A (GOOSE):

[117](#) [121](#) [224](#) [227](#) [231](#) [237](#) [279](#) [323](#) [365](#) [419](#)

Tissues for clause 20 (Control model):

[143](#) [196](#) [246](#) [262](#) [528](#)

Tissues for clause 22 (File transfer):

[118](#) [260](#) [576](#)

Harmonization with 7-2 and 7-3:

[103](#) [141](#) [146](#) [149](#) [173](#) [246](#) [453](#) [456](#) [457](#)

Need help in MMS? [Contact us.](#)

Posted by [Karlheinz Schwarz](#) at [9:04 AM](#) [0 comments](#) 

Labels: [en](#), [GOOSE](#), [IEC 61850](#), [mapping](#), [MMS](#)

Tuesday, March 17, 2009

Electricity speaks one language: IEC 61850

Bachmann electronics provides an IEC 61850 solution for the Integration of wind parks or power stations seamlessly into a control station or into a network.

The IEC 61850 (MMS) server of Bachmann electronic runs as a software module on a M1 controller and communicates outwards the variables available in the application programs (e.g., programmed with IEC 61131-3).

Two page [description by A M Khadkikar \[pdf, 160 KB\]](#)

Posted by [Karlheinz Schwarz](#) at [6:17 AM](#) [0 comments](#) 

Labels: [applications](#), [en](#), [IEC 61400-25](#), [IEC 61850](#), [implementation](#), [Power Plants](#), [SCADA](#), [wind power](#), [wind turbine controller](#)

IEC 61850 Gateway for PLCs

A master thesis by Jonas Lidén (2006, Stockholm/Sweden) discusses the use of IEC 61850 for Vattenfall Vattenkraft AB's technical systems for turbine controllers. The work started with an investigation of today's automation products with focus on station bus communication. Today Vattenfall Vattenkraft AB are modernising their automation products in many of their hydro power plants, and the turbine controllers are developed by SwedPower AB on standard PLC's (Programmable Logic Controller).

[Report on Distributech 2009, San Diego](#)

[CDV of IEC 61850-8-1 Edition 2 published](#)

[Electricity speaks one language: IEC 61850](#)

[IEC 61850 Gateway for PLCs](#)

[Substation hardened Ethernet Switch and Fanless PC...](#)

[IEC 61850, IEC 60870-5 and IEC 61968 CIM Course in...](#)

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[IEC 61850 Interoperability Research Project - Func...](#)

[Siemens PCS 7 driver for IEC 61850](#)

[Hands-on Training in Frankfurt on October 20-23, 2...](#)

[IEC 61850 in action - overview on 12 projects by S...](#)

► [February](#) (11)

► [January](#) (13)

► [2008](#) (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

The report describes the implementation and the results of the testing.

[Download the report \[pdf, 2.3 MB\]](#)


Posted by [Karlheinz Schwarz](#) at [6:00 AM](#) [0 comments](#) 

Labels: [en](#), [hydro power](#), [IEC 61850](#), [implementation](#), [PLC](#), [SCADA](#), [Vattenfall](#)

Substation hardened Ethernet Switch and Fanless PCs

Advantech has developed a 19" rack mounted [Industrial Ethernet Switch](#) and a [Fanless Box PC](#) for grid and substation automation. The hardware is designed for IEC 61850-3 compliance (especially to meet the higher requirements on EMC, temperature range, supply voltage, ...) to be used in Substations and with data gateways and data concentrators.

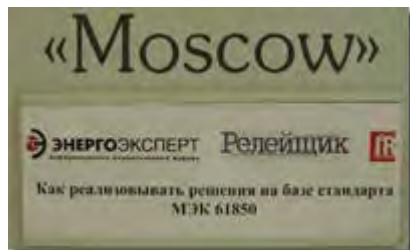
It is very likely that more processor performance for substation automation will be available soon.

Posted by [Karlheinz Schwarz](#) at [5:51 AM](#) [0 comments](#) 

Labels: [Data concentrator](#), [en](#), [Ethernet](#), [Gateway](#), [IEC 61850](#), [RTU](#)

IEC 61850, IEC 60870-5 and IEC 61968 CIM Course in Moscow, March 10-12, 2009

Experts of Substation Automation Systems in the Russian Federation are quite interested in the new Standard IEC 61850 and other IEC Standards.



Several experts from vendors and from an important user attended the comprehensive course on the standards IEC 61850, IEC 60870-5 and IEC 61968 CIM at the Novotel Moscow Centre on March 10 to 12, 2009.

The Russian utility market asks for Russian products compatible with IEC 61850 (protection and control IEDs, SCADA systems, RTUs, ...).



The average age of the participants was surprisingly low! Power engineering is one of the favorite subjects at Moscow's universities and institutes.

We are planning to organize another public IEC 61850 event together with "Vsya Electrotehnika" publishing house, www.energyexpert.ru, in Moscow (October or November 2009).

Contact [NettedAutomation for details](#) or [EnergyExpert](#).

Posted by [Karlheinz Schwarz](#) at 3:37 AM 0 comments 

Labels: [CIM](#), [hands-on Training](#), [IEC 60870-5-104](#), [IEC 61850](#), [IEC 61968](#), [RTU](#), [SCADA](#), [Substation](#), [Substation Automation](#), [Training](#)

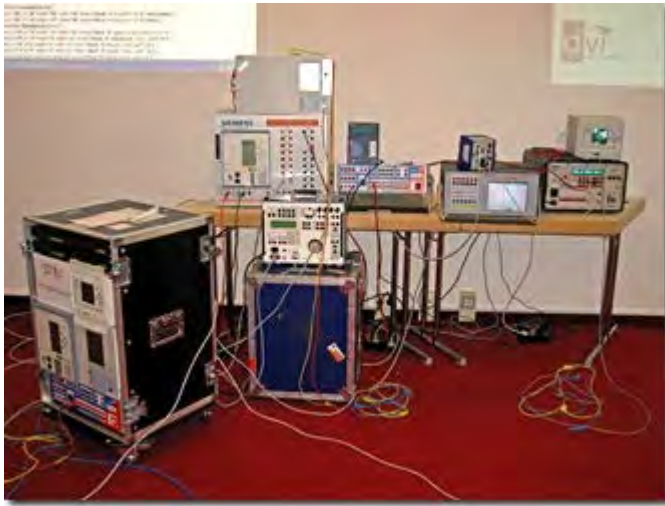
Multi-Vendor Test Case at Frankfurt IEC 61850 training

STRI and NettedAutomation GmbH arranged the second "Comprehensive & Independent Hands-on Training" for IEC 61850 in Frankfurt, March 3-6 2009 with participants from Europe, America and Africa. The multivendor test installation with IEDs from ABB, Areva and Siemens communicating over a RuggedCom network and equipped with an Omicron test set **was shipped in advance** from STRI to be the test environment for the hands-on course: **But it did not arrive on time. What to do now?**

One crucial objective of IEC 61850 is **TEAMWORK**: To make different vendors to talk to each other and to work together. Omicron shipped a new test set overnight from Austria, the Doble participant to the course had brought a Doble test set and Megger/Programma surprised us with a new test set. And we got two new Ethernet switches from the Hirschmann attendee. What about the IEDs? The participant from SEL brought a Schweizer IED for IEC 61850, Siemens sent a new IED and Nicholas picked up a new Areva IED at their training center in Frankfurt. Programma offered us to borrow an ABB RET670 that Carl Öhlén from STRI picked up in Stockholm before flying down to Frankfurt.

One of the hotel rooms became the IEC 61850 instant system integration and engineering center ...

DHL did a good job



to force us the demonstration of REAL multivendor support and multivendor interoperability of new equipment that just arrived.

Read more details on the excellent [experience on multivendor support during the Frankfurt event](#).

The next **public IEC 61850 hands-on training** will be on October 20-23, 2009 in Frankfurt.

In-house hands-on training - a solution where your people do not need to travel - is also possible. Your equipment can also be used in the multivendor hands-on training.

A big European Transmission Grid company has contracted with NettedAutomation to intensively train their SAS staff including hands-on training together with STRI .

Contact [NettedAutomation for details](#).

Posted by [Karlheinz Schwarz](#) at [3:01 AM](#) [0 comments](#) 

Labels: [ABB](#), [Areva](#), [engineering](#), [Ethernet](#), [hands-on Training](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Substation Automation](#)

Monday, March 16, 2009

IEC 61850 Interoperability Research Project - Functional Specification available


A German InterOP research project (investigating interoperability of typical substation functions) has released its functional specification for interoperability testing on Monday, 16th March 2009.

More details on the project are available in the [official announcement](#).

Comments are welcome. Interested parties are invited to review the specification and send comments to the project leader FGH e.V., Germany no later than April 12, 2009.

Interested parties that want comment are kindly asked to register for free by simply sending an e-mail with contact details of a responsible person, in order to reply to potential comments and give feedback. The functional specification will be sent straight forward by the FGH to all registered parties.

For registration please send contact details to interop@fgh-ma.de

Posted by [Karlheinz Schwarz](#) at [2:16 AM](#) [0 comments](#) 

Labels: [engineering](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Substation](#), [Substation Automation](#)

Monday, March 9, 2009

Siemens PCS 7 driver for IEC 61850

The IEC 61850 communication library grants you full access to the data objects provided by protection and control devices. The library blocks automatically map the information to the PCS 7 Operator Station for the visualization of tag data as well as time stamped alarm data.

Areas of application PCS 7 driver blocks for IEC 61850

- Process plants with process connections between the process control system and the electrical power system
- Small to medium size substation systems automated with PCS 7 or S7
- Alarming of critical conditions in process control HMI when substation HMI is not permanently manned

[Details on PCS 7 ...](#)

ABB has already integrated the IEC 61850 into their controller: [see details on 800xA](#).

Posted by [Karlheinz Schwarz](#) at [4:57 AM](#) [0 comments](#) 

Labels: [ABB](#), [DCS](#), [en](#), [IEC 61850](#), [SCADA](#), [Substation](#)

Sunday, March 8, 2009

Hands-on Training in Frankfurt on October 20-23, 2009

After the successful training last week in Frankfurt/Germany, STRI and NettedAutomation have set the date for the fall Hands-on Training event to 20-23 October 2009. The event will also be held in Frankfurt/Germany.

The hands-on training will be extended to offer a SCADA session in parallel to the ID and SCL hands-on training on October 23. Details will be provided in due time.

[Contact us if you are interested.](#)

Posted by [Karlheinz Schwarz](#) at [2:18 PM](#) [0 comments](#) 

Labels: [61850](#), [condition monitoring](#), [engineering](#), [Ethernet](#), [GOOSE](#), [hands-on Training](#), [IEC 61850](#), [SCADA](#), [Training](#)

Monday, March 2, 2009

IEC 61850 in action - overview on 12 projects by Siemens

Siemens has published very interesting brief descriptions of successfully installed substation automation and protection systems with IEC 61850 conformant devices (IEDs):

- Aare-Tessin Ltd. for Electricity (Atel), Olten, Switzerland
- [East China Power Grid Company, Shanghai, China](#)
- RWE Power, Garzweiler, Germany
- RUSAL, Sayanogorsk, Russia

- CADAFE, Caracas, Venezuela
- Petróleos de Venezuela S.A. (PDVSA), Caracas, Venezuela
- Power Grid Corporation of India Ltd (POWERGRID), New Delhi, India
- NUON, Alkmaar, Netherlands
- Statnett SF, Oslo, Norway
- Electrificadora del Meta S.A. (EMSA), Meta/Bogotá, Colombia
- Réseau de Transport d'Electricité (RTE), La Défense Cedex, France
- Eólicas de Portugal / EDP RENOVÁVEIS, Lisbon, Portugal

All brief project descriptions [are contained in a 66 page document \[pdf, 3.3 MB\]](#)

Want to know what IEC 61850 is all about? [Brief introduction \[1 page\]](#).

Posted by [Karlheinz Schwarz](#) at [5:05 AM](#) [0 comments](#) 

Labels: [en](#), [GOOSE](#), [IEC 61850](#), [protection](#), [redundancy](#), [RTU](#), [Substation](#), [Training](#)

Friday, February 27, 2009

Information exchange and encoding messages

For the encoding of messages to be exchanged in automation systems the **red pencil tactics** are still too often used, in the opinion: The shorter the message, the better. Is that what we really are looking for? [Read the imposing joke on encoding.](#)

Saving a few octets was one of the objectives of the definition of hundreds of solutions for communication protocols for automation systems - focusing on getting rid of some octets. Now with the use of secure TCP/IP based communication tunneling the many "old" protocols adds many times more octets at several layers than those saved in the design of the "optimized" application protocols. Saving a few octets in the application protocols has a negligible effect! Some people that complained about the ASN.1 BER encoding years ago are now asking for Webservices with XML encoding - increasing the message lengths by orders of magnitude!

For every problem there is a solution which is simple, neat and wrong.

One lesson learned is: Focus on the applications, information to be exchanged, information exchange services, and the engineering process to get interoperable devices that can smoothly inter-operate - don't discuss saving a few bits in the application protocol encoding.

Posted by [Karlheinz Schwarz](#) at [10:12 PM](#) [0 comments](#) 

Labels: [en](#), [message encoding](#)


IEC 61850 and other Standards for metering

Triangle Microwork's long term experience with IEC Standards IEC 61850 and IEC 60870-5, as well as industry standards DNP3 and Modbus pays off:

Elster (offering smart metering and smart grid systems and solutions) announced that [Triangle MicroWorks](#) has joined [Elster's Advanced Grid Infrastructure \(AGI\) Initiative](#). The AGI Initiative is a collaborative effort between utilities, Elster, and key technology providers to realize innovative solutions for grid modernization.

Elster Senior Vice President David G. Hart said, "We are pleased to have a partnership with Triangle MicroWorks that provides our customers with the benefits of **greater interoperability**. Elster's solutions can better equip utilities by integrating Triangle MicroWorks' leadership in **standardized smart grid communication protocol technologies**."

[Complete news letter \[pdf, 37 KB\]](#)

Posted by [Karlheinz Schwarz](#) at 9:15 PM 0 comments 

Labels: [DNP3](#), [en](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [smart metering](#)


Friday, February 20, 2009

Petrobras Goes IEC 61850 for Refineries in big scale

10 of Petrobras's 12 refineries in Brazil will be equipped with IEC 61850 conformant [DCS system 800xA](#) from ABB.

According to ABB "The scale of the modernization program is immense. In addition to building new units for distillation, hydrotreatment, cooking, desulfurization and other processes, Petrobras is constructing **50 new substations** and **modernizing about 40 others to the new IEC 61850 global standard** for interoperable substation automation devices ... enables refinery operators to monitor and control the systems from a single interface and run power management applications and intelligent IEC 61850 substations in the process automation system." [Read more on ABB's engagement at Petrobras ...](#)

The integration of IEC 61850 in process control automation systems is one of the expected new use cases for IEC 61850. The original scope of IEC 61850 was "substations", the new is "power utility automation" - still restricted to (electric) power, because IEC is in charge of the "electrical World". The standard series IEC 61850 can be used ALL OVER in the automation world: [IEC 61850 outside substations](#) is happening already. More to come.

Posted by [Karlheinz Schwarz](#) at 9:45 PM 0 comments 

Labels: [ABB](#), [DCS](#), [en](#), [IEC 61850](#), [IEC61850](#), [process control](#), [Substation](#), [Substation Automation](#)

Next IEC 61850 Hands-on Training 20-23 October 2009

STRI and NettedAutomation have set the date for the fall Hands-on Training event to 20-23 October 2009. The event is planned to be held in Ludvika (Sweden). Details will be posted in due time.

The next event is in Frankfurt (Germany) from 03 to 06 March 2009 [Details \[pdf\]](#)

Posted by [Karlheinz Schwarz](#) at 7:33 AM 0 comments 

Labels: [en](#), [hands-on Training](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [Training](#)

Thursday, February 19, 2009

IEC 61850 OPC Device Driver

[ReLab Software LLC](#) (based in Concord, California) offers an [OPC Device Driver for IEC 61850](#) to enable communication with all devices supporting the international standard IEC-61850.

[Product information](#) [pdf, 190 KB]

[Experience of the ReLab programmers](#) with the IEC 61850 stack implementation:

"The difficulties of IEC-61850 stack implementation described in this article do not diminish the value of the protocol itself. The protocol is a significant step in communication unification and has a great future."

Posted by [Karlheinz Schwarz](#) at [9:43 PM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#), [implementation](#), [OPC](#), [SCADA](#)

IEC 61850 modeled with UML

The standard IEC 61850 uses simple table notations and text description of the information models and information exchange services.

The working group 10 of IEC TC 57 discussed the use of higher level modeling languages many times, e.g., UML (Unified Modeling Language) or ASN.1. The discussion will continue in a new project group within IEC TC 57:

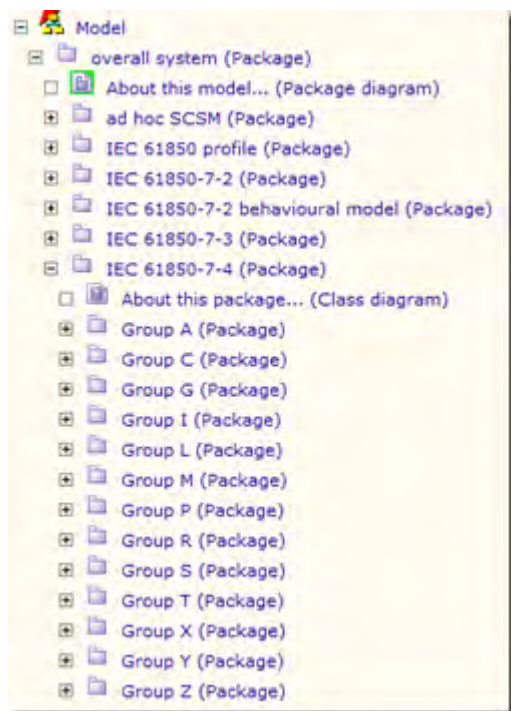
"Web-based and structured access to the IEC 61850 information models"

The web-based access to the [IEC Component Data Dictionary](#) (IEC 61360) is a good example of the benefit of web technologies for IEC standards.

A public available model for IEC 61850 using UML 2.0 is provided and maintained by Electricité De France R&D (Clamart/France). The [current version accessible at the web](#) is dated December 2006, Release 1.1

The scope of this model is the IEC 61850 part 7-2, 7-3 and 7-4 (First Edition) and its HTML format. Enjoy.

Excerpt of model:



Posted by [Karlheinz Schwarz](#) at 9:00 PM 0 comments 

Labels: [en](#), [IEC 61850](#), [IEC61850](#), [UML](#)

RWE Innogy sucht Ingenieur mit Erfahrung in IEC 61850 und 61400-25

RWE Innogy sucht SCADA-Ingenieur mit Kenntnissen in IEC 61850, IEC 61400-25, DNP3, ... Einsatzort Hamburg. [Weitere Details ...](#)

Posted by [Karlheinz Schwarz](#) at 6:31 AM 0 comments 

Labels: [de](#), [DNP3](#), [IEC 61400-25](#), [IEC 61850](#), [OPC](#), [SCADA](#), [wind power](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Wednesday, February 18, 2009

New Tool for CIM (IEC 61970-301)

The internationally widely used standard for utility information modeling (IEC 61970-301) can be managed with the Sparx Systems [Enterprise Architect](#) as a UML tool to maintain and distribute the Common Information Model. IEC TC 57 WG 13 and 14 have decided recently to rely on the cost effective and powerful tool.

[Sparx news letter](#)

Use of the CIM Standard for Managing Assets at the Long Island Power Authority and the application of Enterprise Architect. [more...](#)

Posted by [Karlheinz Schwarz](#) at [9:31 PM](#) [0 comments](#) 

Labels: [CIM](#), [en](#), [IEC 61970](#)

CIM Users Group meets in Europe on 12-15 May 2009

The spring 2009 meeting of the CIM Users Group will be hosted by UCTE in Brussels on 12-15 May 2009.

Key issue is the adoption of the CIM standards by [UCTE](#) (Union for the Co-ordination of Transmission of Electricity) for information exchange. UCTE's decision is expected to lead to wide-spread adoption of the CIM standard for many additional applications in Europe.

Another issue is how CIM can support the Smart Grid vision.

[Further meeting information ...](#)

[Some background information on the use of CIM within UCTE.](#)

Posted by [Karlheinz Schwarz](#) at [7:48 PM](#) [0 comments](#) 

Labels: [CIM](#), [control center](#), [en](#), [IEC 61970](#)

Monday, February 16, 2009

E.ON - Erfahrungen mit IEC 61850

Die E.ON Thüringer Energie AG hat Ende 2008 erste Erfahrungen mit dem Einsatz der Normenreihe IEC 61850 vorgestellt:

"Vorgehensweisen und Erfahrungen mit der IEC 61850"

In einem Vortrag wurden Ideen und Ziele bezüglich des Einsatzes der IEC 61850 bei der E.ON Thüringer Energie AG im Rahmen eines Pilotprojektes vorgestellt und diskutiert.

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[Download Foliensatz](#)

Die Ergebnisse liegen - vor dem Hintergrund der internationalen Erfahrungen - ganz auf Linie der Erfahrungen anderer großer Versorgungsunternehmen. Um die Anforderungen und Wünsche der Energieversorger (vor allem die nachhaltige Interoperabilität von Geräten und Werkzeugen!!) zukünftig umfassend und befriedigend zu erfüllen, sind weitergehende Abstimmungen der Hersteller untereinander, der Hersteller mit den Anwendern und aller Betroffenen mit den Normungsarbeiten notwendig. Bei der Normenreihe IEC 61850 verhält es sich so wie mit dem Baustoff Beton: Es kommt darauf an, was man daraus macht!

E.ON resümiert unter anderem, dass die betroffenen Experten die Normenreihe erst einmal verstehen müssen - und sicher auch, was die Hersteller bisher daraus gemacht haben. Einen Einblick in Produkte der ersten Generation großer Hersteller wie Siemens, Areva und ABB wird auf der neutralen Plattform eines Trainingskurses vom 3.-6. März 2009 in Frankfurt (Main) geboten.

[Details zum Training](#)

Posted by [Karlheinz Schwarz](#) at 8:50 PM 0 comments 

Labels: [ABB](#), [Areva](#), [de](#), [Ethernet](#), [hands-on Training](#), [IEC 61850](#), [interoperability](#), [Siemens](#)

Wednesday, February 4, 2009


IEC 61850 Seminar in Moscow (Russia), 10-12 March 2009

Как реализовывать
решения на базе
стандарта МЭК 61850

Семинар для главных инженеров
и руководителей департаментов РЗИА и АСУ ТП
Москва, 10-12 марта 2009 г.

«Ноу-хау» для создания систем нового поколения МЭК 61850 – международный стандарт для систем связи внутри подстанций. Использование данного стандарта позволяет осуществлять разработку и проектирование систем защиты и управления при применении аппаратуры различных компаний-производителей, и, как следствие, достичь более высокого уровня надежности и экономической эффективности предлагаемых решений. Помимо новых преимуществ, которые предоставляет стандарт, его реализация оказывается сопряжена с рядом трудностей и проблем, что усугубляется ситуацией, когда развитие ведущих производителей аппаратуры (ABB, Siemens, Areva, General Electric и др.) в части реализации стандарта МЭК 61850 становится все более стремительным.

По вопросам участия в семинаре
обращайтесь в редакцию ЗАО «ИД «Вся электротехника»
Куратор семинара: Головин Александр
Тел.: +7 499 157 56 75
Факс: +7 499 157 24 12
e-mail: gav@energyexpert.ru

Posted by [Karlheinz Schwarz](#) at 7:47 PM 0 comments 

Labels: [engineering](#), [IEC 61850](#), [protection](#), [SCADA](#), [Substation](#), [Training](#)

[UML](#)

[RWE Innogy sucht
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Moscow \(Russia\), 10-12
March ...](#)

► January (13)

► 2008 (82)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Monday, January 19, 2009

IEC 61850 at DistribuTech 2009, San Diego

Several paper presentation are scheduled for the DistribuTech 09 conference in San Diego, 03.-05. February 2009

[List of IEC 61850 related papers](#)

Meet the IEC 61850 experts at the UCAIug booth #447

See you there.

Posted by [Karlheinz Schwarz](#) at [10:06 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [Users Group](#)

CIM Standard Edition 2 - FDIS ballot started


IEC 61970-301 Ed.2: Energy management system application program interface (EMS-API) - Part 301: Common information model (CIM) base

The FDIS ballot on the second edition just started.

Ballot closes on **2009-03-20**

The second edition contains several changes from the first edition:

- First edition Annex A which contained the description of the CIM UML model is now a part of the main body
- A new Annex A was added providing a model of a circuit breaker in the CIM as an example of how the CIM can be used to model network devices
- The naming hierarchy was changed.
- ModelingAuthority and ModelingAuthoritySet classes were added to represent ownership of models.
- A new schedules data model was added to replace the use of the curve model for time series data.
- The measurement value attributes were sub-typed into classes Analog, Discrete and Accumulator.
- The class naming was renamed to IdentifiedObject.
- Many editorial corrections, including several cardinality and attribute changes to resolve issues submitted on the first edition.

Posted by [Karlheinz Schwarz](#) at [12:07 PM](#) [0 comments](#) 

Labels: [CIM](#), [IEC 61970](#)

IEC 61850-7-420 (DER) passed the final Vote

The Standards series IEC 61850 has a new part:

IEC 61850-7-420 Ed.1: Communication networks and systems for power utility automation - Part 7-420: Basic communication structure - Distributed energy resources logical nodes

The FDIS vote for this part passed on 2009-01-09.

The International Standard IEC 61850-7-420 will be available very soon.


The standard covers the following energy resources:

- Reciprocating engine
- Fuel cell
- Photovoltaic system (PV)
- Combined heat and power (CHP)

Resources for hydro power and wind power are defined in

- IEC 61850-7-410 and
- IEC 61400-25

An overview of the parts can be found here [\[PDF, 450 KB\]](#)

Posted by [Karlheinz Schwarz](#) at [11:57 AM](#) [0 comments](#) 

Labels: [DER](#), [IEC 61850](#), [IEC 61850-7-420](#)

Saturday, January 17, 2009

CEPSI 2009 Papers now online

The papers of the oral presentations given at the CEPSI 2008 conference are available on the web:

[Two papers on IEC 61850 from Karlheinz Schwarz](#)

[General entry](#)

Posted by [Karlheinz Schwarz](#) at [1:30 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [interoperability](#), [SCADA](#), [Smart Grid](#), [Substation](#), [wind power](#)

Saturday, January 10, 2009

One-day special course on IEC 61850, IEC 60870-5, DNP3, CIM, Security, ... in Mexico City

[NEW: Details in Spanish!!](#)

Please find the details and registration information for the One-day special event on IEC 61850, IEC 60870-5, DNP3, CIM, Security, in Mexico City **on 27. January 2009** below.

NettedAutomation GmbH and ASOCIACIÓN DE NORMALIZACIÓN Y CERTIFICACIÓN, A.C. (ANCE, A.C.), Mexico City, offer you the following service for a special introduction and update on the standards IEC 61850, IEC 6087-5, DNP3, CIM, Security, and other standards.

The objective of the one-day event is to give an Overview and Update on the current standardization efforts within IEC TC 57 and TC 88 and to present the experience of users, vendors, and system integrators made since 2005 - for applications inside and outside the utility industry.

Proposed Program

Standard series presented and discussed are:

- IEC 61850 Communication networks and systems for power automation
- IEC 61400-25 Communications for monitoring and control of wind power plants
- IEC 60870-5 Profiles 101/104 and DNP3

- IEC 62351 Data and Communication Security and NERC CIP
- IEEE 1686 Substation IEDs Cyber Security Capabilities
- IEC 61968 CIM - Energy management system application program interface

Questions like the following will be discussed:

- When will the 2nd Edition of IEC 61850 be available?
- Do utilities really get what they are looking for?
- Is the sustainable interoperability of substation IEDs already reached?
- Turn-key versus "home-made" automation systems!?
- What is the status of the harmonization of CIM & IEC 61850?
- Is the security standard available? and implemented?
- What is the relation between IEC 62351 and NERC's CIP?
- What is IEEE 1686?
- What about multivendor projects for IEC 61850?
- What tools for IEC 61850 are available?
- What's going on in North America?
- What is the future of IEC 60870-5-101/104 and DNP3?

[Complete offer](#) [pdf, 650 KB]

[Program only](#) [pdf]

[Registration only](#) [pdf]

Posted by [Karlheinz Schwarz](#) at [11:45 AM](#) [1 comments](#) 

Labels: [CIM](#), [DNP3](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#), [interoperability](#), [SCADA](#), [security](#), [Substation](#), [Substation Automation](#), [Training](#), [wind power](#)

Updated "Single page introduction on IEC 61850 and IEC 61400-25"

The standard series IEC 61850 „Communication networks and systems in substations“ and IEC 61400-25 „Communications for monitoring and control of wind power plants“ provide perfect support for **sustainable interoperability** of intelligent devices of any kind for electric Power Systems (Generation, Transmission, and Distribution for HV, MV, and LV, ...):

- **Standard Information Models,**
- **Standard Information Exchange Methods,**
- **Standard Protocol Mappings, and**
- **Standard System Configuration Language (SCL)**

An [updated "Single page introduction"](#) provides you with some basics.

Enjoy.

Posted by [Karlheinz Schwarz](#) at [12:44 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [interoperability](#)

Wednesday, January 7, 2009

Substation Automation Handbook - a must to read

Substation Automation Systems (SAS) are key for future power systems performing all the tasks in substations like data acquisition from the power grid via the switchgear and the activation of changes by commands to switchgear like circuit breakers, isolators, transformers, ...

protection, condition monitoring etc. These many functions are realized by intelligent electronic devices (IED).

The **Substation Automation Handbook** (approx. 400 pages) written by well experienced experts provides comprehensive knowledge of all aspects of the application of modern IEDs for SAS.

This book is a MUST to read by engineers involved (one way or the other) in Substation Automation.

[Read more ...](#)

Posted by [Karlheinz Schwarz](#) at [1:52 AM](#) [2 comments](#) 

Labels: [handbook](#), [IEC61850](#), [protection](#), [Substation Automation](#)

Tuesday, January 6, 2009

Devices from multiple vendors for wind power plant substation

24 devices from 9 different product platforms provided by 6 individual vendors (SEL, GE, RuggedCom, Siemens, ZIV, and Team Artech) have been tested and approved for a crucial CFE substation connecting a wind farm to the grid. Comisión Federal de Electricidad (CFE) is Mexico's national utility and major provider of electric power

Considering the international scope of the La Venta II transmission, protection, and control system CFE decided to use the IEC 61850 standard. IEC 61850 provides methods of developing the best engineering practices for substation protection, integration, control, monitoring, metering, and testing.

Read complete report from SEL [[pdf](#)].

Posted by [Karlheinz Schwarz](#) at [5:56 AM](#) [0 comments](#) 

Labels: [GOOSE](#), [IEC 61850](#), [interoperability](#), [interoperability tests](#), [SEL](#), [wind power](#)

Monday, January 5, 2009

Implementations of IEC 61400-25-6

Questions: I work at xx unit of utility-industry in xxx and help some energy companies with their future IT support for the handling of wind power production.

This also leads to some help with the requirements of the position before the contracts. I have a long background from both SCADA and maintenance systems.

Saw on the Internet that you are the project manager for IEC 61400-25-6 for Condition Monitoring and want to ask a few questions I hope you will be friendly to answer.

Question 1: What is the status of the expanded standard for Condition Monitoring IEC 61400-25-6?

The project team TC 88 PT is preparing the so-called FDIS document (final draft international standard). We have our next meeting scheduled for next week at DS in Copenhagen.

I hope that we reach the standard in June or so.

Question 2: How far has the commercial deployment come?

The part 25-6 uses parts 25-2 (many information models for WPP - some can be used for condition monitoring) and 25-4 (service mappings) and IEC 61850. The core software to be implemented is according to IEC 61850 ... IEC 61850 is widely deployed for substation automation systems. Most of the software etc can be re-used for 25 and 25-6.

IEC 61400-25 support is offered by e.g. Beckhoff:

<http://iec61850-news.blogspot.com/search?q=beckhoff>

and by Bachmann:

<http://iec61850-news.blogspot.com/2008/07/bachmann-electronic-mms-server-for-wind.html>

Question 3: Which vendors have implemented server and client?

Servers: see above.

Clients are available from various vendors: ABB, Siemens, ...

<http://iec61850-news.blogspot.com/search?q=siemens>

Question 3: Are there any deployed system? Operating Experience?

A lot with IEC 61850!! Siemens reported that they have installed 50.000+ devices and 1.000+ systems.

Most of these experiences could be applied for wind power applications and especially for condition monitoring.

There is a lot of very good experience!

Posted by [Karlheinz Schwarz](#) at [7:06 AM](#) [0 comments](#) 

Labels: [condition monitoring](#), [IEC 61400-25](#), [IEC 61400-25-6](#), [IEC 61850](#), [maintenance](#), [SCADA](#), [wind power](#), [wind turbine controller](#)

Sunday, January 4, 2009

CIM and Multispeak announced collaboration

The MultiSpeak Initiative and International Electrotechnical Commission's TC 57 Working Group 14 (WG14) announced to collaborate on the development of two new international integration standards to improve data exchange among electric utilities. The two groups seem to have understood that seamless standards are crucial for the future.

Read the [press release](#) [[pdf](#)].

Posted by [Karlheinz Schwarz](#) at [8:45 PM](#) [0 comments](#) 

Labels: [CIM](#), [mapping](#), [Multispeak](#)

New website for UCA International Users Group

The **UCA International Users Group (UCAIug)** has a [new website](#).

The UCAIug is a not-for-profit corporation focused on assisting users and vendors in the deployment of standards for real-time applications for several industries with related requirements. The UCAIug as well as its member groups (CIMug, Open Smart Grid, and IEC 61850) draws its membership from utility user and supplier companies.

Posted by [Karlheinz Schwarz](#) at [8:32 PM](#) [0 comments](#) 

Labels: [CIM](#), [IEC 61850](#), [Users Group](#)

Friday, January 2, 2009

USE61400-25 User Group Website online

The USE61400-25 user group's website is online.

The users group has the main objective to simplify the application of the International Standard [IEC 61400-25](#) and to support users implementing the standard within the wind power industry.

The IEC standard series 61400-25 provides a solution for access to wind power plant information with standardized data names and semantic. It gives possibilities to procure monitoring and control solutions as separate parts, and to use a single system to store, analyze and present wind power information. In addition the standard opens up for control and monitoring of information from different wind turbine vendors in a homogeneous manner - to provide interoperable intelligent devices.

The use of a standard communication solution are beneficial for all parties - vendors, system integrators as well as the customer ...

Read more:

[Access the Users Group's website](#)

[One page introduction to IEC 61400-25 / IEC 61850](#)

Posted by [Karlheinz Schwarz](#) at [2:50 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [interoperability](#), [wind power](#), [wind turbine controller](#)


Happy New Year 2009

I wish you all the best for the New Year 2009 and renew my commitment to provide you with news and up-to-date information on IEC 61850, IEC 61400-25, IEC 60870-5, IEC 60870-6, IEC 61499, ...

May every day in the New Year bring peace, health, happiness and good cheer to You and Your family.

I look forward to another successful year of standardization and application of standards. Enjoy the nature in winter time:



Posted by [Karlheinz Schwarz](#) at [12:37 AM](#) [0 comments](#) 

Labels: [IEC 61850](#)


Tuesday, December 30, 2008

SEL has enhanced the support for IEC 61850 in 2008

SEL is now supporting IEC 61850 as Significant Substation and RTU Standard ... SEL as one of the world leading supplier of protection IEDs is providing a wide range of IEC 61850 compliant devices and tools.

[A new brochure](#) provides many links to a wide range of applications of IEC 61850 with various SEL products:

"Combine IEC 61850 technology, Ethernet networking, and SEL high reliability to perform station computing and protection, automation, and control for distance, current differential, distribution, transformer, bus, motor, and bay control applications."

Posted by [Karlheinz Schwarz](#) at [11:14 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [protection](#), [RTU](#), [SEL](#), [Substation](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Tuesday, December 30, 2008

Job Opportunities - IEC 61850 knowledge required

Experience with the International Standard IEC 61850 and other advanced IEC standards is a prerequisite for many open Job Opportunities! The application of IEC 61850 compliant IEDs and Tools is growing very fast all over - also in North America. Join a booming technology.

Here are a few Job Opportunities that require IEC 61850 experience:

- [3G Malaysia](#) ("... Excellent experience in IEC 61850/60870 protocol")
- [Virelec](#) ("...Systems Integration (SI) Specialist **IEC 60870-5-101/103/104, IEC 61850, TCP/IP** ")
- [MR Control Systems](#) ("...**IEC 60870-5-101, IEC 60870-5-103, IEC 61850**, ...")
- [SEL](#) ("...Research Engineer – Communications Emphasis ... Experience with various SCADA protocols: **IEC 61850, DNP, Modbus, IEC60870**")
- [Think Energy Group](#) ("...and substation automation protocols **such as IEC 61850** and DNP 3.0.")
- [The Select Group](#) ("...Understanding of the advantages of modern Substation Automation communication standards and protocols (e.g. **IEC 61850, DNP 3.0**)")
- [ABB](#) ("... Comprehends the benefits of modern Substation Automation communication standards and protocols (e.g. **IEC 61850, DNP 3.0**)")
- [GE](#) ("... Experience in substation automation and **IEC 61850**")
- [Siemens India](#) ("... **Experience on IEC 61850** protocol devices")
- [SCADA](#) ("... Familiar with typical utility protocols such as **IEC 61850, DNP, and Modbus**")
- [Sinclair Knight Merz \(SKM\)](#) ("... Knowledge in the related area of substation automation and in **particular, the application of IEC 61850**, would be highly regarded. ")
- [3G Labs India](#) ("... Looking for IEC professionals (61850/60870) ...Looking for IEC professionals (61850/60870)")
- ...

If you need help from the real experts on IEC 61850 ... to become an expert in the advanced Standards and to get a better job ... check the following training opportunities on IEC 61850 and other Standards. We help you to get the skills required - You'll get first-hand, comprehensive, up-to-date, vendor neutral knowledge, experience, and guidance:

[Training Overview](#)
[Training opportunities on IEC 61850](#)
[Training Modules on IEC 60870-5, DNP3, ICCP, TASE-2, CIM, ...](#)

Posted by [Karlheinz Schwarz](#) at 7:23 AM [0 comments](#) 

Labels: [3G](#), [IEC 61850](#), [SCADA](#), [SEL](#), [Training](#), [Virelec](#)

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Friday, December 26, 2008

IEC 61850 Hands-on Training at STRI was a success

35 power engineers from Sweden, Finland, Denmark, Norway, UK, Holland and New Zealand have been trained on how to use real multivendor IEDs for protection and control of substations. IEDs from ABB, Areva and Siemens as well as test sets from Omicron and Doble have been used to run the training. A second group has run hands-on training in the use of configuration tools.

The next public hands-on training by NettedAutomation and STRI will be held in Frankfurt (Germany) on March 03-06, 2009. [Details on next course in Frankfurt](#)

The [first Interoperability test](#) at the STRI Independent Interoperability Laboratory for IEC 61850 was performed in the end of November. Customer was Helinks LLC of Switzerland. The test verified the ability of the manufacturer independent Helinks STS configuration tool to act as an independent system configurator tool according to IEC 61850-6.

Posted by [Karlheinz Schwarz](#) at [12:22 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [interoperability](#), [interoperability tests](#), [SCL](#)

Tuesday, December 23, 2008

Various applications of IEC 61850 explained

An explanation of several applications of IEC 61850 can be found in a nice 48 page brochure published by Siemens (in [English](#) and [Deutsch](#)):

- Switchgear Interlocking with IEC 61850-GOOSE
- Reverse Interlocking Using the GOOSE of IEC 61850
- Beneficial Engineering of IEC 61850 Substation Automation Systems
- Innovative Solutions for Substation Control with IEC 61850
- Seamless Migration
- Ethernet Topologies with IEC 61850
- IEC Interoperability, Conformance and Engineering Experiences
- IEC Browser - A Powerful Test Tool for IEC 61850

Posted by [Karlheinz Schwarz](#) at [10:10 PM](#) [0 comments](#) 

Labels: [GOOSE](#), [IEC 61850](#), [Interlocking](#), [Migration](#), [Siemens](#)

IEC 61850 and IEC 61499 for Distributed Power System Automation

Distributed Power Systems need **Distributed Power System Automation** to reach a high level of an intelligent or smart grid. The standard series IEC 61850 and IEC 61499 (Function Blocks) could benefit from each other and provide the smart framework for distributed automation systems.

Neil Higgins, Valeriy Vyatkin, Nirmal-Kumar C Nair, and Karlheinz Schwarz have written one of the first papers presenting and discussing the use of IEC 61850 AND IEC 61499:

Concept for Intelligent Distributed Power System Automation with IEC 61850 and IEC 61499

[Redundancy - IEC 61850 to refer to IEC 62439?](#)

[Schneider Electric offers IEC 61850 IEDs](#)

- ▶ [November](#) (4)
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Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

Abstract.

This paper presents new approach to power system automation, based on distributed intelligence rather than traditional centralised control. The paper investigates the interplay between two international standards, IEC 61850 and IEC 61499, and proposes away of combining of the application functions of IEC61850-compliant devices with IEC 61499-compliant "glue logic," using the communication services of IEC 61850-7-2. The resulting ability to customise control and automation logic will greatly enhance the flexibility and adaptability of automation systems, speeding progress toward the realisation of the Smart Grid concept.

Keywords: Power system automation, IEC 61850, IEC61499, Smart Grid.

[pdf of the paper](#)

[Website of Valeriy Vyatkin](#) with background information on IEC 61499 etc.

Posted by [Karlheinz Schwarz](#) at [12:52 AM](#) [0 comments](#) 

Labels: [IEC 61499](#), [IEC 61850](#), [interoperability](#), [Smart Grid](#), [Substation Automation](#), [telecommunication](#)

Monday, December 22, 2008

Stellenausschreibung-RWE-Innogy-IEC61850

Falls Sie Kenntnisse in **IEC 61850**, **IEC 61400-25** ... OPC und DNP haben ... und sich für SCADA-Anwendungen interessieren und ..., dann könnten Sie sich bei RWE-Innogy bewerben: [Details](#)

Posted by [Karlheinz Schwarz](#) at [1:12 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [RWE](#), [SCADA](#)

Tuesday, December 16, 2008

IEEE 1588 for process bus time synchronization

The IEEE 1588 Standard Precision Time Protocol (PTP) is a new solution for very precise time synchronization on Ethernet networks. The days of "non-deterministic" Ethernet seem to be over ...

IEEE 1588 is about to have a crucial impact on the process bus applications of IEC 61850. IEC 61850-9-2 requires highly synchronized sampling processes for current and voltage sensors (CTs and VTs) in a substation. Today the synchronization is implemented using a separate fibre link.

A good source of technical background can be found at the following site: <http://www.ieee1588.com>

First products are already announced, e.g., by [Tekron \(New Zealand\)](#).

More to come ...

Posted by [Karlheinz Schwarz](#) at [2:08 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [IEEE 1588](#), [process bus](#), [synchronization](#)

Thursday, December 11, 2008

Siemens says - Goodbye GGIO!

Siemens says Goodbye to GGIO - Generic I/O Logical Node (see Siprotec [newsletter 4/2008](#)):

"The scope of standardized data object classes is often limited forcing users to use GGIO generic logical nodes (Generic Input / Output Data) instead. This will be a thing of the past. In the future all mandatory and optional data object classes and all logical nodes of IEC 61850 will be supported. The interoperability is thus greatly enhanced. All data objects can thus be transmitted so that the information semantics can be concluded directly from the object name. We thus obtain comfortable and transparent engineering, commissioning, test, diagnosis and service."

Siemens is very supportive of IEC 61850!!

Good news!!

[Newsletter in Deutsch.](#)

Posted by [Karlheinz Schwarz](#) at [11:01 AM](#) [0 comments](#) 

Labels: [engineering](#), [GGIO](#), [IEC 61850](#), [interoperability](#), [SCL](#), [Siemens](#)

Tuesday, December 9, 2008

IEC 61850 UTC time stamp next leap second this month

Dear All,

The IEC 61850 time stamp uses the [UTC time](#). The [next leap second](#) will be added on December 31, 2008:

2008 December 31, 23h 59m 59s

2008 December 31, 23h 59m 60s

2009 January 1, 0h 0m 0s

That means Dec 31, 2008 is one second longer than any other day in 2008!

As a consequence my birthday is (one second) longer than yours!! Yes, my birthday is Dec. 31 ...

I hope your SCADA and EMS systems take care of my birthday and adjust their glocks by inserting one "Karlheinz" second on Dec 31, 2008.

TAI, Temps Atomique International, is the international atomic time scale based on a continuous counting of the SI second. TAI is currently ahead of UTC by 33 seconds ... soon 34 seconds.

Posted by [Karlheinz Schwarz](#) at [8:40 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [leap second](#), [time stamp](#), [utc](#)

Wednesday, December 3, 2008

IEC 61850 and SCADA systems

Many of today's substation devices like protection relays are IEC 61850 compatible - one way or the other. From a SCADA point-of-view these

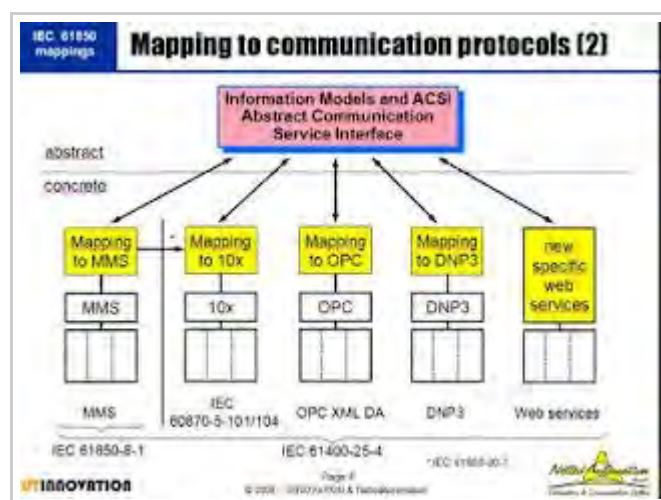
and other devices can easily interface with such devices using the client/server communication services:

- Get a value of single data object (GetDataValues – Client driven)
- Get a list of values of data objects (GetDataValues with list sent in each request – Client driven)
- Get the complete list values of data objects using a dataset object (GetDataSetValues – Client driven)
- Get the complete list of values of data objects (of a dataset) using reporting (reporting, General Interrogation – Client driven)
- Get the complete list of values of data objects (of a dataset) using reporting (reporting, Integrity period – Server driven)
- Get one (BufTm=0) or more (BufTm>0) value(s) of data objects (of a dataset) using reporting on data and quality change and data update – Server driven)
- GOOSE and Sampled Values ... exchanges complete list of values of data objects of a dataset (events: application specific – Server driven)
- Get sequence of value(s) of data objects (of a dataset) using logging (on data and quality change and data update – Client driven)

These IEC 61850 services (except for GOOSE and SV) are mapped to the MMS protocol.

In IEC 61400-25-4 the IEC 61850 services are mapped to:

- IEC 61950-7-2 ACSI and Information Models (LD, LN, DATA, DA, ...) defined as webservices (almost all service in IEC 61850 become a corresponding WS in 61400-25-4)
- (full) Mapping according to IEC 61850-8-1 MMS
- (subset) Mapping to OPC XML DA
- (small subset) Mapping to IEC 60870-5-104
- (small subset) Mapping to DNP3




In the current scenario what should a SCADA vendor support in order to interface with 61850-compatible devices?

In existing installations with DNP3 or IEC 60870-5-101/104 it is recommended to keep these solutions. It is not recommended to just replace one protocol by another! IEC 61850 should be considered if SCADA systems want to benefit from the 3000+ standard information models and the substation configuration language (SCL, IEC 61850-6) to simplify the configuration of Gateways, RTUs, Data Management Systems, and SCADA systems and to simulate easily the Gateways, RTUs, and Data Management Systems!! Direct access from SCADA systems to IEDs may be required. Some utilities get rid of HMIs in Substations and provide IP access directly from the control center to

the IEDs (through routers).

EMS and SCADA systems of the big vendors have already or will have soon direct access to IEC 61850 compliant devices or systems. More to come soon.

Posted by [Karlheinz Schwarz](#) at [11:28 PM](#) [0 comments](#) 

Labels: [DNP3](#), [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61850](#), [Relays](#), [RTU](#), [SCADA](#)

Redundancy - IEC 61850 to refer to IEC 62439?

IEC TC 57 WG 10 considers to use in IEC 61850 the results of the edition 2 of the following standard developed by IEC TC 65C:

IEC 62439: Industrial communication networks: high availability automation networks

The CDV has been published November 21, 2008 (Document 65C/519/CDV); the ballot closes 2009-04-24.

The redundancy is intended to be handled in the link layer ... so that the higher layers do not need to be doubled! Be aware, there are several redundancy concepts in IEC 62439 ... you need to know which concept you want to choose before implementing the redundancy software.

IEC 61850 is likely to reference to Part 3 (PRP).

The IEC 62439 (2nd edition CDV) comprises the following solutions:

- IEC 62439-1 Ed1.0, Industrial communication networks high availability automation networks -Part 1: general concepts and calculation methods (Including RSTP)
- IEC 62439-2 Ed1.0, Industrial communication networks high availability automation networks -Part 2: Media Redundancy Protocol (MRP)
- IEC 62439-3 Ed1.0, Industrial communication networks high availability automation networks -Part 3: Parallel Redundancy Protocol (PRP) and High availability Seamless Ring (HSR)
- IEC 62439-4 Ed1.0, Industrial communication networks high availability automation networks -Part 4: Cross-network Redundancy Protocol (CRP)
- IEC 62439-5 Ed1.0, Industrial communication networks high availability automation networks -Part 5: Beacon Redundancy Protocol (BRP)
- IEC 62439-6 Ed1.0, Industrial communication networks high availability automation networks -Part 6: Distributed Redundancy Protocol (DRP)

[Very good introduction to standard redundancy concepts, rationale, IEC 62439, etc. by Professor Hubert Kirrmann \(ABB Switzerland\) \[PPT, 2 MB\].](#)

Posted by [Karlheinz Schwarz](#) at [10:10 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [real-time](#), [redundancy](#)

Schneider Electric offers IEC 61850 IEDs

Schneider Electric provides IEC 61850 connectivity for their Sepam protection relays:

Sepam units can be connected to an IEC 61850 station bus by one of the following:

ECI850 Sepam server for:

- Sepam series 20
- Sepam series 40
- Sepam series 80

ACE850 communication interface for:

- Sepam series 40
- Sepam series 80 only (available soon).

Sepam units with ECI850 and ACE850 are compliant with:

- IEC 61850-6
- IEC 61850-7-1
- IEC 61850-7-2
- IEC 61850-7-3
- IEC 61850-7-4
- IEC 61850-8-1

[Products](#) [pdf, 680 KB]

[User's manual for Sepam 20/40/80 \(2008-06\)](#) [pdf, 3,8 MB]

Posted by [Karlheinz Schwarz](#) at [3:39 AM](#) [2 comments](#) 

Labels: [IEC 61850](#), [protection](#), [real IEDs](#), [Relays](#)

Friday, November 28, 2008

Hands-on Training at STRI big success

The first Hands-on Training at STRI in Ludvika, Sweden, from 25.-28. November 2008 was a great success.

Many experts have been trained on how to use real multivendor IEDs for protection and control of substations. IEDs from ABB, Areva and Siemens as well as test sets from Omicron and Dobel have been used to run the training. A second group has run hands-on training in the use of configuration tools.

The next public hands-on training by NettedAutomation and STRI will be held in Frankfurt (Germany) on March 03-06, 2009.

[Details on next course in Frankfurt](#)





Posted by [Karlheinz Schwarz](#) at 8:52 PM 0 comments 

Labels: [GOOSE](#), [hands-on Training](#), [interoperability tests](#), [real IEDs](#), [real-time](#), [Training](#)

Thursday, November 27, 2008

IEC 61850-6 SCL Files from Areva available


Areva provides a comprehensive list of SCL Files (.icd files - IED Capability Description) for their IEDs. You can download these files easily ...

[Overview of relays etc.](#)

[Example list for distance protection](#)

All files for [MiCOM P432 and P439](#)

Single icd file example: [P439-611-202.icd](#)

Posted by [Karlheinz Schwarz](#) at 12:57 AM 0 comments 

Labels: [icd file Areva](#), [IEC 61850](#), [SCL](#)

Wednesday, November 26, 2008

Phoenix Contact entwickelt IEC61850-Komponenten

Harald Grewe (Produktmanager IP67-I/O-Systeme bei der Phoenix Contact Electronics GmbH) berichtet am 11.09.2008:

"... Als langjähriger Partner vieler Energieversorgungs-Unternehmen setzt Phoenix Contact die Anforderungen der **IEC61850 in entsprechende Komponenten** um. Die Kombination aus umfassenden Branchenkenntnissen und einem tief greifenden Know-how in puncto

Kommunikationstechniken **wird zu ausgereiften Geräten führen, die zur Erhöhung der Produktivität der Schaltanlagen beitragen. ..."**

[Kompletter Beitrag im "Maschinenmarkt" ...](#)

Posted by [Karlheinz Schwarz](#) at 9:30 PM 0 comments 

Labels: [I/Os](#), [IEC 61850](#)

Thursday, November 20, 2008

IEC 61850 at DistribuTECH San Diego, February 3-5, 2009

The international standard IEC 61850 will be one of the crucial issues at the DistribuTECH, San Diego, February 3-5, 2009.

Monday, February 2, 2009 8:00 AM – FULL DAY COURSE

UU#305 – [Using the IEC 61850 Standard for Communication Networks and Systems in Substations](#)

Presented by: Members of the UCAIug

Course Description:

This seminar will provide an overview of how the IEC 61850 standard is being used in electric utilities today and an introduction to how to use the IEC 61850 standard for communications networks in substations from the perspective of industry leaders who are the editors for the standard and experts in the area of communications for utility automation. Topics will include an overview of system architecture, how data is modeled, mapping to communication protocols, configuring substations and testing, all using IEC 61850.


Who should attend this course? This is an intense comprehensive seminar on using the IEC 61850 Standard and is targeted at engineers interested in or considering applying the standard.

The course will be taught for the UCAIug by:

Christoph Brunner, UTInnovation
David Dolezilek, Schweitzer Engineering Laboratories
Herb Falk, SISCO
George Schimmel, Triangle Micro Works
Karlheinz Schwarz, NettedAutomation

All of the presenters have been and continue to be instrumental in the development of the IEC 61850 International Standard and its application to utility automation.

[Register now.](#)
[Utility university schedule](#)

Posted by [Karlheinz Schwarz](#) at 12:14 AM 0 comments 

Labels: [IEC 61850](#), [IEC61850](#), [interoperability](#), [Training](#)

Thursday, October 30, 2008

SystemCorp Perth/Australia provides IEC 61850 solutions

[SystemCorp](#) (Perth/Australia) announced the other day: "Substation control and other plant process automation tasks can be programmed easily using standardized IEC-61131 software tools. The preferred data

exchange protocol for power control applications is IEC-61850."

The solution is demonstrated at the CEPSE 2008 exhibition in Macau (27-31 October 2008).

[More details](#)

Posted by [Karlheinz Schwarz](#) at [8:01 AM](#) [0 comments](#) 

Labels: [IEC 61131-3](#), [IEC 61850](#)

Smart RTU running IEC 61850 on Linux

The Danish DISCOS® SmartCom RTU module is part of the DISCOS®System. The DISCOS® SmartCom RTU module is designed to link and integrate the DISCOS® System into high-level IT systems like SCADA solutions or other grid management IT platforms. The DISCOS® SmartCom RTU module is based on an ARM®processor running Linux, which offers connectivity according to IEC 61850.

[More details](#)

Posted by [Karlheinz Schwarz](#) at [7:41 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [RTU](#)

Monday, October 27, 2008

IEC 61850-7-420 - DER extensions out for final vote

The extension of IEC 61850 for DER has been published for final vote:

IEC 61850-7-420 Ed.1:Communication networks and systems for power utility automation –Part 7-420: Basic communication structure – Distributed energy resources logical nodes

The voting period ends on 2009-01-09.

The FDIS provides many new Logical nodes:

- 12 Logical nodes for DER management systems
- 10 Logical nodes for DER generation systems
- 10 Logical nodes for specific types of DER
- 13 Logical nodes for auxiliary systems

Need more information? [contact us please ...](#)

Posted by [Karlheinz Schwarz](#) at [7:58 AM](#) [0 comments](#) 

Labels: [61850-7-420](#), [DER](#), [IEC 61850](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Monday, October 27, 2008

CEPSI 2008 Macau and IEC 61850

During the first day of the CEPSI 2008 Conference and Exhibition in Macau (27.-31.11.2008) there is a great interest in IEC 61850. Several exhibitors have indicated that IEC 61850 is a one of the crucial issues here in Asia. The enquiries for IEC 61850 compliant data management products is really growing very fast. One exhibitor told me at the end of the first day: "We have been contacted by so many people that we could leave the exhibition already after the first day ... we have been visited by sooo many people ... including people form the big vendors ...".

The presentation of some four papers on IEC 61850 in the session "T&D - Substation and Distribution Automation" was visited by some 40-50 experts.

More to come.

STRI announced the second hands-on training for IEC 61850 to be hold in Frankfurt/Germany on [03.-06. March 2009](#)... the first training in Ludvika/Sweden end of November 2008 is already sold out.

Posted by [Karlheinz Schwarz](#) at [7:35 AM](#) [0 comments](#) 

Labels: [hands-on Training](#), [IEC 61850](#), [Training](#)

Saturday, October 25, 2008

ABB's System 800xA supports IEC 61850

ABB USA reports on the use of IEC 61850 in ABB's System 800xA

"... System 800xA fully supports IEC 61850, the global communication standard for Power Distribution and Substation Automation. It includes a recently released IEC 61850 interface that fully integrates switchgear and protection Intelligent Electrical Devices (IED) for the power distribution side of an industrial plant. System 800xA has always supported regular electrical devices for the process side of the plant, such as variable-speed drives, motor controllers and low-voltage circuit breakers to enhance equipment effectiveness and improve access to vital equipment and system data without the need for gateways, serial interfaces or hardwiring. ..."

[Full text of the news ...](#)

[More about the use of IEC 61850 in Power Plants ...](#)

Posted by [Karlheinz Schwarz](#) at [12:01 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [Power Plants](#)

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Friday, October 24, 2008

TVA orders IEC 61850 solutions from ABB and GE

ABB wins \$15 Million contract with TVA for IEC 61850 compliant relays

<http://uaelp.pennnet.com> reports: "... The IED 670 series supports the IEC 61850 standard for substation automation, providing extreme intelligence and flexibility that allows for interoperability in communication with other relays and substation automation components."

[more details ...](#)

TVA contract on GE Digital Energy's IEC 61850 compliant Universal Relays

<http://www.marketwatch.com/> reports: "...The Multilin UR products not only met all of TVA's criteria but also offered comprehensive support for IEC 61850, the international standard for substation communication that reduces construction and design costs and will allow TVA to upgrade to future technology without having to replace its existing infrastructure. ..."

[more details ...](#)

Posted by [Karlheinz Schwarz](#) at [11:48 PM](#) [0 comments](#) 

Labels: [IEC 61850](#)

Tuesday, October 21, 2008

Security measures for power industry (BDEW)

The German association BDEW has published earlier in 2008 "a white paper specifying essential security measures for control and telecommunication systems ... for **power industry organisations**. The purpose of this document is to sufficiently protect the operation of these systems against security threats."

DE: Whitepaper: Anforderungen an sichere Steuerungs- und Telekommunikationssysteme

EN: White Paper: Requirements for Secure Control and Telecommunication Systems

[Download dual language paper ... \[pdf\]](#)

Posted by [Karlheinz Schwarz](#) at [10:20 AM](#) [0 comments](#) 

Labels: [SCADA](#), [security](#), [telecommunication](#)

Saturday, October 18, 2008

IEC 61850 is no longer a novelty

ZIV USA states: "IEC 61850 is no longer a novelty. Its acceptance is growing and the number of practical applications in service that utilize it continues to increase. However, in the majority of applications all of the devices originate from the same manufacturer. Only a few projects have been converted into a **real example of interoperability between devices from different suppliers** to demonstrate in practice the viability and the success of the standardization process."

Currently there are many discussions about the "IEC 61850 interoperability".

[Myongji University \(Korea\) cooperates with NettedA...](#)

[IEC Fieldbus Edition 2008](#)

[IEC 61850 in conventional Power Plants](#)

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[IEC 61850 for DER systems at PGE \(Portland, OR\)](#)

[Approved: IEC 61400-25-6 CDV](#)

- [September](#) (18)
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Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

What does the standard IEC 61850-1 define?

interoperability

the ability of two or more IEDs from the same vendor, or different vendors, to exchange in-formation and use that information for correct execution of specified functions.

interchangeability

the ability to replace a device supplied by one manufacturer with a device supplied by another manufacturer, without making changes to the other elements in the system.

The interoperability ment in IEC 61850 is the **communication interoperability**! But, users usually want to have **function interoperability**! The function interoperability requires the FUNCTIONS to be defined - which is not (yet) the case in IEC 61850!

IEC 61850:

- DOES NOT standardize (application) functions like interlocking function NOR the distribution of a function (1 or n IEDs) !!
- Standardizes the information produced and consumed (3000+) by functions and how information is exchanged (get/set, control, report, log, GOOSE, SV ...)
- Standardizes a language to describe the substation topology, information models, communication, binding to process, the data flow, ... (SCL - Substation Configuration Language; IEC 61850-6)

Interchangeability is NOT AT ALL defined in IEC 61850!!

Download a comprehensive document on [IEC 61850 from ZIV](#) (link to pdf file 11 MB can be found there).

Posted by [Karlheinz Schwarz](#) at [10:41 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [interchangeability](#), [interoperability](#)

Wednesday, October 15, 2008

IEC 61850, CIM, Security one-day-event in Mexico City - January 27, 2009

Karlheinz Schwarz, NettedAutomation (Karlsruhe/Germany) offers a ONE-DAY event on IEC 61850, CIM, IEC 61400-25, IEEE 1686, ...

Where: Mexico City

When: January 27, 2009

Time: 09:00 a.m. to 06:00 p.m.

Language: English

The objective of the one-day event is to give an OVERVIEW and UPDATE on the current standardization efforts within IEC TC 57 and TC 88 and to present the USER, VENDOR and SYSTEM INTEGRATOR EXPERIENCE since 2005 - for applications inside and outside the utility industry:

- IEC 61850: Communication networks and systems for power automation
- IEC 62351: Data and Communication Security and NERC CIP
- IEC 61968: CIM - Energy management system application program interface
- IEC 61400-25: Communications for monitoring and control of

- wind power plants
- IEEE 1686: Substation IEDs Cyber Security Capabilities
- ...

Questions like the following will be discussed:

- When will the 2nd Edition of IEC 61850 be available?
- Do utilities really get what they are looking for?
- Is the interoperability of substation IEDs already reached?
- Turn-key versus "home-made" automation systems!?
- What is the status of the harmonization of CIM & IEC 61850?
- Is the security standard available? and implemented?
- What is the relation between IEC 62351 and NERC's CIP?
- What is IEEE 1686?
- What about multivendor projects for IEC 61850?
- What tools for IEC 61850 are available?
- What's going on in North America?
- ...

If you are interested to attend to get the latest information - neutral, up-to-date, experienced, and comprehensive - please [contact NettedAutomation by email](#) indicating how many experts from your organization may be interested.

Posted by [Karlheinz Schwarz](#) at [11:10 AM](#) [0 comments](#) 

Labels: [CIM](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61850 edition 2](#), [IEC 61968](#), [IEC 61970](#), [Training](#), [wind power](#)

Myongji University (Korea) cooperates with NettedAutomation

During the Seminar on IEC 61850 and IEC 61400-25 on October 02, 2008, at the Utility IT Laboratory of the Myongji University (Yongin, Kyunggi-Do/Republic of South Korea)

NettedAutomation GmbH (Karlsruhe / Germany) and

Utility IT Laboratory (Yongin, Kyunggi-Do / Republic of South Korea)

announced their cooperation in the area of the international standard series IEC 61400-25 and IEC 61850:



1.Intention

NettedAutomation GmbH (Karlsruhe/Germany) and Utility IT Laboratory (Yongin, Kyunggi-Do/Republic of South Korea) have agreed to cooperate in the area of standardized information, communication and configuration for the protection, automation and monitoring of power systems.

2.Duration of Cooperation


From September 2008 to August 2010.

3. Area of Cooperation

The two organizations have agreed to cooperate in the following areas of the definition and application of international standards related to Power IT solution for:

- Renewable Energy Resources (IEC 61850-7-420)
- Wind Power (IEC 61400-25)
- Substation Automation Systems (IEC 61850)
- RTU and SCADA applications for above listed areas
- Various monitoring functions of primary and secondary equipment and functions

[Seminar program \(2008-10-02\)](#)

Posted by [Karlheinz Schwarz](#) at 9:10 AM 0 comments 

Labels: [IEC 61400-25](#), [IEC 61850](#), [Training](#), [wind power](#)

Tuesday, October 14, 2008

IEC Fieldbus Edition 2008

The 2008 Edition of the IEC 61158 Fieldbus standard "Industrial communication networks –Fieldbus specifications" has been published recently.

The picture depicts the stack of fieldbus standards of the IEC 61158 Edition 2007 (more than 60 parts, each part is a CD ROM as sold by the German DIN).



A good overview of the parts and the many solutions could be found in a [table posted at the DKE website](#).

List of all [99 IEC 61158 standards and related standards](#)

Posted by [Karlheinz Schwarz](#) at 5:56 AM 0 comments 

Labels: [Ethernet](#), [fieldbus](#), [IEC 61158](#)

IEC 61850 in conventional Power Plants

ABB uses IEC 61850 in conventional Power Plants:

In Control, Issue May 2008, presents the new application domain for IEC 61850:

IEC 61850: New standard improves the automation of power plants

Today, power plants are highly automated. For large thermal power generators, all the sub-systems can be supervised from a central control room. The electrical systems are also one of these sub-systems. In the future, the new IEC 61850 standard will simplify the integration of electrical components from different manufacturers in power plant automation systems and at the same time reduce the costs for the operation and maintenance of these plants.


[Download magazine, EN \(pdf, 1MB\)](#)

IEC 61850: Neue Norm verbessert die Automatisierung von Kraftwerken

Kraftwerke sind heute hoch automatisiert. Bei großen thermischen Stromerzeugern können alle Teilsysteme von einer zentralen Leitwarte aus überwacht werden. Zu diesen Teilsystemen zählen auch die elektrischen Systeme. Die neue Norm IEC 61850 wird künftig herstellerübergreifend die Integration von elektrischen Komponenten in die Automatisierung von Kraftwerken vereinfachen und zugleich die Kosten für Betrieb und Instandhaltung dieser Anlagen senken.

[Download magazine, DE \(pdf, 1 MB\)](#)

[Additional Slides in German \(pdf, 750 KB\).](#)

Posted by [Karlheinz Schwarz](#) at [5:21 AM](#) [0 comments](#) 

Labels: [condition monitoring](#), [DCS](#), [IEC 61850](#), [Power Plants](#)

Sunday, October 12, 2008

IEC 61850-7-4 Edition 2 CDV approved

The IEC 61850-7-4 Edition 2 CDV approved by 100 per cent support.

IEC 61850-7-4 Ed.2:

Communication networks and systems for power utility automation -
Part 7-4: Basic communication structure -
Compatible logical node classes and data classes

[Voting report](#)

Posted by [Karlheinz Schwarz](#) at [9:54 PM](#) [0 comments](#) 

Labels: [IEC 61850 edition 2](#)

Tuesday, October 7, 2008

IEC 61850 for DER systems at PGE (Portland, OR)

One of the latest announcements to use and support IEC 61850 comes from the US - from Portland General Electric (PGE) ... according to ISA's InTech [news report 2008-10](#).

"... PGE received a grant from GridApp to take GenOnSys applications to the next version, GenOnSys 2.0. "In order to be able to go into that world, we wanted a standard [IEC 61850-7-420] we and other utilities could use to allow everyone to do things the same way,"

"GenOnSys is able to provide a distributed realtime monitoring, live video cameras, and alarming system based on the IEC 61850-7-420 object standard for all sites."

[More on IEC 61850-7-420 for DER ...](#)

Posted by [Karlheinz Schwarz](#) at [7:52 PM](#) [0 comments](#) 

Labels: [61850-7-420](#), [DER](#), [IEC 61850](#)

Saturday, October 4, 2008

Approved: IEC 61400-25-6 CDV

The Committee Draft IEC 61400-25-6 Ed.1:

Wind turbines -

Part 25-6: Communications for monitoring and control of wind power plants

- Logical node classes and data classes for condition monitoring

has been approved on Friday, October 03, 2008.

[Voting Report.](#)

The next step will be to prepare the FDIS. The Project Team PT 25-6 will meet in Copenhagen (Denmark) next week Oct 08-10) to prepare the next version.

Posted by [Karlheinz Schwarz](#) at [6:44 AM](#) [0 comments](#) 

Labels: [condition monitoring](#), [IEC 61400-25](#), [IEC 61400-25-6](#), [wind power](#)

Sunday, September 28, 2008

Huge off-shore substation with IEC 61850

The huge [off-shore substation for Alpha Ventus](#) supporting IEC 61850 has been installed in the North Sea (nice pictures ... text in German).

[Background information](#) from one of the partner companies: EWE (pdf, 950 KB)

Posted by [Karlheinz Schwarz](#) at [8:05 PM](#) [0 comments](#) 

Labels: [de](#), [IEC 61850](#), [wind power](#)

Alcatel Lucent IEC 61850 Gigabit Ethernet

Alcatel-Lucent OmniSwitch 6855 Hardened LAN **Gigabit** [Ethernet switch supports IEC 61850](#).

Posted by [Karlheinz Schwarz](#) at [5:28 PM](#) [0 comments](#) 

Labels: [Ethernet](#), [IEC 61850](#)

More than 250 visits per day

The IEC 61850 News Blog has been visited more than 250 times per day. There is always something to catch ...

I look forward to serving your needs in the future with up-to-date and crucial information on IEC 61850 and IEC 61400-25.

Keep tuned.

Posted by [Karlheinz Schwarz](#) at [7:20 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#)

IEC 61850 OPC Server

[ReLab](#) IEC-61850 OPC device driver extends ReLab OPC Server capabilities and allows it to communicate with any IED that support IEC-

61850 protocol.

ReLab's OPC server provides along awaited bridge between IEC-61850 devices and OPC world.

[More details ...](#)

Posted by [Karlheinz Schwarz](#) at [7:14 AM](#) [0 comments](#) 

Labels: [IEC 61850](#), [OPC](#)

Standard PLC with IEC 61850 and IEC 61400-25

[Beckhoff](#) (PLC manufacturer from Germany) supports the standards IEC 61400-25 and IEC 61850 in the TwinCAT PLCs for wind turbine communication. Release in mid 2009.

[Brief information in English ... in German ...](#)
[further information in German](#)
[further information in English](#)

After the many fieldbus wars we see more and more PLC manufacturers returning to the "old" concept of [MMS](#) (ISO 9506, Manufacturing Message Specification) ...

[IEC 61850 / IEC 61400-25 on a single page.](#)

Posted by [Karlheinz Schwarz](#) at [6:43 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [IEC61850](#), [MMS](#), [wind power](#), [wind turbine controller](#)

IEC 61850 and IEC 61400-25 at CEPSI 2008 (Macau)

IEC 61850 and IEC 61400-25 presented by Karlheinz Schwarz (SCC) at the [CEPSI 2008 conference in Macau](#) end of October 2008:

27 Oct 2008, Monday

4:15 pm – 6:00 pm Technical Session (IEC 61850 outside Substations, [paper abstract](#))

31 Oct 2008, Friday

2:00 pm – 6:00 pm Technical Session (IEC 61850/61400-25 and Condition Monitoring, [paper abstract](#))

I look forward to seeing you there.

Posted by [Karlheinz Schwarz](#) at [6:09 AM](#) [0 comments](#) 

Labels: [condition monitoring](#), [IEC 61400-25](#), [IEC 61850](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Friday, September 26, 2008

Nari Relays successfully in operation

[Nari Relays](#) (Nanjing, China) provides a variety of products applying IEC 61850.

RCS-FAMILY Products Based on IEC 61850:

- RCS-900 Series Protection
- RCS-9700 Software Package
- RCS-9700 Series Bay Control Unit
- RCS-9600 Series Protection, Monitoring & Control Unit
- RCS-9698G/H Communication Control Unit
- RCS-9794A Protocol Converter (Gateway)

[Product brochure](#) (pdf, 1.4 MB)

Posted by [Karlheinz Schwarz](#) at [6:48 PM](#) [0 comments](#) 

Labels: [IEC 61850](#), [IEC61850](#)


Saturday, September 13, 2008

IEC 61850-80-1 to be published very soon

The final text for the Technical Specification (TS) IEC 61850-80-1 "Guideline to exchanging information from a CDC based data model using IEC 60870-5-101 or IEC 60870-5-104" has been sent by the project leader Wolfgang Brodt (Siemens Vienna) to IEC Central Office for preparation of the official TS publication. Wolfgang has done a great job to publish the TS!

"This Technical Specification gives a guideline on how to exchange information from a CDC based data model (e.g. IEC 61850) using IEC 60870-5-101 or IEC 60870-5-104 between substation(s) and control center(s). Mostly guidelines for functions needed in a substation gateway device are given.

The goal of this Technical specification is to describe standardized mapping of device oriented data models (e.g. IEC 61850) with already defined attributes of CDC's and services (e.g. IEC 61850-7) onto the already defined ASDU's and services of IEC 60870-5-104 or IEC 60870-5-101. It is not the goal of this Technical Specification to add any extensions to published standards (e.g. IEC 61850 or IEC 60870-5-104 or IEC 60870-5-101)."

Posted by [Karlheinz Schwarz](#) at [10:04 PM](#) [0 comments](#) 

Labels: [IEC 60870-5-101](#), [IEC 60870-5-104](#), [IEC 61400-25](#), [IEC 61850](#)

Center for IT Standards in the Energy Sector (CISE)

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[Nari Relays successfully in operation](#)

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[Center for IT Standards in the Energy Sector \(CISE...\)](#)

Am [OFFIS in Oldenburg](#) wird im Oktober 2008 das "Center for IT Standards in the Energy Sector" ([CISE](#)) gegründet.

[Flyer mit Details](#)

Ziel: Bei zunehmender Anzahl und Heterogenität der Marktakteure, Geräte, Systeme und Anlagen in der zukünftigen (dezentralen) Energieversorgung ist die Automatisierung im Zusammenspiel mit dem Informationsaustausch eine sehr wichtige Komponente. Eine „semantisch saubere“, d.h. inhaltlich unmissverständliche Kommunikation der beteiligten Komponenten ist seit einiger Zeit Gegenstand der internationalen Normung bei IEC: IEC 61968, IEC 61970, IEC 61850, IEC 61400-25, ... ISO 9506. Mitarbeiter des CISE werden aktiv an der Gestaltung und Umsetzung der entsprechenden Normen mitwirken.

"Internationale Standards und Normen ermöglichen die Interoperabilität im Energiesektor und senken so die Integrationskosten. Der Umsetzung dieser Standards in Software ..."


Posted by [Karlheinz Schwarz](#) at [7:07 AM](#) [0 comments](#) 

Labels: [CIM](#), [IEC 61400-25](#), [IEC 61850](#), [IEC 61968](#), [IEC 61970](#)

Friday, September 12, 2008

One Page Introduction to IEC 61850 (IEC 61400-25)

One of the shortest introductions to the standard series IEC 61850 and IEC 61400-25 on a single page with the basics and an example ... [download](#) (pdf, 57 KB)

Posted by [Karlheinz Schwarz](#) at [6:18 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61400-25](#), [IEC 61850](#)

Wednesday, September 10, 2008

Solvay uses IEC 61850 for Energy Control Center

Solvay (world-leading producer of chemicals, plastics and pharmaceutical products) uses IEC 61850 to ensure the chemical company's power supply worldwide by utilizing an Energy Control Center based on IEC 61850. Solvay requires energy in large amounts on a consistent basis for its chemical processing, especially for soda production by electrolysis. Reliability and optimization of the supply are therefore vital to Solvay's success.

Solvay attached considerable importance to a solution with maximum standardization, not only for cost reasons but also because of its greater practicality. A standardized architecture for system features, archive and software module, as well as ease of operation and problem-free maintenance were therefore solidified in the invitation to bid.

Paper from Siemens in [English](#), [German](#)

Posted by [Karlheinz Schwarz](#) at [8:24 AM](#) [0 comments](#) 

Labels: [applications](#), [IEC 61850](#)

[One Page Introduction to IEC 61850 \(IEC 61400-25\)](#)

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[Wind Power: IEC 61400-25 PLC library from Beckhoff...](#)

[IEC 61400-25-4 Mappings published as International...](#)

► [August](#) (13)

► [July](#) (20)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

Reinhausen reports about successful integration of IEC 61850

Utilities in many different countries benefit from the Ethernet based networking offered by IEC 61850 for load tap change controllers. Reinhausen is one of the first manufacturer with integrated IEC 61850 capability in their devices. Reinhausen reports on several succesful projects in multiple languages:

News in [German](#), [English](#), [Spanish](#), [Italien](#), and [Russian](#)

Posted by [Karlheinz Schwarz](#) at [6:39 AM](#) [0 comments](#) 

Labels: [IEC 61850](#)

Sunday, September 7, 2008

One Day Introduction on IEC 61850/61400-25 for renewable energy in Seoul

The benefits of using approved International Standards IEC 61850 and IEC 61400-25 for Renewable Energy Resources will be presented and discussed during a one day seminar in Seoul (South Korea) on October 2008-10-02.

The Myongji University organizes the event during the 60th Anniverary.

[Flyer with details \(pdf\)](#)

Posted by [Karlheinz Schwarz](#) at [10:06 PM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [MMS](#), [tools](#)

Saturday, September 6, 2008

Sisco provides new release of AX-S4 MMS (V5.1000)

A [new release of Sisco's AX-S4 MMS \(V5.1000\)](#) is now available with improved IEC 61850 support including SCL configuration.

[AX-S4 MMS overview](#)

[AX-S4 MMS data sheet](#)


Posted by [Karlheinz Schwarz](#) at [11:02 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#), [MMS](#)

New IEC 61850-6 ICD Editor

Triangle MicroWorks offers a new IEC 61850 ICD Editor (IED capability description) that supports the creation and editing of Substation Configuration Language (SCL) files defined by the IEC 61850-6 specification.

Downloads: [Evaluation version](#), [Brochure](#), [Manual](#), [Test Server Manual](#)

Posted by [Karlheinz Schwarz](#) at [10:50 AM](#) [0 comments](#) 


Labels: [IEC 61850](#), [SCL](#)

Friday, September 5, 2008

Kick-off meeting for IEC 61400-25 Interest Group

USE61400-25 – IEC 61400-25 user group in wind power kick-off meeting - the opening session for establishing an interest group focusing on the new IEC 61400-25 standard on communication aspects for wind power systems.

[Invitation](#) and [agenda](#) for first meeting in Copenhagen/Denmark, September 17, 2008

Posted by [Karlheinz Schwarz](#) at [12:59 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [wind power](#), [wind turbine controller](#)

Thursday, September 4, 2008

Wind Power: IEC 61400-25 PLC library from Beckhoff

The IEC 61400-25 standard defines information models and information exchange for monitoring and controlling wind turbines. Its integration in Beckhoff's TwinCAT PLC (programmable logic controller) software will simplify the control and monitoring of heterogeneous wind farms considerably.

[More details ...](#)

Posted by [Karlheinz Schwarz](#) at [11:00 PM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [IEC 61850](#), [wind power](#), [wind turbine controller](#)

Wednesday, September 3, 2008

IEC 61400-25-4 Mappings published as International Standard

The fifth part of the series IEC 61400-25 - part 25-4 for mappings - has been published recently.

The mappings specified in this part of IEC 61400-25 comprise:

- a mapping to SOAP-based web services,
- a mapping to OPC/XML-DA,
- a mapping to IEC 61850-8-1 MMS,
- a mapping to IEC 60870-5-104,
- a mapping to DNP3.

All mappings are optional, but at least one optional mapping shall be selected in order to be compliant with this part of IEC 61400-25.

A preview can be [downloaded from IEC](#).

Posted by [Karlheinz Schwarz](#) at [6:43 AM](#) [0 comments](#) 

Labels: [IEC 61400-25](#), [mapping](#), [wind power](#)

Thursday, August 28, 2008

How Vattenfall wants to benefit from IEC 61400-25

The IEC standard series [61400-25](#) (Communications for monitoring and

control of wind power plants) provides a solution for access to wind power information with standardized data names and semantic. It gives possibilities to procure monitoring and control solutions as separate parts, and to use a single system to store, analyze and present wind power information.

Paper from Vattenfall discusses the potential cost savings - quite interesting:

[Use of IEC 61400-25 to secure access to key O&M data](#)

Vattenfall has been involved in the development of the international standard from the very beginning. This paper gives an introduction to the IEC 61400-25 series of standards and presents an overview of the different parts. Furthermore it describes how Vattenfall and other wind power owners and operators can benefit from the standard.

Posted by [Karlheinz Schwarz](#) at 3:02 AM 0 comments 

Labels: [en](#), [IEC 61400-25](#), [IEC 61850](#), [maintenance](#), [wind power](#)

GE Multilin demo on IEC 61850 based HardFiber Process Bus at Cigré 2008 in Paris

GE Multilin has demonstrated their new IEC 61850 based HardFiber Process Bus System at Cigré 2008 in Paris. There were many experts that seem to be surprised seeing this quite simple approach used for HardFiber. HardFiber may be a first step in replacing copper wires between the switch yard and the control house.

The solution is - of course - quite restricted compared to what IEC 61850 could provide for a Process Bus.

One benefit - among others - is: the Bricks for HardFiber are available.

One drawback is: Bricks are (to my knowledge) interoperable with GE Relays ONLY. To be compatible with the Bricks it would require implementing GE-specific features ... these go beyond the standard IEC 61850!

Information on HardFiber can be found [here](#).

Download the comprehensive [Manual \[4.5 MB, PDF\]](#)

Posted by [Karlheinz Schwarz](#) at 2:32 AM 2 comments 

Labels: [en](#), [IEC 61850](#), [merging unit](#), [process bus](#)

Wednesday, August 27, 2008

Siemens sold more 1000 plants with IEC 61850

Siemens reported during the Cigré exhibition in Paris (25-29 August 2008) that they have sold more than 1000 plants with some 50 000 IEC 61850 compliant devices.



According to a statement made in January 2008 Siemens is selling more IEC 61850 compliant devices than expected earlier!

Posted by [Karlheinz Schwarz](#) at 3:19 AM 0 comments 

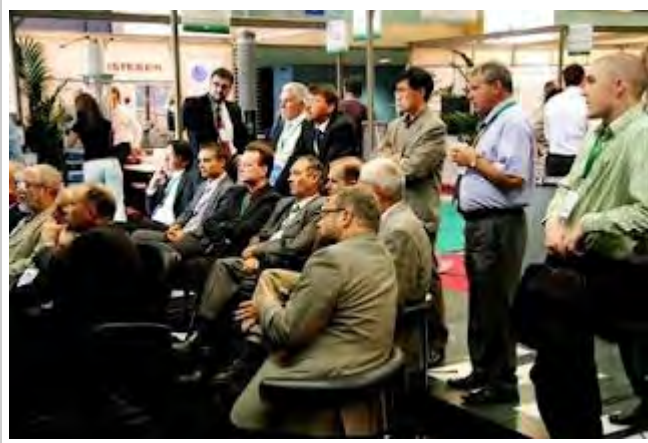
Labels: [en](#), [IEC 61850](#), [IEC61850](#)

Tuesday, August 26, 2008

IEC 61850 Usersgroup at Cigré 2008 in Paris

The UCA booth #95 at the Cigré 2008 in Paris (25-28 August 2008) is a big success! Many utility experts from utilities, vendors, consultants, system integrators, and universities stopped at the booth to listen to presentations,





discuss the use of IEC 61850




and to make users and vendors happy



or just to collect some useful information.

More reports on the Cigré 2008 follow. Stay tuned.

Posted by [Karlheinz Schwarz](#) at [10:28 PM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#), [IEC61850](#)

Schniewindt demo on CT and VT according to IEC 61850-9-2LE in Paris at Cigre 2008

Schniewindt (Neuenrade, Germany) offers one of the first Hybrid Electronic Combined Current and Voltage Transformers (VT and VT) with

optical-digital data transfer according to IEC 61850-9-2LE (light edition).

Information about the sensor could be found [here](#).

The merging unit for the CT/VT according to IEC 61850-9-2LE is available (IX 9010 Optically Powered Data Link Ethernet Output module) and in use at the RWE Process Bus R&D project in Nehden (Germany).

For information about the merging unit contact Schniewindt [directly](#).
Information about the IEC 61850-9-2LE could be [downloaded](#).

More details on the RWE project will be disclosed shortly. Stay tuned.

Posted by [Karlheinz Schwarz](#) at 9:40 PM 0 comments 

Labels: [en](#), [IEC 61850](#), [merging unit](#), [process bus](#)

Wednesday, August 20, 2008

IEC 61850 at the CIGRE Exhibition 2008 Paris

The following UCAIug Booth Sponsors will be present at the UCA Iug Booth (#95) one way or the other:

DIAMOND:

AREVA, GE Digital Energy Multilin, RuggedCom Inc., Siemens, SISCO, Triangle Micro Works, UTInnovation, ZIV, KEMA

GOLD:

Ingeteam T&D, Maschinenfabrik Reinhausen GmbH, Schweitzer Engineering Laboratories, Toshiba,

SILVER:

EFACEC, Kalki Communication Technologies, Nari Relays, [NettedAutomation GmbH](#), OMICRON, RTDS

Several interesting presentations are scheduled:

http://nettedautomation.com/download/uca_cigre_2008.pdf

Karlheinz Schwarz (NettedAutomation) will be available on Monday and Tuesday (25-26 August 2008) ... see you there.

Posted by [Karlheinz Schwarz](#) at 8:38 AM 0 comments 

Labels: [hands-on Training](#), [IEC 61850](#), [IEC61850](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Tuesday, August 12, 2008


UCA International Users Group at Cigre in Paris

The UCAIug is one of the crucial supporter of IEC 61850. Experts of the UCAIug members (e.g. Karlheinz Schwarz from NettedAutomation, Germany, August 25-26, 2008) will be available to meet you at the [Cigre 2008 exhibition](#):

August 25-29, 2008
Stand #95
Palais des Congres
Paris, France

Several presentations will be given on August 25-28, 2008.

See you in Paris.

Posted by [Karlheinz Schwarz](#) at [9:40 PM](#) [0 comments](#) 

Labels: [IEC 61850](#)

Monday, August 11, 2008

IEC 61850 for real-time communication

Ethernet is used for many years for real-time applications - most of the solutions use some dedicated hardware or software. IEC 61850 is sometimes understood as a solution that provides protocols and information models running on top of TCP/IP only ... as shown in the [Industrial Ethernet Handbook](#).

IEC 61850 supports the exchange of real-time traffic:

- Peer-to-peer exchange of status and other simple information by the so-called GOOSE message (Generic Object Oriented Substation Event) - you may replace substation by system ... GOOSE uses Ethernet and multicast messages. Requirement to meet: delay of max 4 ms after failure in the electrical network. GOOSE messaging could be understood as remote I/O communication.
- Peer-to-peer exchange of sampled values of voltage and current measurements (80 or 256 samples/period - 4 kHz for 50 Hz system and 80 samples/period) (Sampled Value exchange). Sampled Value exchange uses Ethernet and multicast messages.

All communication of the client/server for reading, setting, control, reporting, logging, retrieving self-description, ... is using TCP/IP and higher layer protocols.

Posted by [Karlheinz Schwarz](#) at [9:18 AM](#) [0 comments](#) 

Labels: [GOOSE](#), [real-time](#)

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Friday, August 8, 2008

Independent Interoperability Tests for IEC 61850

STRI has opened an Independent Interoperability Test Lab for IEC 61850.

In order to support Nordic Utilities and industries with the introduction of the new standard for communication networks and systems in substations communication STRI has decided to invest in an extensive interoperability test facility.

This Lab seems to be the first public Test Lab for Interoperability Tests - a real IEC 61850 Competence Center!

[Read more ...](#)

Posted by [Karlheinz Schwarz](#) at 4:23 AM 0 comments 

Labels: [IEC 61850](#), [interoperability tests](#)


RTUs and IEC 61850

RTUs (Remote Terminal Units - German: Fernwirkgerät) are applied in many domains like power transmission and distribution. These RTUs meet the requirements of the past - but the future needs are far beyond the functions currently implemented.

One crucial future requirement is the communication between intelligent electronic devices (IED). A distribution automation device could communicate with many neighboring IEDs (peer-to-peer communication) and figure out autonomously what's going on in the distribution network ... and make decisions without a central SCADA system!

IEC 61850 has all the communication services to support the intelligent IEDs in the distribution network.

[A paper from SEL](#) shows an example how to use GOOSE messaging for peer-to-peer communication in distribution automation.

Posted by [Karlheinz Schwarz](#) at 12:00 AM 0 comments 

Labels: [GOOSE](#), [IEC61850](#)

Tuesday, August 5, 2008

STRI and NettedAutomation GmbH announced cooperation

[STRI](#) (Ludvika, Sweden) and [NettedAutomation](#) GmbH (Karlsruhe, Germany) [announced today a close cooperation on IEC 61850](#) Comprehensive and Independent Hands-on Training with IEDs (intelligent electronic devices) and Tools from Multiple Vendors;

[First hands-on training session](#) in Ludvika (Sweden) on 25-28 November 2008

Objective and structure of the hands-on training

[Independent Interoperability Tests for IEC 61850](#)

[RTUs and IEC 61850](#)

[STRI and NettedAutomation GmbH announced cooperati...](#)

[Wind Power and IEC 61400-25](#)

[IEC 61400-25-4 \(Mappings\) approved as Internationa...](#)

► July (20)

Contributors

[Karlheinz Schwarz](#)

[Michael Schwarz](#)

This training has the objective to provide both theory and practice on the application of IEC 61850 in a substation

The 4 day course consists of:

- Module 1 gives a level 1 introduction to the IEC 61850 standard together with a summary with real applications and the demonstration of STRI facilities for multivendor interoperability testing.
- Module 2 gives an independent and more detailed update on the IEC 61850 standard for substation and device modeling as well as communication principles with real examples.
- Module 3 will present possible functional allocation and architecture of a typical substation with state of the art IEDs from different manufacturers (ABB, Areva, Siemens) as well as available test sets (Omicron, Doble, Programma) with group sessions on how to optimize the solution.
- Module 4 is divided in two parallel courses.
- Option 1 – IEC 61850 hands-on workshop demonstrating interoperability of protection and control devices from ABB, Areva and Siemens.
- Option 2 – Substation Configuration Language (SCL) hands-on workshop. Learn what you need to know for specification, evaluation, verification, and maintenance of IEC 61850 substations and IEDs.

Posted by [Karlheinz Schwarz](#) at [6:26 AM](#) [0 comments](#) 

Labels: [hands-on Training](#), [IEC61850](#), [real IEDs](#)

Wind Power and IEC 61400-25

[BTC](#) and [Deutsche WindGuard](#) develop Wind Power Plant Control and Management System for Offshore Wind Farms using IEC 61400-25 open communication [more details ...](#)

Posted by [Karlheinz Schwarz](#) at [12:06 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61400-25](#)

Saturday, August 2, 2008

IEC 61400-25-4 (Mappings) approved as International Standard

The fifth part of the International Standard IEC 61400-25-4 "Wind turbines - Part 25-4: Communications for monitoring and control of wind power plants - [Mapping to communication profile](#)" has been approved as International Standard on 01. August 2008!

The four parts IEC 61400-25-1, -2, -3, and -5 have already been published in 2007.

[Voting result](#): 93 % approval !!

Posted by [Karlheinz Schwarz](#) at [12:05 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61400-25](#), [wind power](#)

Saturday, July 26, 2008

BTC setzt auf IEC 61400-25 und IEC 61850

BTC Wind Farm Center (WFC)
Windparkleit- und Managementsystem für Offshore Windparks

Das BTC Wind Farm Center umfasst:

- Funktionen zur Überwachung und Steuerung aller Komponenten eines Windparks in Echtzeit
- Funktionen zur Ressourcenplanung und -steuerung für den Betriebsführer
- Funktionen für Zustandsanalyse und Ertragscontrolling für den Betreiber
- Unterstützung des neuen IEC 61400-25 Standard als Kommunikationsprotokoll
- Erfüllung der Berichtsanforderungen von Banken, Versicherungen und öffentlichen Stellen

.... unabhängige Prozesskommunikation mittels der Normen IEC 60870-5-104, IEC 61400-25 und IEC 61850


[Mehr Details ...](#)

Posted by [Karlheinz Schwarz](#) at [1:07 AM](#) [0 comments](#) 

Labels: [IEC 1850](#), [IEC 61400-25](#), [wind power](#)

Offshore Windpark alpha ventus - Baustart am 28.07.2008

Die Arbeiten für den ersten Bauabschnitt des Windparks alpha ventus beginnen am 28. Juli 2008 ... [mehr Information](#)

Posted by [Karlheinz Schwarz](#) at [12:58 AM](#) [0 comments](#) 

Tuesday, July 22, 2008

500 kV Bradley Substation in operation

According to CNN Money the Tennessee Valley Authority's (TVA) substation Bradley is a big step forward in the application of IEC 61850 compliant substations in the USA:

"The successful implementation of IEC 61850 is a reality now. Short lead-time, cost-effective, repeatable and flexible protection and control systems can now be designed and implemented at the highest voltage levels."

[more ...](#)

Posted by [Karlheinz Schwarz](#) at [8:06 PM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#)

Monday, July 21, 2008

IEC 61850 presentations and seminars in Asia fall 2008

Several IEC 61850 related Presentations, Seminars and Training

sessions in Asia in fall 2008 are planned by Karlheinz Schwarz (SCC):

[CEPSI](#) (Macau) Presentations - 27-31 October, 2008
(exact dates of presentations not yet known)

- IEC 61850 BEYOND SUBSTATIONS – THE STANDARD FOR THE WHOLE ENERGY SUPPLY SYSTEM
- ADVANCED CONDITION MONITORING OF PRIMARY EQUIPMENT WITH THE STANDARD SERIES IEC 61850 AND IEC 61400-25

Brisbane (Australia) - 6-7 November 2008

- Seminar/Update on latest developments on IEC 61850 - Interested? [contact us ...](#)

Wellington (New Zealand) - 10-11 November 2008

- Seminar on IEC 61850 - Interested? [contact us ...](#)

Auckland (New Zealand) - 13-14 November 2008

- Seminar on IEC 61850 - Interested? [contact us ...](#)

Posted by [Karlheinz Schwarz](#) at [5:52 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 1850](#), [Training](#)

Friday, July 18, 2008

Doble Test Equipment speaks IEC 61850

[Doble's Power System Simulator F6150](#) supports IEC 61850 GSE (GOSE and GSSE).

The F6860 IEC 61850-Compliant Protection Testing
Modern protection test systems are designed to comply with the IEC 61850 GSE messaging standard. The [F6860 option](#) and Doble protection testing software package make testing protection schemes that use IEC 61850-compliant IEDs (intelligent electronic devices) simple.

Posted by [Karlheinz Schwarz](#) at [5:54 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61850](#)

Thursday, July 17, 2008

Bachmann electronic: MMS server for wind turbine controller


2007-07-17: Bachmann electronic (Feldkirch, Austria) offers IEC 61850 (IEC 61400-25) wind turbine controller M1 with MMS (Manufacturing Message Specification) as protocol to run on TCP/IP.

[Press release English](#) (Word document)

[Press release German](#) (Word document)

[More details on IEC 61400-25](#) (Communications for monitoring and control of wind power plants).

[Details on MMS.](#)

Posted by [Karlheinz Schwarz](#) at [11:42 PM](#) [0 comments](#) 

Labels: [de](#), [en](#), [IEC 1850](#), [IEC 61400-25](#), [wind turbine controller](#)

Usersgroup for IEC 61400-25: start in September 2008

Vattenfall and other utilities have invited for the start-up of a Usersgroup for [IEC 61400-25](#).

The start-up meeting will be on September 17, 2008, in Kopenhagen (Denmark). On September 16 there will be a meeting to celebrate the successful publication of the standards series IEC 61400-25.

Interested? [contact us ...](#)

Posted by [Karlheinz Schwarz](#) at [6:05 AM](#) [0 comments](#) 

Labels: [en](#), [IEC 61400-25](#)

Kommunikation A und O für zukünftige Energieversorgung

Die VDI-Studie "Smart Distribution 2020 - Virtuelle Kraftwerke in Verteilungsnetzen" fordert die konsequente Anwendung der Normenreihe IEC 61850!

[Bericht in den VDI-Nachrichten](#) vom 10.07.2008

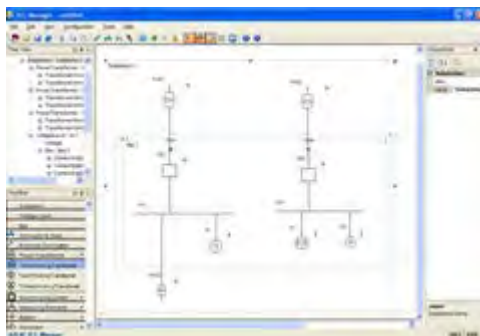
Posted by [Karlheinz Schwarz](#) at [5:59 AM](#) [0 comments](#) 

Labels: [de](#), [IEC 61850](#)

Tuesday, July 15, 2008

Did you know... Kalkitech Sub-Station Configuration Tool?

[Kalki SCL Manager](#) is the leading Substation Configuration Software Platform, that enables substation engineers and design and commissioning engineers to build different substation configurations, architectures, models etc., quickly and cost effectively, without being to be experts in IEC 61850.



More [details and key functionality overview here...](#)

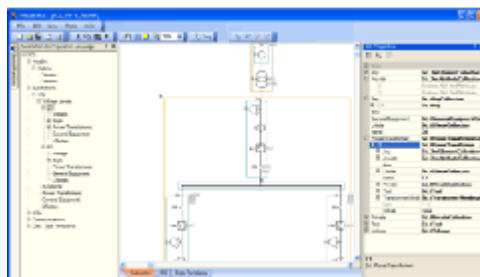
Posted by Michael Schwarz at [2:54 PM](#) [0 comments](#) 

Labels: [61850](#), [en](#)

Did you know... Visual SCL?

[ASE's Visual SCL](#) is a graphical tool that allows the creation, editing and viewing of IEC 61850 SCL files without requiring

knowledge of the underlying XML syntax. This allows the user to concentrate on the engineering process as opposed to XML syntax. IEC 61850-6 Visual SCL can be used for SAS functional specification (SSD files), IED capability description (ICD files), as well as SA system description (SCD files). Visual SCL contains high level graphical editing tools for the Substation, IED, and Communication models as well as a Data Template editor.



[Download a 15 day limited evaluation copy](#) and [read more about the features of Visual Substation Configuration Language \(SCL\)](#)...

Definition: [SCL](#)

Posted by Michael Schwarz at [2:51 PM 0 comments](#) 

Labels: [61850](#), [en](#)

EnBW to buy a quarter of EWE for 2 billion euros

German utility [EnBW](#) (Number 3 in Germany) agreed to buy 25 per cent of EWE for 2 billion euros (\$3.2 billion). [EWE](#) is quite active in the renewable and distributed energy market .. as well as in the telecom business and software development (BTC). EWE and [BTC both support the standards IEC 61850 and IEC 61400-25](#).

EWE and EnBW have said that the Information and Communication Technologies are the base of the future smart power systems!

[Dr. Brinker \(CEO of EWE\) said](#): "... That includes in particular the combination of **energy**, **telecommunications** and **information technology** as a precondition for **intelligent energy supplies in the future**".

More to come.

[Reuter's news report \[de\]](#)
[de] [EWE und EnBW beschließen Partnerschaft](#)

Posted by [Karlheinz Schwarz](#) at [3:38 AM 0 comments](#) 

Labels: [61850](#), [en](#)

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News on IEC 61850 and related Standards

Daily news concerning the standards IEC 61850, IEC 61400-25, IEC 61970 (CIM), IEC 60870-5, ...

Sunday, July 13, 2008

Google supports SmartGridCity in Boulder

SmartGridCity in Boulder supported by Google, Current Group, Xcel Energy, ... at a core of a \$ 100 million program !! The information exchange for the smart grid is based on Current Group's BPL (broadband-over-powerline). This allows that every information needed for the future smart power system is available at any time. [more details...](#)

[About Current Group](#)

The connectivity to the transformers may also be used to tap any kind of useful information from the respective substation. IEC 61850 compliant substation IEDs would simplify the access of any needed substation information like voltage, currents, frequency, power factor ...

More to come.

Posted by [Karlheinz Schwarz](#) at [3:18 PM](#) [0 comments](#) 

Labels: [61850](#), [en](#)

Friday, July 11, 2008

IEC 61850 SCL-Validator

I found a free online SCL-Validator for IEC 61850.


"Here is a web-based SCL-validator provided to check the conformity of your SCL-files to the schema of IEC 61850-6.

Used version of the SCL-schema:

xmlns="http://www.iec.ch/61850/2003/SCL" version="1.4"

All you need is to send your SCL-file into the application and get the validation result in a seperate window."

Try the [online demo of the IEC 61850 SCL-Validator...](#)

Posted by Michael Schwarz at [11:18 PM](#) [2 comments](#) 

Labels: [61850](#), [en](#)

From protection to perfection - Unleashing the full potential of the IEC 61850 standard

"Packed with the latest protection technology and featuring native support for the prevailing IEC 61850 substation communication standard, [ABB's REF615 feeder protection relay](#) is the ideal choice

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[Bachmann electronic: MMS server for wind turbine C...](#)

[Usersgroup for IEC 61400-25: start in September 20...](#)

for the protection and control of your distribution substations. Implementing horizontal inter-relay communication and GOOSE services over an Ethernet substation LAN, the REF615 relays unleash the full potential of the IEC 61850 standard as demonstrated by a cost-effective, fast and reliable substation busbar protection system."



See the REF615 protection relay at the CIGRÉ 2008 Session in Paris, France, 24 - 29 August 2008.

REF615 Human Machine Interface (HMI) Simulator

The [REF615 HMI Simulator](#) offers you an easy and convenient way to get familiar with the HMI operations and functionality of REF615.

Posted by Michael Schwarz at [1:20 PM](#) [0 comments](#) 

Labels: [61850](#), [en](#)

IEC 61850 Links

Here is my IEC 61850 link collection (unsorted). Feel free to send me your favorite links to be added here.

- Wikipedia article on [IEC 61850](#)
- [IEC Web site for IEC 61850 standards](#)
- IEC 61850 Technical Issues Web site (the [TISSUE](#) database) - the database where open issues related to IEC 61850 (ambiguities or errors) can be reported and the solution for already known issues can be retrieved
- [UCA International Users Group](#) - a users group for IEC 61850

Posted by Michael Schwarz at [4:30 AM](#) [0 comments](#) 

Labels: [61850](#), [61850-7-420](#), [en](#)

IEC 61850 / 61400-25 Training

Here is a list of current seminars or training events on IEC 61850 / 61400-25:

1. 10.-11. July 2008 (New Date)
09:00-18:30 and 8:30-17:00
Atlanta, GA (USA)
2. 21.-22. August 2008
09:00-18:30 and 8:30-17:00
Paris (France)
prior to [CIGRE](#) conference
3. week 22.-26. September 2008 (new date!!)
09:00-18:30 and 8:30-17:00
Seoul (South Korea)
prior to IEC TC 57 Plenary meeting
4. *coming soon*

[Kommunikation A und O für zukünftige Energieversor...](#)

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[Did you know... Visual SCL?](#)

[EnBW to buy a quarter of EWE for 2 billion euros](#)

[Google supports SmartGridCity in Boulder](#)

[IEC 61850 SCL-Validator](#)

[From protection to perfection - Unleashing the ful...](#)

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[IEC 61850 / 61400-25 Training](#)

[\[de\] VDE: Mehr Intelligenz ins Stromnetz](#)

[\[de\] Dezentrale Energieversorgungsanlagen mit IEC ...](#)

[Smart Grid Vehicle - Putting IEC 61850-7-420 on wh...](#)


[\[de\] Virtuelle Kraftwerke brauchen viel Kommunikat...](#)

Contributors

[Michael Schwarz](#)

[Karlheinz Schwarz](#)

If you offering another event on IEC 61850 feel free to contact me to add it to the list here.

Posted by Michael Schwarz at [4:19 AM](#) [0 comments](#) 


[de] VDE: Mehr Intelligenz ins Stromnetz

In den heise online News vom 2. Juli 2008 gefunden:

"Eine Voraussetzung für die optimale Einbindung des wachsenden Anteils erneuerbarer Energien in die Stromversorgung ist die breit angelegte Aufrüstung mit Informations- und Kommunikationstechniken (IKT) im Bereich der Verteilnetze. Darauf wies der [VDE](#) am heutigen Mittwoch bei der Präsentation der Studie "[Smart Distribution 2020](#)" in Berlin hin. [...]

Anstelle der heute zur Netzsteuerung vielfach verwendeten proprietären Kommunikationsprotokolle unterschiedlicher Hersteller plädiert die Studie für den konsequenten Einsatz des Standards [IEC 61850](#) auf allen Netzebenen und Übertragungsmedien."

Den [ganzen Artikel auf heise online lesen](#)...

Posted by Michael Schwarz at [4:03 AM](#) [0 comments](#) 


Labels: [61850](#), [de](#)

[de] Dezentrale Energieversorgungsanlagen mit IEC 61850 kommunikationsfähig machen

Photovoltaik-Anlagen, Wasserkraftwerke, Brennstoffzellen, Blockheizkraftwerke, Dieselgeneratoren – jeder speist in das Verbundnetz ein, was er gerade zu bieten hat?

"[...] Dazu bedarf es eines Taktstockes, also eines Kommunikationsmediums, das alle angeschlossenen Teilnehmer gleichermaßen verstehen. Das DKE/K 952 Netzleittechnik ist der Ansicht, dass so ein Taktstock auf Basis der [IEC 61850](#) definiert werden kann und hat hierzu den DKE/AK 917.0.17 einberufen"

Lesen sie den [Steckbrief des DKE/AK 952.0.17 \(pdf\)](#) als auch den [ganzen Artikel](#)...

Posted by Michael Schwarz at [3:58 AM](#) [0 comments](#) 


Labels: [61850](#), [de](#)

Smart Grid Vehicle - Putting IEC 61850-7-420 on wheels

A new project from [German Section of the International Solar Energy Society](#) (DGS) has started putting IEC 61850-7-420 on wheels: the Smart Grid Vehicle (SGV).

"Smart Grid Services: Electric cars are basically batteries storage systems on wheels and can serve as versatile distributed energy resources... managed via [IEC 61850](#)."

[Read more at the SGV Web site...](#)

Posted by Michael Schwarz at [3:52 AM](#) [0 comments](#) 

Labels: [61850](#), [61850-7-420](#), [en](#)

[de] Virtuelle Kraftwerke brauchen viel Kommunikation


Energie: VDE-Studie macht Vorschläge für die Einbindung von Ökostrom in Verteilungsnetze - Neue Speicher und Lastmanagement sollen den Anlagenbetrieb unterstützen

Das Ziel der Bundesregierung ist klar: Erneuerbare Energien sollen einen wachsenden Anteil an der Stromerzeugung erbringen. Doch die zahlreichen dezentralen Anlagen - von Windkraft über Biomasse bis Photovoltaik - müssen sinnvoll ins Netz eingepasst werden. Der Verband VDE erarbeitete dazu ein Konzept.

[...]

Der VDE plädiert für den konsequenten Einsatz des Standards [IEC 61850](#) ([Wikipedia EN](#)), weil damit auch Datensicherheit gewährleistet sei.

[Weiter lesen...](#)

Posted by Michael Schwarz at [3:46 AM](#) [0 comments](#) 

Labels: [61850](#), [de](#)

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