Training

NettedAutomation GmbH
Information & Communication Systems

IEC 61850 and IEC 61400-25

GLOBAL Standards for all Energy Systems

Generation, Transmission, Distribution, ... Smart Grids –
Design, Specification, Engineering, Configuration, Automation,
SCADA, Measuring, Condition Monitoring;
Information Modeling, Exchange and Management

Stack and API Integration
Embedded Controller, Software Support
Gateways (DNP3, Modbus, IEC 60870-104, ...)
Consultancy, Training

3,000+ Experts from 750+ Companies from 75+ Countries trained (2012-08)

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IEC 1906 AWARD

UCA International Users Group

USE61400-25
IEC 61400-25 user group

Dipl.-Ing. Karlheinz Schwarz, Karlsruhe/Germany
Editor of IEC 61850 and IEC 61400-25 (Wind Power Plants)
Member of IEC TC 57 WG 10, WG 17 (DER), WG 18 (Hydro Power Plants)
Member of IEC TC 88 PT 25 (IEC 61400-25, Wind Power Plants)
Convenor of IEC TC 88 IEC 61400-25-6 (Condition Monitoring)

You get comprehensive, first-hand, and neutral knowledge and experience

NettedAutomation GmbH

Information & Communication Systems

25+ Years of Excellence

International Standards for Power Systems

Generation, Transmission, Distribution, ..., Smart Grids; Design, Specification, Bidding, Engineering, Configuration, Automation, SCADA, Condition Monitoring, Information Management ...

We bring standards, smart people, intelligent devices, tools, and systems together to build Smarter Grids!

IEC 1906 AWARD

Supplier information, capabilities, and experience profile

Supplier information

Company	**NettedAutomation GmbH**
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Foundation	2000

Our knowledge and experience are asked all over – more and more!

3,000+ Experts from 750+ Companies from 75+ Countries trained (2012-08)

Ownership	Privately held by **Dipl.-Ing. Karlheinz Schwarz**	
Registered	Amtsgericht Karlsruhe HRB 8866	
General Manager	Ingeruth Schwarz	
Major Customers	Users:	AXPO, Bayernwerk, Badenwerk, Con Edison NYC, ENERGI E2, E.ON, Endessa, EdF, EdP, Energex, ETRANS, EVS, EWE, GdF, HEW, Manitoba Hydro, Hydro Quebec, Itaipu Binacional Hydro Power Plant Brazil, KEPCO, Mercedes Benz, PowerLink Australia, RWE, Stattkraft, TNB Malaysia, Terna, Transba, Transpower NZ, Vector, VEW, Vattenfall, ...
	Vendors:	AEG, Beck, Beckhoff, ABB, Alstom, AREVA, Bosch, BTC, Doble, E+H, IDS, Eberle, GE, Hirschmann, Kloeckner & Möller, LG, OMICRON, Pepperl & Fuchs, Phoenix Contact, PSI, Repas AEG, Schweitzer Engineering Labs, Siemens, TNB, VATECH SAT, SMA, VESTAS Wind, Voith Hydro, ...
	Consultants:	KEPRI, SKM, Teshmont, ...

More than 30 training sessions in 2011

Vendor independent, up-to-date, neutral, and experienced!

The primary service of NettedAutomation is to provide **consulting** services to all enterprises for feasibility studies, information modeling, system specification, implementation and use of devices and systems; **education and hands-on training** for users, system integrators and vendors in all aspects of Standards used for Power Systems; **support** for marketing, information dissemination, procurement for distributed systems, specifying procurement requirements; and **evaluation** of bidder proposals for devices, systems, tools, and open communications. The application domains cover generation, transmission, and distribution, Smart Grids, RTUs, SCADA and EMS systems, protection, automation and condition monitoring systems.

NettedAutomation has long-time experience in IEC 61850, IEC 61400-25, IEC 60870-5-10x, IEC 60870-6 TASE.2, IEC 62351, DNP3, IEC 61970 CIM, IEC 61968, IEC 61158, IEC 61499, IEEE 802.3, and ISO 9506 MMS to name just a few.

To keep abreast of the latest technical development, NettedAutomation is actively involved in workshops, seminars, hands-on training, task forces, and committees of various professional organizations such as ISO, IEC, IEEE, CEN, CENELEC, DKE, VDI, ZVEI, NIST SGIP, UCA IUG, and USE-IEC61400-25.

Curriculum vitae of Karlheinz Schwarz

Dipl.-Ing. **Karlheinz Schwarz** (58) received his diploma degree in Information and Automation Technology at the University of Siegen (Germany) in 1982. He is married and has four children and seven grandchildren.

As a manager with Siemens Automation & Drives (communication systems) he represented the positions of Siemens and the German national committee in the international standardization of MAP, MMS, MMS companion standards, Fieldbus, and other standardization projects from 1984 until 1997.

He is president of SCC (Schwarz Consulting Company), Karlsruhe (Germany) specializing in distributed automation systems. He is an independent consultant in the area of information modeling, systems and information integration, system and device engineering and configuration, open information exchange, and open communications since 1992. Mr. Schwarz has immense experience in the migration from proprietary or other solutions to standard compliant solutions.

He is involved in many standardization activities within IEC (TC 57, TC 65, and TC 88), ISO (TC 184), CENELEC (TC 65 CX), IEEE (SCC 36 "UCA", 802), and DIN since 1985. He is engaged in representing main industry branches in the global standardization and providing consulting services to users and vendors. Mr. Schwarz is a well-known authority in the application of mainstream information and communication technologies. He provides guidance in the migration from proprietary solutions to advanced seamless and standard-based solutions applicable in substations, and power generation units, and between these and with local, regional, and central SCADA systems. Specifically, his contributions to the publication of many standards are considered to be outstanding.

He has been awarded with the IEC 1906 Award in 2007 ***"For his strong involvement in the edition of the IEC 61850 series, its promotion inside and outside IEC, and specifically its adaptation for wind turbine plant control."***

http://www.nettedautomation.com/download/IEC1906-Award.pdf

Publications:

http://www.nettedautomation.com/marketing/scc_publications/index.html

NettedAutomation's Capabilities and Experience Profile

Learn firsthand what you need to know about these standards and products!

We assist companies in examining open communications and distributed systems technologies in substation automation, Smart Grids, and many other application areas outside the utility industry (for which IEC 61850 was originally designed). We support the design and implementation of IEDs compliant with IEC 61850 and other standards. Support for procurement requirements and evaluation of bidder proposals for IEC 61850 related devices, systems and tools can be provided. We have long term experience in implementing and organizing IEC 61850 and IEC 61850 based pilot projects.

Mr. Schwarz is the principal teacher and trainer of the seminars and training services offered and organized by NettedAutomation GmbH. We have given lectures all over

http://www.nettedautomation.com/seminars

We offers consulting services outlined above for a wide range of information and device modeling as well as standards-based configuration, communication systems and technical applications oriented to the automation of discrete and continuous automation related to:

- International Fieldbus standard, IEC 61158 (IEC TC 65)
- European Fieldbus, EN 50170 (CENELEC TC 65 CX)
- National Fieldbus standards like PROFIBUS, FIP, P-Net
- Actuator Sensor Interface (ASI) or IEEE 802 LAN/WAN
- Utility Comm. Architecture (UCA™), IEEE SCC 36
- Communication networks and systems for power utiliy automation, IEC 61850 (IEC TC 57)
- Telecontrol equipment and system, IEC 60870-5-10x
- Communications for monitoring & control of wind power plants, IEC 61400-25 (IEC TC 88) and IEC 61400-25-6 on Information models for condition monitoring systems (IEC TC 88)
- Communications Systems for Distributed Energy Resources (DER), IEC 62350 (IEC TC 57)
- Hydroelectric power plants – Communication for monitoring and control, IEC 62344 (IEC TC 57)
- Intercontrol Center Communications Protocol (ICCP), IEC 60870-6 TASE.2 (IEC TC 57)
- Common information models (CIM), IEC 61970 (IEC TC 57)
- Accreditation, Testing and Certification of IT products (DIN Test Lab Auditor), Quality Management
- Standard for the Exchange of Product Model Data (STEP)
- Application and Function block modeling IEC 61499 (IEC TC 65)
- Process Control Functionblocks and Device Description Language, IEC 61804 (IEC TC 65)
- Open Systems Application Frameworks, ISO 15745 (ISO TC 184 SC5)
- Manufacturing Automation Protocol (MAP), MiniMAP/FAIS
- Manufacturing Message Specification, MMS, ISO 9506 (ISO TC 184)

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Appendix: Personal education and qualifications of Karlheinz Schwarz

1. Education

1958 – 1962	Elementary School
1962 – 1965	Secondary School
1965 – 1967	Secondary School (Gymnasium)
1967 – 1969	Technical School
1969 – 1972	Apprenticeship as electrical mechanic and electronics (Siemens)
1973 – 1974	Service technician responsible for alarm systems (Siemens: fire alarm systems, burglar alarm systems, ...)
1975 – 1977	Academic high school (Hessenkolleg)
1977 – 1982	Study of electrical engineering and IT at University Siegen (degree: Dipl.-Ing.)
1981 – 1997	Employee at Siemens Automation (responsible for standardization of comms)
1992 – present	Consultant and trainer for communication and automation (see above and below)

2. Training experience since 2002

Mr. Schwarz has trained almost 3,000 experts all over. Most seminars have been conducted as in-house courses. Attendees from more than 700 companies have attended. Attendees from small, medium and big utilities and big vendors have attended. An excerpt is shown in the following table:

Year	Training in Countries	Courses	Attendees
2002	China	2	30
2003	Denmark, Spain	2	22
2004	Spain, Germany, France, USA, China, South Africa, Malaysia	8	199
2005	South Korea, Mexico, Denmark, Canada, Switzerland, Germany, South Africa, Australia, Israel	12	299
2006	Germany, Italy, Spain, India, Canada, UK, Portugal, France, Austria, USA	18	545
2007	Russia, Germany, Portugal, USA, France, Canada, South Korea, Australia, New Zealand	11	252
2008	Germany, Slovenia, Canada, USA, France, Malaysia, South Korea, Australia, New Zealand, Sweden	20	379
2009	Mexico, Russia, Italy, Germany, Malaysia, USA, Australia	15	220
2010	Iceland, Spain, Ireland, Argentina, Brazil, Germany, Japan, Denmark, USA, Philippines, Sweden, Australia, France	20	276
2011	France, UK, Germany, Australia, South Korea, Switzerland, Zimbabwe, Canada, Belgium, USA, China, Austria, Brazil	33	542
2012 (Sept)	Germany, India, Belgium, Israel, Italy, Sweden, USA, South Korea, China, Taiwan	18	262
		159	***3.026***

3. Standardization experience

Mr. Schwarz is (was) a principal contributor in the following standardization projects (either project member or as the technical lead), representing many German industries (users and vendors):

ISO	ISO TC 184/SC5	Architecture, Communications, Integration Frameworks	Member	1985-2012
	ISO TC 184/SC5/WG 5	Open Systems Application Frameworks	Member	1985-2005
	ISO TC 184/SC5/WG 2	Communications and interconnection (MMS, ...)	Mem-ber/Chairman	1985-2005/1998-2005
IEC	IEC TC 57	Power Systems Control and Associated Communications	Member	1992-2012
	IEC TC 57 SPAG	Strategic Policy Advisory Group	Invited Guest	
	IEC TC 57 WG 07	Protocols compatible with ISO/OSI and ITU	Member	1992-2000
	IEC TC 57 WG 10	Power system IED communication and associated data models / Communication and systems within Substations (IEC 61850)	Member/editor of 61850	1995-2012
	IEC TC 57 WG 17	Communications Systems for Distributed Energy Resources (DER) – based on IEC 61850	Member	2004-2012
	IEC TC 57 WG 18	Hydroelectric power plants – Communication for monitoring and control – based on IEC 61850	Member	2004-2012
	IEC TC 57 WG 19	Interoperability within TC 57 in the long term	Member	2005-2012
	IEC TC 65 WG 6	Functionblocks (IEC 61499)	Member	1990-2002
	IEC TC 65 PJWG	Device Profiles	Member	1998-2002
	IEC TC 65C WG 1	Message data format for information transferred on process and control data highways, Profiles	Member	1983-2006
	IEC TC 65C WG 6	Fieldbus (IEC 61158)	Member	1997-2000
	IEC TC 65C WG 7	Functionblocks and Data Descriptive Language (IEC 61804)	Member	1996-1999
	IEC TC 88 PT 25	Communications for monitoring and control of wind power plants (IEC 61400-25-1/-2/-3/-4/-5) – based on IEC 61850	Member/editor of 61400-25	2001-2012
	IEC TC 88 PT 25 / IEC 61400-6	Communications for monitoring and control of wind power plants (IEC 61400-25-6) – Logical node classes and data clas-ses for condition monitoring	Convenor	2006-2011
IEEE	IEEE 802.3 /.15	LAN, WAN	Member	1998-2001
	IEEE SCC 36	Utility Communication Architecture	Member	1996-2000
CENELEC	CENELEC TC 65 CX	Fieldbus Communication	Member	1992-2000
CEN	CEN TC 310/TG ICOM	Task Group on industrial communications	Member	1994-1996
MMS Forum	EPRI, Electric Power Research Institute	Communications and application modelling in the area of power utilities (UCA, ICCP)	Member	1992-1998
NAM	DKE/NAM/NI 96.5	Architektur und Kommunikation	Member	1985-1998
	DKE/NAM/NI GA 96.5.2	Kommunikation und Datenaustausch (MMS, ...)	Chairman	1985-2002
DKE	DKE FB 9 AK AP	FB 9 Arbeitskreis Arbeitsplanung	Member	1989-2003
	KG-ILT	Koordinierungsgruppe Industrielle Leittechnik	Member	1989-2003
	K 261	Mirror of IEC TC 8: System aspects of electrical energy supply	Member	2003-2008
	DKE K 950	Kommunikation und Informationslogistik	Member	1998-2001
	DKE AK 956.0.2	Kommunikationsdienste, Process Control	Member	1992-1997
	DKE K 956	Feldbus	Member	1986-2012
	DKE AK 956.3.1	Functionblocks and Data Descriptive Language	Chairman	1995-206
	DKE K 952	Netzleittechnik	Vice Chair-man/member	1992-2012
	DKE AK 952.0.7	Protocols compatible with ISO/OSI and ITU	Member	1992-2005
	DKE AK 952.0.10	Stationsleittechnik	Member	1995-2012
	DKE AK 952.0.17	Kommunikation für verteilte Energieversorgung (TC 57 WG 17)	Member	2005-2012
	DKE K 383.0.1	Kommunikation für Windenergieanlagen	Chairman	2001-2012
GMA	GMA AK 4.2	Kommunikation in verteilten Systemen	Member	1996-1998
VDMA	Fachverband InCom	Industrial Communications	Member	1990-1996
ZVEI	ZVEI GA IK	Gemeinschaftsausschuss Industrielle Kommunikation	Member	1986-2012

Training modules for public and in-house training courses

IEC 61850, IEC 61400-25, IEC 60870-5/-6, IEC 61968/70 CIM, DNP3, ...

The following list contains the most asked modules of our training services with regard to standards related to power system automation. Depending on the needs of our customers we select the modules to provide the most crucial information for the experts of the customers. Other topics can be added as needed. The modules are used for public training courses as well as for in-house training sessions.

[S-00] – General		
00	Welcome and opening	Welcome, opening, roll call of attendees, expectations of attendees, Title and scope of IEC 61850 (IEC TC 57), Power Delivery System, What does IEC 61850 provide?, Motivation for the new standards, IEC 61850 in brief, Re-use of IEC 61850, Tools and System Integration, Standardization and projects, General observations.
01	Summary	Summary and next steps
[S-01] – Management and automation of the power system (basics)		
00	Power system automation basics	Basics of power system information integration and automation covering control centers, substations, power generation; Elements of the power system: Substations, Power Generation, Transmission, Distribution, System architecture, Functions, Communications, System engineering, and device configuration
01	Standardization	IEC activities related to power system standardization, IEC TC 57 and TC 88, International organizations for the power industry, IEC organization and standardization work, IEC activities related to the power industry, CIGRE, IEEE, UCA Users Group, IEC 61400 User Group, activities related to the power industry; international fieldbus
02	System design and specification	Introduction Substation automation system specification, Product requirements for communication equipment from IEC 61850-4, product requirements from IEC 61850-3, substation automation system design
03	System migration aspects and role of system integrator	Stepwise migration from existing systems to solutions compliant to standards, project and migration planning, ...; roles of users, vendors and system integrators
04	Security	Secure communication (data on travel and data stored) (IEC 62351), IED security (IEEE 1686), IEC/TS 62443-1, NERC CIP (critical infrastructure protection), VDE Guideline, NIST SGIP
05	System management	Revision control and asset management with IEC 61850
06	Testing devices and systems	Test coverage and steps towards system testing and simulation (from devices to systems)
07	Power Delivery System Basics	Brief Introduction to Power Delivery System and relations to standards from IEC TC 57 and TC 88; mainly intended to give an overview of the power delivery system and power system automation for non-utility experts.
[S-02] – IEC 61850 (and IEC 61400-25) basics		
00	IEC 61850 series – overview	Communication networks and systems for power system automation: general introduction on whole series. Design objectives and scope IEC 61850, Content and structure of IEC 61850, Features of IEC 61850, Application modeling, Information exchange and communication services, the 20+ parts of the standard
01	IEC 61850 Application modeling principles	Modeling protection, substation automation, other applications (Logical nodes, data and data attributes, function modeling, extension of the models, monitoring). The elements of the data model, Acquisition of measured information, Controlling of switchgear equipment, Protection functions, Edition 2 updates, Example of a model.
02	IEC 61850-6 engineering process	Engineering process using the configuration language: from IEDs and single line diagram to configured substation automation system Systems specification (Single line diagram and functions), IED specification (IED

		capability description), System engineering, IED engineering and configuration, Use of SCL (summary), Edition 2.
03	Communication services of IEC 61850	Information exchange with the ACSI according to IEC 61850-7-2 Basics, Information flow through IEDs, ACSI in detail (IEC 61850-7-2), Server, Logical Device, Logical Node, Data, DataSet, Control Blocks (Reporting, Logging, GOOSE, SV), Control, Conformance statement, Recording (IEC 61850-7-4).
04	Implementation of IEC 61850 conformant devices and tools	Device models, design of advanced IEDs, software and hardware architectures, OEM software
05	Device conformance testing	Conformance testing of devices according to IEC 61850-10
06	Extension rules IEC 61850	The extension rules for Logical Nodes, Data, and Common Data Classes, the name space concept. Scope, Instantiation of existing information model classes, New information models, Name space concept.
07	Substation configuration language (SCL)	System configuration language: basics and details; Engineering process and SCL, SCL object model, SCL syntax (IEC 61850-6 (SCL)), SCL edition 2. The object model and content of the SCL files, Examples, Binding models to real world, inputs, and to outputs, the data flow engineering; File extensions: SSD, SCD, ICD, CID, IID, ... including examples; configuring servers and clients.
08	Common Data Classes (Ed2)	What is new in part IEC 61850-7-3 Edition 2? New possibilities for information modelers.
50	Mapping of Common Data Classes (CDC) to IEC 60870-5-101/104 according to IEC 61850-80-1	Introduction and details of IEC 61850-80-1. The Technical Specification IEC 61850-80-1 gives a guideline on how to exchange information from a CDC based data model (IEC 61850) using IEC 60870-5-101 or IEC 60870-5-104 protocols between substation(s) and control center(s).
[S-03] – Substation automation and protection		
00	IEC 61850 modeling details	Modeling of protection, switchgear, metering and power quality equipment and other substation automation applications. Basic principles, Protection functions, Protection related functions, Control, Example
01	Applying IEC 61850 for power system automation – use cases	Use cases from power system automation like measuring of current and voltage, protection, operating a switch, creation of a sequence of events, SCADA. Use case 1 – measuring current and voltage Use case 2 – operate switchgear
02	Product specifications for substation equipment	Implementation guideline IEC 61850-9-2 “LE”, Product standard for switchgear with integrated IEC 61850 interface (IEC 62271-003)
03	Substation automation system architecture	Communication architecture and topology, device architecture, impact of new technologies; redundancy concepts for switched Ethernet network. Communication architecture, Device modeling, Availability considerations
04	Substation to substation communication for protection and control with IEC 61850	What does the standard IEC 61850-90-1 (Use of IEC 61850 for the communication between substations) provide? Introduction and current status of work. Interlocking between substations, Distance line protection, Current differential line protection, Out-of-step detection, etc.
[S-04] – Power generation		
00	Wind power plants	Overview and introduction of the standard for Communications for monitoring and control of wind power plants – IEC 61400-25
01	Hydro power plants	Overview and introduction of the standard for Communications for monitoring and control of hydro power plants – IEC 61850-7-410
02	Distributed Energy Resources	Overview and introduction of the standard for Communications for monitoring and control of Distributed Energy Resources (DER) – IEC 61850-7-420
03	Application modeling for hydro power plants	Overview and introduction of the standard for IEC 61850-7-410 modeling details; New common data classes for hydro power plants
[S-05] – Communication between field devices and system level and at system level		
00	Telecontrol protocols IEC 60870-5-101/-104 and DNP3	Fundamentals of Telecontrol standards IEC 60870-5-101, IEC 60870-5-104, and DNP3. What is the market relevance in the future (comprehensive set of slides available if information is needed for the attendees; several slides are added for the attendees convenience – to take home). Is IEC 61850 competing with Telecontrol Protocols? What are the use cases for Telecontrol Protocols and IEC 61850?
01	Telecontrol protocols details	Fundamentals of DNP3; comparison with IEC 60870-5-101/104
02	Substation to control center communication with IEC 61850	What will the standard IEC 61850-90-2 (Using IEC 61850 for the communication between substations and control centres) provide? Introduction and current status of work.

03	Inter control center communication (ICCP)	Fundamentals of the use of IEC 60870-6-TASE.2 (ICCP); a comprehensive stand-alone seminar is available as well, ask for details.
04	Webservices	Fundamentals of the definition of Webservices for IEC 61400-25-3 (and IEC 61850-7-2) as specified in IEC 61400-25-4.
05	Comparison of protocols	Detailed comparison of the protocol suites IEC 60870-5, DNP3, ICCP (TASE.2), IEC 61850
[S-06] – Power system level applications		
00	IEC 61970 / 61968 series	Energy management system application program interface (EMS-API) / System interfaces for distribution management – introduction
01	IEC 61970-301 CIM	Energy management system application program interface (EMS-API); focus on Part 301: Common Information Model (CIM) and harmonization with IEC 61850
02	Dynamic and static use of the CIM Model	Component Interfaces for information exchange, use cases for the CIM: GID, EAI, Network models
03	Tooling for the Common Information Model CIM	Available tools, platforms, experiences with power delivery systems Overview of existing OS tools: CIMTool, Xpetal, CIMVT, CIMValidate, CIMSpy; Available commercial tools; Flaws and future tools
04	UML Modeling basics	Introduction of the modeling basics required for CIM
05	UML demonstration of the CIM	Using the free viewer of the Spax Enterprise Architect Modeling and Design Tool to visualize the current CIM (IEC 61970-301 Edition 2009). Free viewer will be provided for all attendees.
06	CIM Users Group	Activities of the CIM Users Group
07	Application examples and projects	Presentation of implemented and planned applications; projects
08	Harmonization CIM – IEC 61850	Present the current status and potential issues of the harmonization of the two models
[S-07] – Communication and SCADA aspects and protocol implementations		
00	Extracting data from field devices	General SCADA services – configuration of control blocks (IEC 61850-7-2). Overview, Reporting, Logging, GOOSE, Sampled values
01	Monitoring for SCADA applications	Fundamentals of special SCADA services (IEC 61850-7-2): model basics for monitoring, event reporting, event logging. IEC 61850 aspects of monitoring, SCADA services, Alarm handling
02	Communication technologies	Fundamentals of Industrial Ethernet used for substations and beyond Industrial Ethernet features, Ethernet Requirements for IEC 61850, Shared Ethernet, Switched Ethernet, Ethernet frames, Ethertypes used in IEC 61850, Priority tagging, 802.1Q / 802.1p
03	Information presentation and encoding	Fundamentals of UML, XML, ASN.1, ... Presentation of IEC 61850 Domain in UML Notation (Status of WG 10Task Force: 2010-09; Enterprise Architect)
04	Protocol details	Fundamentals of ISO 9506 (MMS), Webservices, IEC 60870-5, DNP3, ICCP
05	Protocol implementations and Mappings for IEC 61850-7-2	Details on how to implement protocols and information models? MMS, ASN.1 BER, Web services, ..., simple MMS clients; IEC 60870-5, ICCP, DNP3
06	Demonstration of compliant software	Demonstration of IEC 61850 compliant client and server software. Server (software-only, hardware version), API between existing data and „standard world“, Existing data, DER model, and mapping of existing data to the DER model, Clients (MS Internet Explorer, Tamarack test client, Tamarack Client), Demonstrate information exchange
07	MMS client and server implementation – the basis for IEC 61850	Comprehensive training on the implementation of MMS clients and servers for all basic services required by TC 57 standards: Association, NamedVariable, NamedVariableList, Read, Write, Information Report, ... This module usually requires a 2 day course
08	ICCP (IEC 60870-6 TASE.2 Protocol)	Use of MMS for realizing the TASE.2 services
09	Network Engineering Guidelines (IEC 61850-11)	Recovery protocols (RSTP, PRP, etc); different approaches to network topology, redundancy, time synchronization, etc.; status of standardization
[S-08] – Products and projects		
00	Practical experience	IEC 61850 devices, tools, and projects in reality; penetration of IEC 61850 (61400-25) in the global market. Equipment, IEDs, Tools, Substations, Industrial applications
01	Tool support	Tools for IEC 61850, SCL, IEC 61400-25, Ethernet, TCP/IP, MMS, ASN.1 MS Internet Explorer, XML, SCL browser from ABB, Use of SCL for automatic building IED data bases of servers, Validation of models of a server IEDs, Network analyzers (Ethereal, KEMA UNICA, ...)

02	User support	UCA international users group, quality measures and TISSUE process, why to join the users group?
03	Current and future standardization	Introduction of current and future application domains using and extending IEC 61850; Update on ongoing and planned standardization activities, Coordination and harmonization of information models, Maintenance of IEC 61850 base documents, Data and communication security, Power quality monitoring, Statistical and historical statistical data, Wind power plants, Hydro power plants, Decentralized energy resources, Substation to control center communication, Substation to substation communication, Product standards: switch gear and merging units, Monitoring, asset management, and maintenance (various groups), Condition monitoring.
04	SCL demo with compliant software	Use of SCL files for building data model in an IED, extension of model (new data); including live demonstration.
05	Products offered by major vendors	What is the situation on the market? What products are offered by the major vendors (ABB, Areva, GE, Siemens, ... Doble, Omicron, ... Beckhoff, Phoenix Contact, ... RuggedCom, Hirschmann, ...)
06	Multivendor projects and turn key projects of single vendor	Experiences after two years substation automation and protection with IEC 61850; turn key projects, ... User's view and requirements for the future. Are the users' expectations met?
07	IEC 61850 Network Analyzer and SCL	Presentation and demonstration of the use of SCL files for the interpretation of messages: Connect IED Scout to QNE Measurement IED, Generate SCL for QNE with IED Scout, KEMA UNICA trace without SCL, KEMA UNICA trace with SCL, Ethereal Trace and interpretation of ASN.1 BER
10	Tools for the engineering of IEC 61850 conformant systems	The engineering process of IEC 61850 requires several tools for the various aspects of engineering: system design, IED design, system engineering, IED configuration, testing, ... The presentation introduces the typical engineering process using tools. More details can be found in the hands-on training [H-0104]
11	Second edition of IEC 61850 and other extensions	The first edition of IEC 61850 had 14 parts and was published between 2002 to 2005. In the meantime many extensions have been defined and published as standards or draft standards. This presentations presents the many new definitions in information models, services, configuration, mappings, and applications.
50	Quality process and user group	The UCA international users group represents all major vendors, many utilities, system integrators and consultants to support the various standards. The crucial objective is the support of the quality assurance process for testing, certification and lab accreditations.
[S-09] – Real-time information exchange with GOOSE and Sampled Values		
00	Network Infrastructure for Real-time information exchange	Required Ethernet communication infrastructure (Ethertype, Multicasting, Multicast filtering, ... Redundancy). Non Ethernet communication solutions. Basics on PRP, HSR, and IEEE 1588. Draft IEC 61850-90-4
01	GOOSE (Generic Object Oriented System Event)	GOOSE Control Blocks and dynamic behavior of GOOSE message exchange. Required Ethernet communication infrastructure (Ethertype, Multicasting, Multicast filtering, ...) . GOSSE message syntax (flexible and fixed encoding). Configuration of GOOSE control using SCL. GOOSE application examples. Demonstration of GOOSE messaging and network traffic analysis.
02	Sampled Measured Values	SMV Control Blocks and dynamic behavior of SMV message exchange. Required Ethernet communication infrastructure (Ethertype, Multicasting, Multicast filtering, ...). SMV message syntax. Configuration of SMV control using SCL. SMV application examples.
[S-10] – Functional Testing		
00	Basics of functional testing. NEW	The functional elements in system testing. Status of standardization work in IEC TC 57 and CIGRÉ
02	Details of functional testing. NEW	How to use services and Model contents (various data objects) and IEDs like Merging Units for functional testing. Testing of servers, clients and system aspects.
[S-11] – Edition 1, Edition 2, Edition 3, ...		
00	Basics of the various Editions in the series IEC 61850 and IEC 61400-25. NEW	The standard series IEC 61850 and IEC 61400-25 comprise more than 25 different parts. Each part has its own designation: "Edition 1", "Edition 2", ... To reduce the confusion and to learn the right terminology of Editions the basic structures will be explained.
01	Detailed comparisons of the Edition 1 and Edition 2 of the core documents. NEW	The many differences between Edition 1 and Edition 2 of the following documents will be explained: IEC 61850-5, IEC 61850-6, IEC 61850-7-1, IEC 61850-7-2, IEC 61850-7-3, IEC 61850-7-4, IEC 61850-8-1, IEC 61850-7-410

Special hands-on Training opportunities for IEC 61850

[H-00] – General IEC 61850 hands-on training for in-house courses

00	Extended modeling of non-standardized information	Build your own extended model. The use of the extension rules of IEC 61850 to model application information outside standards
01	Design and engineering of a substation	Engineering of substations, IEDs and other systems using SCL tools
02	Real models	Analysis of existing real models; design of the model for your application
03	IED communication	Hands-on training of the use of communication services (ACSI) using an IED Simulator and common IED Browsers. The communication comprises all ACSI services except Sampled Values; communication with real IEDs (if IEDs are available and accessible); Network infrastructure and PCs are required; one PC per two attendees; training software will be provided in advance
04	Analyzing the communication	Analyzing the communication according to IEC 61850: client-server, GOOSE, SV; communication testing
05	H-0005-Client-Server-Demos-Hands-on_reviced-2010-10-25.ppt	

[H-01] – IEC 61850 IED and Engineering tools hands-on training in cooperation with STRI, Ludvika/Sweden

This hands-on training is offered as public or in-house events. The duration is usually 4 days. Contact NettedAutomation for details, dates and locations.

00	Module 1	Gives an introduction to the IEC 61850 standard together with a summary with real applications and the demonstration of STRI facilities for multivendor interoperability testing. Introduction to IEC 61850, the basics of the standard series, updates and other extensions. Presentation of the STRI multivendor application with ABB, Areva and Siemens IEDs for a typical substation. Demonstration of compliant IEC 61850 software, devices and test procedures in STRI's Independent IEC 61850 laboratory.
01	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. IEC 61850 substation and device modeling and communication principles (GOOSE, Sample Values, Client/Server applications). What you need to know for specification, evaluation, verification and maintenance of IEC 61850 systems (whole substations and IEDs).
02	Module 3	Presents 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. Review of available functions and possible architectures for substation automation. Optimized application of IEC 61850 in power utilities with examples based on the STRI multivendor application with ABB, Areva and Siemens IEDs for a typical substation. Morning session with theory and afternoon with group workshop to design and specify typical substation functions.
03	Module 4A IED interoperability workshop	IEC 61850 hands-on workshop demonstrating inter-operability of protection and control devices from ABB, Areva and Siemens. The intention is to create a small system demonstrating interoperability of protection and control devices from ABB, Areva and Siemens. The participants will be divided in three subgroups with the task of browsing the IED model of each device (using self-description, validation of model and SCL file) and creating outgoing GOOSE messages from their relay. After lunch the network traffic is jointly analyzed and the reception of GOOSE messages will be configured in smaller groups. Finally the system is tested through e.g. simple multi-protection tripping schemes and the use of IEC 61850 compatible test devices. Participant gets hands-on experience of at least two vendors IEC 61850 implementation in IEDs and tools. Experience in system debugging and network traffic analysis using third party and open source tools is gained.
04	Module 4B Substation Configuration Language (SCL) workshop	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.

The workshop focuses on the design of typical substation functions and the engineering of the substation and IEDs according to the engineering process described in edition 2 of IEC 61850-6 (SCL). The participants will use third-party functional specification, design and engineering tools to design ICD files, substation sections, communication sections, IED sections and DataTypeTemplates. The participants will create a SCD file that is used to generate a fully functional IED (IEC 61850) server simulator. The SCD file is also used as import file for an IED configuration tool to configure a real IED (data model, server and GOOSE message). During the last hour of the workshop the two groups join for the IED configuration by use of the SCD file created by the SCL group.

This workshop 4B requires participants to bring their own notebooks (at least one for two attendees). The demo tools (from third parties) required will be provided by NettedAutomation prior to the beginning of the event.

Special hands-on Training opportunities for IEC 61850

[H-02] – General CIM (IEC 61968) hands-on training for in-house courses		
00	Hands-on training with available CIM tool demonstration software	The attendees will be guided through several sample tools. The students will learn how to use CIM compliant tools for sample applications.

Date and locations for public events: http://www.nettedautomation.com/seminars/uca/sem.html#standardpublic
In-house courses: http://www.nettedautomation.com/seminars/uca/sem.html#inhouse
Contact: karlheinz.schwarz@nettedautomation.com
IEC 61850 Blog: http://blog.iec61850.com

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Fax +49-721-679387

Program

IEC 61850 Seminar and Hands-on Training

Frankfurt (Germany)

09.–11. May 2012

Notes:

1. Questions and discussions during and after each presentation are expected and welcome.
2. Breaks may be shifted and added if required.
3. If required some presentations may be reduced or extended.
4. The given durations may vary.
5. Page numbers Pxxx refer to the printed slides for the attendees

Wednesday, 09. May 2012 – Day 1

#	Modul	Topic	Description	Min	Time
01	S-0000 P007	Welcome and opening	Welcome, opening, roll call of attendees, expectations of attendees, Title and scope of IEC 61850 (IEC TC 57), Power Delivery System, What does IEC 61850 provide?, Motivation for the new standards, IEC 61850 in brief, Re-use of IEC 61850, Tools and System Integration, Standardization and projects, General observations.	150	10:00 – 12:30
Lunch					12:30 – 13:30
02	S-0100 P038	Power system automation basics	Basics of power system information integration and automation covering control centers, substations, power generation; Elements of the power system: Substations, Power Generation, Transmission, Distribution, System architecture, Functions, Communications, System engineering, and device configuration	45	13:30 – 14:15
03	S-0101 P050	Standardization	IEC activities related to power system standardization, IEC TC 57 and TC 88, International organizations for the power industry, IEC organization and standardization work, IEC activities related to the power industry, CIGRE, IEEE, UCA Users Group, IEC 61400 User Group, activities related to the power industry; international fieldbus	30	14:15 – 14:45
Break					14:45 – 15:05

#	Modul	Topic	Description	Min	Time
04	S-0200 P062	IEC 61850 series – overview	Communication networks and systems for power system automation: general introduction on whole series. Design objectives and scope IEC 61850, Content and structure of IEC 61850, Features of IEC 61850, Application modeling, Information exchange and communication services, the 16 parts of the standard	100	15:05 – 16:45
Break					16:45 – 16:55
05	S-0202 P088	IEC 61850-6 engineering process	Engineering process using the configuration language: from IEDs and single line diagram to configured substation automation system Systems specification (Single line diagram and functions), IED specification (IED capability description), System engineering, IED engineering and configuration, Use of SCL (summary), Edition 2.	45	16:55 – 17:40
06		Q&A		20	17:40 – 18:00

Thursday, 10. May 2012 – Day 2

#	Modul	Topic	Description	Min	Time
07	S-0201 P095	IEC 61850 Application modeling principles	Modeling protection, substation automation, other applications (Logical nodes, data and data attributes, function modeling, extension of the models, monitoring). The elements of the data model, Acquisition of measured information, Controlling of switchgear equipment, Protection functions, Edition 2 updates, Example of a model.	60	08:30 – 09:30
08	S-0203 P111	Communication	Information exchange with the ACSI according to IEC 61850-7-2 Basics, Information flow through IEDs, ACSI in detail (IEC 61850-7-2), Server, Logical Device, Logical Node, Data, DataSet, Control Blocks (Reporting, Logging, GOOSE, SV), Control, Conformance statement, Recording (IEC 61850-7-4).	90	09:30 – 10:30
Break					10:30 – 10:50
		cont.			10:50 – 11:20
09	S-0204 P143	Implementation of IEC 61850 conformant devices and tools	Device models, design of advanced IEDs, software and hardware architectures, OEM software	40	11:20 – 12:00
10	S-0800 P154	Practical experience	IEC 61850 devices, tools, and projects in reality; penetration of IEC 61850 (61400-25) in the global market. Equipment, IEDs, Tools, Substations, Industrial applications	30	12:00 – 12:30

#	Modul	Topic	Description	Min	Time
Lunch					12:30 – 13:30
11	S-0205 P169	Device conformance testing	Conformance testing of devices according to IEC 61850-10	20	13:30 – 13:50
12	S-0206 P177	Extension rules IEC 61850	The extension rules for Logical Nodes, Data, and Common Data Classes, the name space concept. Scope, Instantiation of existing information model classes, New information mod-els, Name space concept.	25	13:50 – 14:15
13	S-0207 P187	Substation configuration language (SCL)	System configuration language: basics and details; Engineering process and SCL, SCL object model, SCL syntax (IEC 61850-6 (SCL))	60	14:15 – 14:45
Break					14:45 – 15:05
		cont.			15:05 – 15:35
14	S-0301 P214	Applying IEC 61850 for substation automation – use cases	Use cases from substation automation like measuring of current and voltage, protection, operating a switch, creation of a sequence of events	25	15:35 – 16:00
15	S-0302 P223	Product specifications for substation equipment	Implementation guideline IEC 61850-9-2 “LE”, Product standard for switchgear with integrated IEC 61850 interface (IEC 62271-003)	20	16:00 – 16:20
Break					16:20 – 16:30
16	S-0400 P231	Wind power plants	Overview and introduction of the standard for Communications for monitoring and control of wind power plants – IEC 61400-25	10	16:30 – 16:40
17	S-0401 P250	Hydro power plants	Overview and introduction of the standard for Communications for monitoring and control of hydro power plants – IEC 61850-7-410	10	16:40 – 16:50
18	S-0402 P255	Distributed Energy Resources	Overview and introduction of the standard for Communications for monitoring and control of Distributed Energy Resources (DER) – IEC 61850-7-420	10	16:50 – 17:00
19	S-0700 P264	Extracting data from field devices	General SCADA services – configuration of control blocks (IEC 61850-7-2). Overview, Reporting, Logging, GOOSE, Sampled values	40	17:00 – 17:40
20	S-0701 P274	Monitoring for SCADA applications	Fundamentals of special SCADA services (IEC 61850-7-2): model basics for monitoring, event reporting, event logging. IEC 61850 aspects of monitoring, SCADA services, Alarm handling	20	17:40 – 18:00

Friday, 11. May 2012 – Day 3

21	S-0807 P284	IEC 61850 Network Analyzer and SCL	Presentation and demonstration of the use of SCL files for the interpretation of messages: Connect IED Scout to QNE Measurement IED, Generate SCL for QNE with IED Scout, KEMA UNICA trace without SCL, KEMA UNICA trace with SCL, Ethereal Trace and interpretation of ASN.1 BER	15	08:30 – 08:45
22	S-0900 P296	Network Infrastructure for Real-time information exchange	Required Ethernet communication infrastructure (Ethertype, Multicasting, Multicast filtering, ... Redundancy). Non Ethernet communication solutions.	30	08:45 – 09:15
23	S-0901 P308	GOOSE (Generic Object Oriented System Event)	GOOSE Control Blocks and dynamic behavior of GOOSE message exchange. Required Ethernet communication infrastructure (Ethertype, Multicasting, Multicast filtering, ...) . GOSSE message syntax. Configuration of GOOSE control using SCL. GOOSE application examples. Demonstration of GOOSE messaging and network traffic analysis.	30	09:15 – 09:45
24	S-0705 P319	Protocol implementations and Mappings for IEC 61850-7-2	Details on how to implement protocols and information models? MMS, ASN.1 BER, Web services, ..., simple MMS clients	45	09:45 – 10:30
Break					10:30 – 10:50
25	H-03 P335	IED communication	Hands-on training of the use of communication services (ACSI) using an IED Simulator and common IED Browsers. The communication comprises all ACSI services except Sampled Values; communication with real IEDs (Measurement IED); Network infrastructure will be provided; two attendees each with a PC will be connected 1:1 by a cross-over cable; training software will be provided in advance.	180	10:50 – 12:30
Lunch					12:30 – 13:30
		cont.			13.30 – 14:50
Break					14:50 – 15:10
26	H-04	Analyzing the communication	Analyzing the communication according to IEC 61850: client-server, GOOSE, SV (if available); communication testing	60	15:10 – 16:10
27		Question & Answers	Final questions and answers	20	16:10 – 16:30

Feedback from attendees and pictures of IEC 61850/61400-25 Seminars and Training Workshops

NettedAutomation GmbH

http://nettedautomation.com

http://blog.iec61850.com

(respective Dipl.-Ing. Karlheinz Schwarz, SCC)

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Version 2012-08-28

Summary of courses (seminars and training courses)

	Event	*Days*	*Att.*
1.	[redacted] (China) 2002-10		13
2.	[redacted] (China) 2002-10		17
3.	Rødkærsbro (Denmark) 2003-03		8
4.	Barcelona (Spain) 2003-04		14
5.	Madrid (Spain) 2004-03		22
6.	Frankfurt (Germany)2004-05		40
7.	Paris (France) 2004-08		25
8.	Chicago (USA) 2004-10		12
9.	Beijing (China) 2004-11		32
10.	Johannesburg (South Africa) 2004-11		23
11.	Kuala Lumpur (Malaysia) 2004-11		27
12.	Frankfurt (Germany) 2004-12		18
13.	Daejeon (South Korea) 2005-02		30
14.	Torréon (Mexico) 2005-04		22
15.	Copenhagen (Denmark) 2005-05		18
16.	Berlin (Germany) 2006-06		15
17.	Frankfurt (Germany) 2006-06		15
18.	Toronto (Canada) 2005-09		16
19.	Ottawa (Canada) 2005-09		15
20.	Baden (Switzerland) 2005-09		21
21.	Berlin (Germany) 2005-10		20
22.	Cape Town (South Africa) 2005-10		35
23.	Zurich (Switzerland) 2005-10		22
24.	Melbourne (Australia) 2005-11		22
25.	Brisbane (Australia) 2005-11		43
26.	Haifa (Israel) 2005-12		31
27.	[redacted] (Italien) 2006-01		16
28.	[redacted] Dortmund (Germany)2006-02		15
29.	[redacted] Neckart. (Germany) 2006-02		10
30.	[redacted] Rostock (Germany) 2006-03		6
31.	Frankfurt (Germany) 2006-03		7
32.	Madrid (Spain) 2006-03		11
33.	Bangalore (India) 2006-04	3	350
34.	[redacted] Berlin (Germany) 2006-05	3	22
35.	Calgary (Canada)	3	17
36.	London (UK) 2006-07	2	15
37.	[redacted] Lisboa (Portugal), 2006-07	3	8
38.	Paris (France) 2006-08	3	7
39.	[redacted] Klaus (Austria) 2006-08	3	7
40.	[redacted] (USA) 2006-11	4	10
41.	[redacted] Barcelona (Spain) 2006-11	3	8
42.	Frankfurt (Germany) 2006-12	3	6
43.	Cheboksary (Russia) 2007-04	4	16
44.	[redacted] Grenoble (France) 2007-04	2	70
45.	[redacted] Oldenburg (Germany) 2007-04	3	14
46.	[redacted] (Germany) 2007-05	2	10
47.	Itaipu (Brazil) 2007-05		15
48.	Doha (Qatar) 2007-05		15
49.	Frankfurt (Germany) 2007-07		5
50.	[redacted] (Portugal) 2007-07		10
51.	[redacted] (Germany) 2007-08		10
52.	[redacted] (NC, USA) 2007-08		5
53.	Frankfurt (Germany) 2007-09		5

	Event	Days	Att.
54.	[redacted] Paris (France) 2007-09		18
55.	[redacted] Regina (Canada) 2007-10		6
56.	[redacted] Seoul (Rep. Korea) 2007-10		9
57.	Melbourne (Australia) 2007-11		15
58.	Sydney (Australia) 2007-11		9
59.	[redacted] Wellington (New Zealand) 2007-11		20
60.	[redacted] Dortmund (Germany) 2008-01		11
61.	Frankfurt (Germany) 2008-01		11
62.	[redacted] (Germany) 2008-02		29
63.	[redacted] Oldenburg (Germany) 2008-03		10
64.	[redacted] Ljublijana (Slovenia) 2008-03		28
65.	Frankfurt (Germany) 2008-04		15
66.	[redacted] [redacted] Winnipeg (Canada)		25
67.	Atlanta (USA) 2008-07		12
68.	Paris (France) 2008-08		10
69.	[redacted] Kuala Lumpur (Malaysia) 2008-09		16
70.	Seoul (Rep. Korea) 2008-10		20
71.	[redacted] Minden (Germany) 2008-10	2	5
72.	[redacted] New York City (USA) 2008-10	3	55
73.	[redacted] Brisbane (Australia) 2008-10	3	23
74.	[redacted] Auckland (New Zealand) 2008-11	2	15
75.	[redacted] Hamilton (New Zealand) 2008-11	3	10
76.	[redacted] Christchurch (New Zealand) 2008-11	3	30
77.	STRI Ludvika (Sweden) 2008-11	4	35
78.	[redacted] Berlin (Germany) 2008-12	2	7
79.	[redacted] Detmold (Germany) 2008-12	2	12
80.	Mexico City (Mexico) 2009-01	1	21
81.	Frankfurt (Germany) 2009-03	4	23
82.	Moscow (Russia) 2009-03	3	22
83.	[redacted] (TSO Italy) 2009-03/05/07 11 days	11	12
84.	[redacted], Berlin (Germany) 2009-04	2	7
85.	Kuala Lumpur (Malaysia) 2009-05	1	22
86.	[redacted] Magdeburg (Germany) 2009-06	2	6
87.	Moscow (Russia) 2009-09	3	10
88.	[redacted] Fürth (Germany) 2009-10	4	14
89.	Frankfurt (Germany) 2009-10	4	19
90.	San Antonio (TX, USA) 2009-10	2	16

	Event	Days	Att.
91.	Nürnberg (Germany) 2009-11	1	10
92.	Brisbane (Australia) 2009-11	3	21
93.	Sydney (Australia) 2009-12	3	17
94.	Reykjavik (Iceland) 2010-01	3	29
95.	[redacted] Madrid (Spain) 2010-01	5	23
96.	[redacted], Dublin (Ireland) 2010-01	4	8
97.	Buenos Aires (Argentina) 2010-04	3	26
98.	Sao Paulo (Brazil) 2010-04	3	10
99.	Frankfurt (Germany) 2010-05	3	9
100.	[redacted] Tokyo (Japan) 2010-05	4	7
101.	Siemens Wind DK 2010-06	4	32
102.	ABB Bethlehem (USA) 2010-07	4	24
103.	[redacted] 2010-07	3	1
104.	Frankfurt (Germany) 2010-09	3	7
105.	[redacted] (Germany) 2010-10	1	7
106.	Remote Dallas (TX) 2010-10	2	7
107.	[redacted] Manila (Phil) 2010-10	4	25
108.	STRI Stockholm (Sweden) 2010-11	4	19
109.	[redacted] (Germany) 2010-11-10	2	16
110.	[redacted] [redacted] (Germany) 2010-11-19	1	8
111.	[redacted] Sydney (Australia) 2010-12-06	5	15
112.	[redacted] Paris (France) 2010-12-14	1	3
113.	[redacted] (Germany) 2010-12-21	1	7
114.	[redacted] (France) 2011-01-06	2	9
115.	[redacted] Knaresborough (UK) 2011-01-10	3	6
116.	[redacted] Karlsruhe Crashkurs 2011-02-17	1	2
117.	5 Guru Sydney (Australia) 2011-03-07	3	49
118.	Myong Ji University Yongin (Korea) 2011-03-13	1	45
119.	[redacted] (Germany) 2011-03-14	1	6
120.	[redacted] Baden (Schweiz) 2011-04-26	2	6
121.	[redacted] Harare (Zimbabwe) 2011-04-04	3	22
122.	[redacted] Ashby (UK) 2011-04-18	3	5
123.	Frankfurt (Germany) 2011-05-04	3	6
124.	[redacted] Karlsruhe (Germany) 2011-05-12	1	7
125.	[redacted] Vancouver (Canada) 2011-05-16	3	46

	Event	Days	Att.
126.	[redacted] Seefeld (Germany) 2011-06-01	1	7
127.	[redacted] München (Germany) 2011-06-03	1	6
128.	[redacted] (Germany) 2011-06-17	1	5
129.	[redacted] (Germany) 2011-06-27	2	6
130.	[redacted] (Germany) 2011-06-29	3	15
131.	[redacted] (Germany) 2011-07-05	1	13
132.	[redacted] Fürth (Germany) 2011-07-13	1	6
133.	[redacted] (Germany) 2011-07-14	1	6
134.	[redacted] Hannover (Germany) 2011-07-21	1	2
135.	[redacted] Brussels (Belgium) 2011-08-22	3	9
136.	[redacted] Emden (Germany) 2011-08-30	3	6
137.	Shanghai (China) 2011-09-05	1	110
138.	[redacted] Graz (Austria) 2011-09-12	2	6
139.	Remote Nashville (TN, USA) 2011-09-20	2	11
140.	[redacted] Linz (Austria) 2011-09-27	3	14
141.	Frankfurt (Germany) 2011-10-05	3	7
142.	[redacted] (France) 2011-10-17	6	19
143.	[redacted] (France) 2011-11-02	6	20
144.	Sao Paulo (Brazil) 2011-11-21	3	23
145.	[redacted] Shanghai (China) 2011-11-28	10	26
146.	[redacted]s Seefeld (Germany) 2011-12-14	1	16

	Event	Days	Att.
147.	[redacted] München 2012-01-26	1	6
148.	[redacted] Aachen 2012-02-15	1	6
149.	[redacted] (Germany) 2012-02-22	1	29
150.	[redacted] München 2012-03-16	1	5
151.	[redacted] New Delhi 2012-03-19/21	3	28
152.	[redacted] Hamburg 2012-03-28	2	55
153.	[redacted] Brüssel 2012-03-11/13	3	8
154.	[redacted] Tel Aviv 2012-04-30	4	15
155.	Uni Peninsula Capetown 2012-05-02	3	2
156.	Frankfurt 2012-05-09	3	2
157.	[redacted] 2012-05-14	1	45
158.	[redacted] 2012-05-15	1	7
159.	[redacted] Italien 2012-05-29	3	15
160.	KTH Stockholm 2012-06-11	1	16
161.	[redacted] Hattersheim 2012-06-19	2	6
162.	Beck IPC Pohlheim (Germany) 2012-07-03	1	9
163.	[redacted] (MA), 2012-07-16/19	3	4
164.	[redacted] München (Germany). 2012-07-23	1	4
165.			
166.			
167.			
168.			
169.			
170.			
	***Total** (by 2012-08-28)*	***244***	***3.029***

Experts from more than 70 countries have attended (2011-07-20):

1. Argentina
2. Australia
3. Belgium
4. Botswana
5. Brazil
6. Canada
7. China
8. Chile
9. Colombia
10. Democratic Repulic Of Congo
11. Croatia
12. Cyprus
13. Denmark
14. Deutschland
15. Finland
16. France
17. Ghana
18. Germany
19. Greece
20. Hungary
21. India
22. Indonesia
23. Iceland
24. Ireland
25. Israel
26. Italy
27. Japan
28. Kingdom of Bahrain
29. Korea
30. Kosova
31. Lesotho
32. Lithuania
33. Malaysia
34. Malawi
35. Mexico
36. Mozambique
37. Namibia
38. Netherlands
39. New Zealand
40. Norway
41. Österreich
42. Paraquay
43. Peru
44. Poland
45. Portugal
46. Philippines
47. Romania
48. Qatar
49. Russia
50. Saudi Arabia
51. Schweiz
52. Schwitzerland
53. Singapore
54. Slovenia
55. South Africa
56. South Korea
57. Spain
58. Sweden
59. Switzerland
60. Taiwan
61. Tanzania
62. The Netherlands
63. Turkey
64. UK
65. United Arab Emirates
66. United Kingdom
67. Uruguay
68. USA
69. Venezuela
70. Waziland
71. Zambia
72. Zimbabwe

Companies that have sent people to the seminars (2006-04-01):

1. A. Zilinskio ir ko UAB
2. ABB AG
3. ABB Australia Ply Limited
4. ABB Automation GmbH
5. ABB Automation Ltd.
6. ABB Corporate Research
7. ABB Elk. San. A.S.
8. ABB Forschungszentrum
9. ABB High Voltage Products
10. ABB HVDC
11. ABB Malaysia Sdn Bhd
12. ABB Power Technologies
13. ABB Substation Automation
14. ABB Taiwan
15. Abu Dhabi Water & Electricity Authority-ADWEA
16. AEW
17. Agency for Technology and Standards
18. Alcatel-Lucent
19. Alcom Matomo
20. Alstom Power Paris
21. Alstom Power Sweden AB
22. Alstom Transport
23. AMA-SYSTEMS GmbH
24. AnyGate Corp.
25. AREVA Energietechnik GmbH
26. Areva T&D
27. AREVA T&D Canada Inc
28. Areva T&D Malaysia SDN BHD
29. AREVA T&D P&C
30. AREVA-TD
31. Atien Industries Sdn. Bhd
32. ATS
33. Avacon AG
34. B.R. Sp.Pracy M.S.A.Mikronika
35. Beca
36. Behagian Penghantaran
37. BeiJing Sifang Automation
38. BEL Engineering
39. BEL Engineering S.A.
40. Bernecker + Rainer Industrie-Elektronik GmbH
41. BFH TI Burgdorf
42. Breton, Beanville & Associates
43. C.F.E.
44. C.F.E. CENACE
45. C.F.E. CPTT
46. C.F.E. GRTN
47. C.F.E. GRTOR
48. Camille Bauer AG
49. Cape Town City Council
50. Cape Town Electricity
51. Chilectra S.A.
52. City of Cape Town
53. City of Capetown
54. CKW
55. Connected Energy Corp.
56. CROC Incorporated, JSC
57. Current Group
58. Cybectec Inc.
59. Doble Engineering Co.
60. Doble Engineering Company
61. Dong Energy
62. DongDaZHongdianke
63. Dravske elektrarne Maribor, d.o.o.
64. E.ON Finland Oyj
65. EDF
66. EDF Cite
67. EDF R & D
68. EDF R&D
69. EDF Research and Development
70. EKS
71. EKT
72. EKZ
73. El & Industriteknik Svenska AB
74. Electranet
75. Electric Power Development Co., Ltd
76. Electrificación del Caroní, C.A
77. Elektro Celje, d.d.
78. Elektro Gorenjska, d.d.
79. Elektro Ljubljana, d.d.
80. Elektro Primorska, d.d.
81. Elektro Slovenija, d.o.o.
82. Elster GmbH
83. Eltra amba
84. Empower
85. Empresas Públicas de Medellín
86. ENDESA
87. Eneco netbeheen B.V.
88. ENERGEX
89. Energex Pty Ltd
90. Energi E2
91. Energy & Control Services Pty Ltd
92. EnergyAustralia
93. E-ON
94. EON Solutions
95. ESCOM
96. Eskom
97. ESKOM - Warmbad
98. Eskom Distribution
99. Eskom Holdings Ltd
100. Essent Network
101. ethekwini electricity
102. ETRANS Ltd
103. EURISCO Aps
104. Fingrid
105. Fingrid Oyj
106. Fortum Service Oy
107. GE Energy Services
108. General Electric Canada Inc.
109. GuoDian Nari Technology Co.
110. Helinks
111. Hirschmann Electronics GmbH & Co. KG
112. Hitachi Power Systems
113. HSE, d.o.o.
114. HV Power
115. Hydro One Networks
116. Hydro-Quebec

117. Hydro-Québec
118. Hydro-Québec TransÉnergie
119. Hyosung
120. Hyundai
121. IDS GmbH
122. IEC
123. IKERLAN
124. INDAP S.A.
125. Infokom GmbH
126. INFOTEAM SA
127. Institut de Recherche d'Hydro-Québec
128. Institute of Power Engineering
129. IPCOMM GmbH
130. Iskra Sistemi, d.d.
131. Kayser Threde GmbH
132. KDN
133. KEPCO
134. KEPRI
135. KERI
136. Kinkei System Corporation
137. Končar - Electrical engineering institute
138. KONCAR - Power Plant and Electric Traction Engineering Inc.
139. Kraftwerke Hinterrhein AG
140. Labein
141. Latihan & Pembangunan
142. LEM BE
143. LG Industiral Systems
144. LG Industrial Systems Co., Ltd.
145. logicaCMG
146. MAESSA - Sistemas de Telecontrol
147. Mälarenergi
148. Manitoba Hydro
149. Maschinenfabrik Reinhausen GmbH
150. Maunsell
151. Microsol
152. Ministery of Electricity & Water department
153. Myonggji University
154. NanJing Relay Electrical Co.
155. National Power Line Company (OVIT)
156. NOK
157. Norconsult AS
158. North China Power Electric University
159. Northwest Territories Power Corp
160. Nulec Africa
161. NU-LEC industries
162. Nuon
163. Oersted-DTU (University)
164. OFFIS
165. Pacific Hydro
166. PB Power South Africa
167. Pengurus
168. Pestech SDN BHD
169. Phoenix Contact GmbH & Co. KG
170. Power & Industrial Division"
171. Power Corporation of Kosova
172. Power Systems Consultants
173. PowerCorp
174. Powerlink
175. Prolan Co.
176. PSC
177. Pulsar Technologies, INC.
178. Quanta Technology
179. Remsdaq Limited
180. Rittmeyer
181. Royal Haskoning
182. Royal Haskoning
183. RTDS Technologies Inc.
184. RTE
185. RuggedCom Inc. (Europe)
186. RWE
187. RYTU SKIRSTOMIEJI TINKLAI AB
188. SAE IT-systems GmbH & Co. KG
189. SAK
190. Sanion
191. Saudi Electricity Co.
192. Schneider Electric
193. Schneider Electric - E.P.S Ltd. (Saudi Arabia)
194. Schweitzer Engineering Laboratories
195. Schweitzer Engineering Laboratories b.v.
196. Schweitzer Engineering Laboratories PTY Ltd.
197. Schweitzer Engineering Laboratories, Inc.
198. SEL
199. SENSA
200. Services Ind.
201. SGS
202. Siemens A/S
203. Siemens AG
204. Siemens AG
205. Siemens AG PTD
206. Siemens Energy Management & Information Systems
207. Siemens Ltd, South Africa.
208. Siemens Ltd.
209. SMA Technologie AG
210. Smart Digital Optics
211. SNC-Lavalin Inc.
212. Solvay R&T
213. Soške elektrarne Nova Gorica, d.o.o.
214. Soške elektrarne Nova Gorica, d.o.o.
215. Souzlon
216. SPARQ Solutions
217. SPI PowerNet Pty Ltd
218. SPPower ystems
219. SSC
220. St. Gallisch-Appenzellische Kraftwerke AG
221. St. Gallisch-Appenzellische Kraftwerke AG
222. Statnett
223. Sumbor Manusia & Pentadbiran
224. Svenska Kraftnät
225. SystemCorp Pty Ltd
226. TEAM S.A.
227. TEAM, S.A
228. Teletrol
229. Telvent Energía y Medio Ambiente
230. Tenaga Nasional Berhad
231. Tenix Alliance
232. Teshmont Consultants LP
233. Tesla
234. TE-TOL, d.o.o.
235. TGE

236. Thronson Internacional de Venezuela (Tivenca)
237. Transba S.A.
238. Transgrid
239. Transpower
240. Transpower Limited - New Zealand
241. Transpower New Zealand Limited
242. Trench Austria GmbH
243. TruData
244. UNION FENOSA distribución
245. University Alverca
246. University of Ulsan
247. VA TECH SAT
248. VA TECH SAT GmbH
249. VA TECH SAT GmbH & Co
250. VA TECH SAT SDN BHD
251. Vamp
252. VATECH Reyrolle ACP Ltd
253. Vattenfall Distribution Norden
254. Vattenfall Eldistribution
255. Vattenfall Europe
256. Vattenfall Research & Development
257. Vattenfall Service
258. Vector
259. Vector Networks Ltd
260. Vestas Wind Systems A/S
261. Voith AG
262. WAGO Kontakttechnik GmbH
263. Warsaw University of Technology
264. Weidmüller Interface GmbH & Co. KG
265. Woodward-Seg
266. Xelpower
267. XuJi Software Technology Co.
268. Yantai Dongfang Electronics
269.

not complete

Some personal responses:

1. Again thank you for all wise words and information.

   My knowledge of 61850 is extremely improved. It is always nice to see how experts show their knowledge. Also the location (Frankfurt) was excellent

2. I would like to thank you very much for the CD you gave me in Paris at the Cigré exhibition.

   It is very interesting for us to be informed like this about all the improvements done for the IEC 61850 and to realise how much work you had for all the presentations you made during the workshop in Paris. Congratulation !

   I was very pleased to see you once more and I hope it will not last too long since we meat again.

3. Excellent course ....thought provoking. I think it will be a matter of seeing if demand from the user community is high enough to encourage vendors to adopt 61850. Or visa versa. Another chicken before the egg scenario. I intend to pursue corporate membership in the UCA User's group.

4. Hi Karlheinz,

   You and Mr. Brunner speak very good today. Thank you very much.

5. You've done very well. Thanks for your hard work!

6. Thanks for your evaluation and your help. I would admire your hard working greately. I would like to cooperate with you in the future.

7. Friends,

   We had an IEC61850 seminar in Kuala Lumpur last week for 3 days. Needless to say, it was a rewarding experience to listen to Karlheinz Schwarz (Nettedautomation, Germany) and Christoph Brunner (ABB, Switzerland). I was informed by Karlheinz that there is an intent to have a IEC61850 seminar in India early next year.

   The standard is in the early stages of pilot implementations (in Europe). All leading players like ABB, Siemens, VATECH SAT, Areva etc besides the utilities in Europe are supporting this standard strongly.

   I am sure this seminar will go a long way in your understanding of the new standard. Please make the best use of the opportunity.

8. One of my colleagues (Gary T.) has attended Netted Automation courses in the past and his feedback has been very positive.

9. The seminar on the implementation of IEC 61850 based solutions is some kind of unique. As far as I know, there have not been such events in Russian Federation before. The lecturer is highly qualified professional who is involved in the development of IEC 61850 series and other standards. The program of the seminar included as well as the overview of all parts of the standard as the questions of its practical application. That is why the seminar gave a chance to capture a great portion of information and to learn the experience of foreign companies who are already implementing the standard in their systems.

   It was very useful to talk to other participants of the seminar – those professionals who work on its implementation, those who work in the area of SAS development, development of microprocessor based relays, testing equipment and in the utilities.

   The only drawback of the seminar is the limits of time that we had – three days is not enough for such an event – there is a will to get into the aspects of the standard more deeply.

10. “The seminar has delivered all the goods that I expected and brought even more. It was once more confirmed that IEC 61850 standard is the main track for the development of automation systems in power engineering and other related areas. One of the most useful aspects of the seminar was revealing of the aspects of the second edition of the standard.

If there is something to add I would only say that there is a need for organizing separate and more specialized seminars for programmers, engineers and top-managers of organizations."

11. "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."

12. Attendee of the Sydney course (02-04 December 2009):

    "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."

Need any information? – contact:

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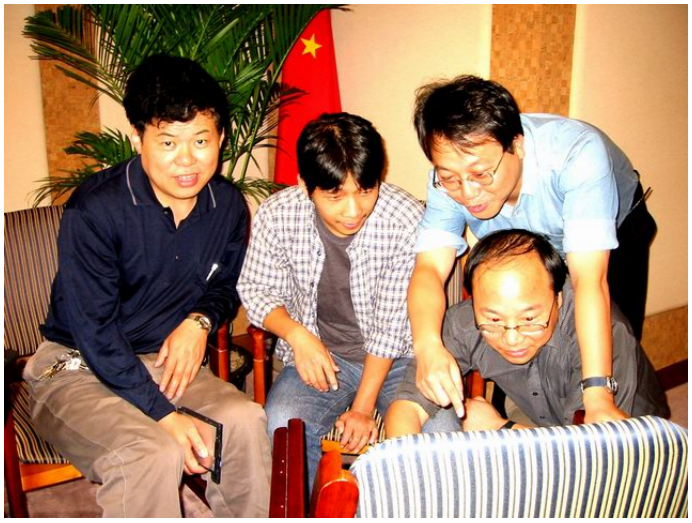
Email mailto:karlheinz.schwarz@nettedautomation.com
or visit: www.nettedautomation.com/seminars/uca

Shanghai (China), 2002-10



Xian (China), 2002-10

Frankfurt, 2004-05

Beijing, 2004-11

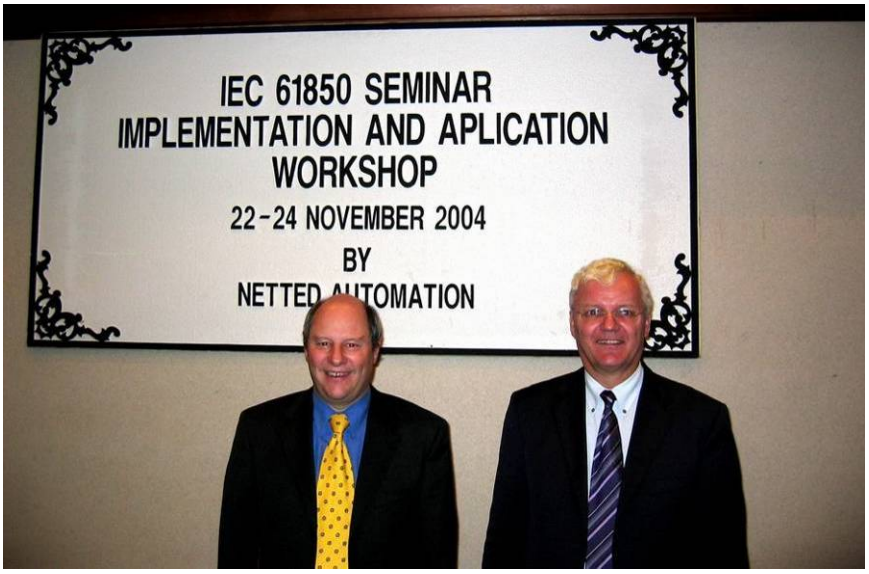

IEC61850 Seminar/Workshop (BeiJing)


61850 Seminar/Workshop


国家电网公司
STATE GRID
江苏省电力公司人力资源管理赴欧洲考察团
用餐地点
行云流水
IEC61850研讨会
用餐地点
细雨润物


61850 Seminar/Workshop (BeiJin

Kuala Lumpur, 2004-11



Daejeon (South Korea), 2005-02

Torréon (Mexico), 2005-04

Bangalore (India), 2006-04

Terna, Turin (Italy), 2009-07

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.**"