FMTP™

IEC 61850

NettedAutomation GmbH
Information & Communication Systems

Do you want to reach interoperability for Protection, SCADA, Generation, Design, and Engineering? We are here to help you!

4,100+ Experts
from 900+ Companies
from 90+ 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

- IEC 61850 standardization since 1995
- Overview about the standard series
- Information modeling and models
- Information exchange services (ACSI)
- System Configuration Language (SCL)
- Communication and cyber security (IEC 62351)
- Where are we in 2016?

Communication Architecture

- Pros and cons of typical Ethernet architectures
- Redundancy and interoperability
- Traffic control and data flow management
- Gateways to fieldbus, IEC 60870-5-104, DNP3, …
- SCADA communication, data management
- Migration path for accommodating full-scope deployment from station bus applications to combined station bus and process bus applications

Station Bus

- Overview of data models for GOOSE exchange
- Mapping of models and services to MMS (ISO 9506)
- State-of-the-art configuration tools
- Horizontal integration
  - Typical GOOSE applications
  - Inter-tripping schemes
  - Breaker failure protection schemes
  - Interlocking schemes
  - Open/close switch gears

Process Bus

- Overview of IEC 61850-9-2
- Merging unit and sampled value streams
- Subscribers in relays
- Time synchronization
- Interoperability and Interchangeability challenges

Modeling and Naming

- Overview of IEC 61850-5 and IEC 61850-7-x
- Modeling approach (hierarchical models)
- Basic information models (Logical Nodes)
- Retrieving self-description of devices
- Functional naming for logical devices
- Product-related naming
- Model extensions (name spaces)

Deployment Strategy

- Functional specification for protection and SCADA based on SCL (SSD)
- Design of Network Architecture (SCD)
- Cyber security based on IEC 62351
- System-wide naming convention
- Data flow engineering
- Data models for protection and SCADA
- Communication with control centers
- Testing (conformance, interoperation, functional)

Engineering and configuration tools

- System design for procurement specifications
- Vendor-specific and third party tools

Additional application domains

- Wind Power (IEC 61400-25)
- Hydro and conventional Power Plants
- Decentralized Energy Resources (DER)
- IEC 61850 in power distribution
- Power data (COMTRADE and COMFEDE)

Life time challenges

- Harmonization between IEC 61850 and CIM
- Strategy for new substations
- Maintenance of substations
- Extensions of existing substations

Practical work 1: Integration of Multi-Vendor IEDs for GOOSE Applications (with protection IEDs)

- Basics
- System Configuration Language (ICD, CID, SCD)
- IED and system configuration tools
- GOOSE publication/subscription, Client and Server

Practical work 2: Interoperability Testing of Multi-Vendor IEDs for GOOSE Applications (protection)

- IED Configuration tools
- GOOSE simulation with Omicron IDScout 4.2
- GOOSE performance testing
- GOOSE transfer trip vs. local hard-wired trip
- GOOSE analyzers (GridEX, UNICA, Wireshark, …)

Practical work 3: Integration and Interoperability for – Client / Server Applications (various IEDs)

- Client / server integration
- Data point mapping and signal configuration
- Switchgear Control
- Buffered and un-buffered reporting and alarming
- Logging and COMTRADE (IEC 60255-2)
- Recording and COMFEDE (IEEE C37.239)
- Gateways to IEC 60870-5-104, DNP3, fieldbus

Practical work 4: Testing of Multi-Vendor Merging Units and Data Subscription in Relays

- Test system approach
- Configuration tools and Integration
- Time synchronization protocols and overview
- Interchangeability of merging units and IEDs

Practical work 5: The way to UCAIug certification

- Test requirements and certification process
- Test labs worldwide (TÜV SÜD, DNV/KEMA, …)

Practical work 6: Power system simulation and IEC 61850

- Configuration of OPAL RT (according to IEC 60255-121 test sequences) using SCL configuration files

Practical work 7: Engineering with third party IEC 61850 Engineering tools

- Specification and documentation process
- Top down and bottom up engineering

Who Should Attend?

- Substation designers
- Protection and Automation Engineers
- SCADA and RTU engineers
- System Integrators and test engineers
- Maintenance Staff
- Consultants

from power industry, HV, MV, transportation, railways, ..., infrastructure industry...

Key Benefits

Gain a comprehensive understanding:

- Practical experience on how to build substation and power utility automation systems
- Crucial IEDs and tools (Ed1/Ed2) usually used:
  - Relays: ABB, Siemens, GE, Protecta, …
  - Omicron (IEDScout 4.2)
  - DNV/KEMA (UNICA SCL Checker, Analyzer)
  - FMTP GridEX (Smart Grid Multimeter)
  - HMS Gateways (fieldbus, 104, Modbus, …)
  - HELINKS STS (System Engineering)
  - OPAL RT real-time simulation (IEC 60255 and 61850)
  - SystemCorp (ICDDesigner)
  - Many other IEDS, demos and tools

Duration and attendance fee

Duration: 3, 4, or 5 days public or in-house

Attendance fee: contact us for a quote

Complimentary lunch and coffee breaks and course material

Instructors

Andrea Bonetti (FMTP)
andrea.bonetti@fmtppower.com

Karlheinz Schwarz (NettedAutomation)
karlheinz.schwarz@nettedautomation.com

M.Sc. Andrea Bonetti
Member of IEC TC95: Measuring relays and protection equipment
IEC 1906 Award - 2013

Dipl.- Ing. Karlheinz Schwarz
Editor of IEC 61850; Member of IEC TC57: Power systems management and associated information exchange
Member of IEC TC88: Wind turbines (IEC 61400-25)
IEC 1906 Award - 2007