IEC 61850 SEMINAR AND HANDS-ON TRAINING

24 – 26 OCTOBER 2016, SINGAPORE

TOPICS COVERED

Substation configuration language (SCL)

Protocol implementations and Mappings for IEC 61850-7-2

Conventional & Hydro power plants

Demonstration: Design of ICD and CID documents, analyzing and using SCD documents

Demonstration: Configuring and using Server devices for monitoring and control using IEC 61850 and IEC 60870-5-104

IEC 61850 series overview and parts

IEC 61850-6 Engineering process

IEC 61850 Application modeling principles
Preparation of hands-on training. The hands-on training will use the DLL evaluation kit.

Demonstration: Configuring and using Client devices for IEC 61850 to IEC 60870-5-104 gateway, and proxy server for IEC 61850; demonstration of IEC61850 Client to OPC UA Server

Expert Faculty Leader

Dipl.-Ing. Karlheinz Schwarz

This training has been delivered to 4,100 experts from more than 900 companies and more than 60 countries
About This Training Course

IEC 61850 is the most important, comprehensive, and crucial international standard for information sharing in electrical substations: Information about single line diagrams, signals for protection, automation, and SCADA. And describing information exchange between engineering and configuration tools, between Intelligent Electronic Devices (IEDs) in and between substations, with control centers, as well as in and with power generation sites.

The three-day training course 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).

The seminar will teach people from utilities, suppliers, consultants, and other parties in order to prevent disconnects in discussions of groups dealing with procurement, purchase, engineering, configuration, commissioning, test, operation, and error diagnostics, and maintenance.

Demonstrations and basic hands-on exercises complete the course. Windows-based hands-on examples can be taken home and used after the course for free.

Registered attendees can provide written questions prior to the course. All crucial questions will be answered during and after the course.

Benefits of Attending

- The course helps people to understand the philosophy of the 20+ parts of the standard series IEC 61850.
- This is the most comprehensive course to shorten the time to use the standards.
- The training is saving you a lot of time reading the sheer amount of documents and money.
- We possess the expertise and sophisticated capability that is truly essential.
- This is the opportunity to harvest the benefits of the standard for Power Automation Systems.
- Attendees will learn how to tap the field instrumentation in factories and other facilities using standard field busses like Profibus, Ethernet/IP, Modbus, ... using Gateways.
- Attendees will receive experience from trainer that has conducted more than 230 courses, with 4.100+ attendees, from 900+ companies all over.

Who Should Attend

- The course is especially set-up for:
- Managers within all groups dealing with power automation
- In-house and third-party consultants,
- Technical advisors responsible for decision making, setting long-term strategies, for protection, automation and SCADA systems.
- People responsible for primary and secondary asset management.
- Protection engineers,
- Finally: ALL people that care about Smart Grids and electric power in public utilities, industrial sites, or building automation
- Everybody that is open-minded to learn how IEC 61850 fits into the future power deliver system of all voltage levels.
3 Day Course Outline

Day 1
Welcome, Opening, History, Crucial aspects of IEC 61850 and other standards, Context, Where are we now?
- 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.

IEC 61850 series overview and parts
- 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 parts of the standard

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.

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.

Preparation of hands-on training. The hands-on training will use the DLL evaluation kit.
- Providing the software for hands-on training, presentation of tools and how to install and use it on Windows Notebooks.
- Requires USB interface or Wireless communication to retrieve the software.

Day 2
Substation configuration language (SCL)
- System configuration language: basics and details; Engineering process and SCL, SCL object model, SCL syntax (IEC 61850-6 (SCL))

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

Conventional & Hydro power plants
- Conventional & Hydro power Plants – IEC 61850-7-410

Demonstration: Design of ICD and CID documents, analyzing and using SCD documents
Training sessions:
- ICDDesigner to design new ICD File and CID files from scratch,
- Text Editor (e.g., Notepad++) to explain basic concepts of SCL
- SCL Checker to verify the correctness of the SCL documents generated,
- ITT600 Explorer to visualize SCD documents,
- IEDScout to configure client and to generate ICD from retrieved self-description information
- UNICA Analyzer and Wireshark to diagnose messages.

Day 3
Demonstration: Configuring and using Server devices for monitoring and control using IEC 61850 and IEC 60870-5-104
Training sessions:
- Use ICD documents from above to configure Server device HMS Anybus SG Gateways
- Use CID document from above to configure device HMS Anybus SG Gateways
- Configure HMS Anybus SG Gateways to implement IEC 60870-5-104 role
- Analyze network traffic.
- Modify communication behavior of server (datasets, controlblocks) and analyze change of traffic pattern
- Analyze polling and event-driven reporting as well as GOOSE messaging
- Several HMS Anybus SG Gateways will be provided

The software will be installed by those that want to do hands-on training with their own Notebooks.
Day 3 (continued)

Demonstration: Configuring and using Client devices for IEC 61850 to IEC 60870-5-104 gateway, and proxy server for IEC 61850; demonstration of IEC 61850 Client to OPC UA Server

Recap of RAM, RCM, RBI, IPF, EPF, FMECA, RCA, FTA, ETA

Training sessions:
- Use above examples and extend to build IEC 61850 Proxy Gateway, IEC 61850 Gateway, and Gateway between IEC 61850 Client and IEC 60870-5-104.
- Several HMS Anybus SG Gateways will be provided
- Corresponding clients like QTester104 and IEDScout will be used.
- Analyze traffic between various servers and clients.
- Demonstration of configuration of Softing’s IEC 61850 Client to OPC UA Server solution

Hands-On training (3 attendees per PC)

Training sessions:
- Use IEC 61850 Stack/API DLL for Windows with C#-Applications for client and server
- Modify Models and check with Wireshark
- Check Reporting and GOOSE

Your Expert Course Faculty Leader

Karlheinz Schwarz

Karlheinz Schwarz (president of Schwarz Consulting Company, SCC; Karlsruhe/Germany) specializing in distributed automation systems. He is involved in many international standardization projects (IEC 61850 – utility automation, DER, hydro power, IEC 61400-25 – wind power, IEC 61158 - Fieldbus, ISO 9506 – MMS, …) since 1984. He is engaged in representing main industry branches in the international standardization of real-time information modeling, configuration, and exchange systems. He provides consulting services and training to utilities, system integrators, consultants, and vendors. He has trained some 4,100 experts from more than 900 companies and more than 60 countries. The training courses are considered to be outstanding. Mr. Schwarz is a well-known authority on the application of mainstream information and communication technologies in the utility industry.
The Hands on training will be using the following devices & tools (additional tools may be used if required)

### Devices

<table>
<thead>
<tr>
<th>Devices</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notebook (Windows); bring your own with you</td>
<td>USB recommended</td>
</tr>
<tr>
<td>Wireless or Wired Ethernet recommended</td>
<td>Network Infrastructure</td>
</tr>
<tr>
<td>Ethernet Switches and WiFi AP available.</td>
<td>Various Switches</td>
</tr>
<tr>
<td>Beck IPC com.tom BASIC 5.1 for accessing Modbus Meter and binary inputs and outputs.</td>
<td>This device comes with an IEC 60870-5-104 Server, an IEC 61850 Server (publisher), and a WEB-PLC. <a href="http://www.anybus.com/products/smartgrid.shtml">http://www.anybus.com/products/smartgrid.shtml</a></td>
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### Tools

<table>
<thead>
<tr>
<th>Tools</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>IEC 61850 Stack/API DLL for Windows *</td>
<td>Freely available evaluation package provided by SystemCorp. The DLL can run as client or server or both. The package comes with source code for the client and for the server application. <a href="http://www.systemcorp.com.au/products/softwarelibraries/iec61850/">http://www.systemcorp.com.au/products/softwarelibraries/iec61850/</a></td>
</tr>
<tr>
<td>Wireshark *</td>
<td>Freely available analyzer. Analyses communication protocols including IEC 60870-5-104, IEC 61850-8-1, GOOSE, SV. <a href="http://www.wireshark.org/">http://www.wireshark.org/</a></td>
</tr>
<tr>
<td>Unica IEC 61850</td>
<td>KEMA IEC 61850 Analyzer (can be used for TASE.2 as well). One full version available. <a href="http://www.dnvkema.com/Images/KEMA%2061850%20Test%20Tool%20Family.pdf">http://www.dnvkema.com/Images/KEMA%2061850%20Test%20Tool%20Family.pdf</a></td>
</tr>
<tr>
<td>Unica SCL Checker</td>
<td>KEMA SCL checker. One full version available.</td>
</tr>
<tr>
<td>ICDDesigner *</td>
<td>Freely available evaluation package provided by SystemCorp. The designer can be used to create and modify ICD and CID Files. <a href="http://www.systemcorp.com.au/download/">http://www.systemcorp.com.au/download/</a></td>
</tr>
<tr>
<td>IEDScout *</td>
<td>IEC 61850 Browser and testing tool. Six full versions available to share during hands-on training (6 dongles). Demo of Version 4.1 available for download (runs 30 days). <a href="https://www.omicronenergy.com/en/products/all/secondary-testing-calibration/iedscout/noc/1/#Description">https://www.omicronenergy.com/en/products/all/secondary-testing-calibration/iedscout/noc/1/#Description</a></td>
</tr>
<tr>
<td>WinPP104 *</td>
<td>Freely available client/server emulation and test tool; runs in demo mode with restrictions (The current settings and the telegrams are not saved; only suitable for receiving and sending 20 telegrams). One full version is available for the course. <a href="http://www.ppflink.de/produkte_eng.htm">http://www.ppflink.de/produkte_eng.htm</a></td>
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*These software packages could be installed prior to the training course or at the end of the first day.*
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<table>
<thead>
<tr>
<th>3 Day Programme</th>
<th>PER PARTICIPANT</th>
<th>2 PARTICIPANTS or MORE</th>
<th>IN HOUSE</th>
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<tbody>
<tr>
<td></td>
<td>SGD 4,200 Per Participant</td>
<td>SGD 3,900 Per Participant</td>
<td>Guaranteed min 40% off Normal</td>
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<tr>
<td></td>
<td>*SGD 4,494 Per Participant (GST Inclusive)</td>
<td>*SGD4,173 Per Participant (GST Inclusive)</td>
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**ATTENDEE DETAILS**

*GST FOR SINGAPORE REGISTERED COMPANIES ONLY

**COMPANY DETAILS**

PAYMENT METHODS

<table>
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<tr>
<th>4 ways to Register</th>
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<tbody>
<tr>
<td>Online Web Registration</td>
</tr>
<tr>
<td><a href="mailto:info@poweredgeasia.com">info@poweredgeasia.com</a></td>
</tr>
<tr>
<td>(65) 6741 9927</td>
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<tr>
<td>(65) 67478737</td>
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You may also be interested in

- Keeping Electrical Switchgear Safe
- Introduction to Power Systems
- Excitation Systems
- Fundamentals of Power Generation

On Site Training

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