

# Program

## 5 Day IEC 61850 Seminar and Training

XXXX  
Automation & Information Systems  
XXXX  
18.-22.01.2010

### 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.

### Monday, 18.01.2010

#	Modul	Topic	Description	Min	Time
01	S-0000 P011	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.	120	09:00 – 11:00
<b>Break</b>					11:00 – 11:15
02	S-0100 P040	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	11:15 – 12:00
03	S-0200 P052	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	30	12:00 – 12:30
04	S-0101 P079	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, IEC Users Group, IEC 61400 User Group, activities related to the power industry; international fieldbus	15	12:30 – 12:45
05	S-0201 P090	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,	45	12:45 – 13:30

#	Modul	Topic	Description	Min	Time
			Protection functions, Edition 2 updates, Example of a model.		
<b>Lunch</b>					13:30 – 14:30
<b>06</b>	S-0202 P105	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.	30	14:30 – 15:00
<b>07</b>	S-0800 P111	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	25	15:00 – 15:25
<b>08</b>	S-0803 P125	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.	50	15:25 – 16:15
<b>Break</b>					16:15 – 16:30
<b>09</b>	S-0102 P138	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	30	16:30 – 17:00
<b>10</b>	S-0105 P153	System management	Revision control and asset management with IEC 61850	30	17:00 – 17:30

## Tuesday, 19.01.2010

#	Modul	Topic	Description	Min	Time
11	S-0300 P158	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	60	09:00 – 10:00
12	S-0301 P172	Applying IEC 61850 for substation 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	60	10:00 – 11:00
<b>Break</b>					11:15 – 11:30
13	S-0302 P181	Product specifications for substation equipment	Implementation guideline IEC 61850-9-2 "LE", Product standard for switchgear with integrated IEC 61850 interface (IEC 62271-003)	30	11:30 – 12:00
14	S-0303 P189	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	45	12:00 – 12:45
15	S-0203 P204	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).	45	12:45 – 13:30
<b>Lunch</b>					13:30 – 14:30
16	S-0304 P242	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.	30	14:30 – 15:00
17	S-0502 P258	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.	20	15:00 – 15:20
18	S-0500 P271	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	20	15:20 – 15:40

#	Modul	Topic	Description	Min	Time
			the use cases for Telecontrol Protocols and IEC 61850?		
<b>19</b>	S-0504 P289	Webservices	Fundamentals of the definition of Webservices for IEC 61400-25-3 (and IEC 61850-7-2) as specified in IEC 61400-25-4.	20	15:40 – 16:00
<b>Break</b>					16:00 – 16:15
<b>20</b>	S-0505 P294	Comparison of protocols	Detailed comparison of the protocol suites IEC 60870-5, DNP3, ICCP (TASE.2), IEC 61850	15	16:15 – 16:30
<b>21</b>	S-0204 P296	Implementation of IEC 61850 conformant devices and tools	Device models, design of advanced IEDs, software and hardware architectures, OEM software	45	16:30 – 17:15
<b>22</b>	S-0106 P325	Testing devices and systems	Test coverage and steps towards system testing and simulation (from devices to systems)	15	17:15 – 17:30
<b>23</b>	S-0205 P333	Device conformance testing	Conformance testing of devices according to IEC 61850-10	15	17:30 – 17:45

## Wednesday, 20.01.2010

<b>24</b>	S-0206 P341	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.	30	09:00 – 09:30
<b>25</b>	S-0700 P350	Extracting data from field devices	General SCADA services – configuration of logs, reports, ... (IEC 61850-7-2)	30	09:30 – 10:00
<b>26</b>	S-0701 P365	Alarm handling	Fundamentals of SCADA services (IEC 61850-7-2)	30	10:00 – 10:30
<b>Break</b>					10:30 – 10:45
<b>27</b>	S-0702 P374	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	30	10:45 – 11:15
<b>28</b>	S-0703 P382	Information presentation and encoding	Fundamentals of UML, XML, ASN.1, ...	15	11:15 – 11:30
<b>29</b>	S-0705 P391	Protocol implementations and Mappings for IEC 61850-7-2	Details on how to implement protocols and information models? MMS, ASN.1 BER, Webservices, ..., simple MMS clients; IEC 60870-5, IEC 61850-7-2	60	11:30 – 12:30
<b>30</b>	S-0207 P400	Substation configuration language (SCL)	System configuration language: basics and details; Engineering process and SCL, SCL object model, SCL syntax (IEC 61850-6 (SCL))	120	12:30 – 13:30
<b>Lunch</b>					13:30 – 14:30
		cont.			14:30 – 15:30
<b>31</b>	S-0804 P425	SCL demo with compliant software	Use of SCL files for building data model in an IED, extension of model (new data); including live demonstration	30	15:30 – 16:00
<b>Break</b>					16:00 – 16:15
<b>32</b>	S-0807 P433	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	40	16:15 – 17:00
<b>33</b>	S-0810 P445	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	30	17:00 – 17:30

			tools.		
<b>34</b>	S-0850 P453	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.	15	17:30 – 17:45

## Thursday, 21.01.2010

#	Modul	Topic	Description	Min	Time
35	S-0709 P458	Network Engineering Guidelines (IEC 61850-11)	Recovery protocols (RSTP, PRP, etc); different approaches to network topology, redundancy, time synchronization, etc.; status of standardization	90	09:00 – 10:30
<b>Break</b>					10:30 – 10:45
36	S-0104 P464	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	90	10:45 – 12:15
37		Edition2 of IEC 61850	Status and crucial changes and extensions	75	12:15 – 13:30
<b>Lunch</b>					13:30 – 14:30
38		Spanish E3 group	Presentation and discussion of the E3 Working document	150	14:30 – 16:00
<b>Break</b>					16:00 – 16:15
		cont.			16:15 – 17:15

## Friday, 22.01.2010

#	Modul	Topic	Description	Min	Time
39		Hands-on training of demo software and tools	Hands-on training of demo software and tools. I will provide you the software prior to the event so that you can setup a few PCs (notebooks); one PC for two people; possible the two PC could be connected (back-to-back) with Ethernet or we may have an Ethernet network. We will also use AREVA IEDs and tools in order to configure GOOSE messages and use Client/Server communication with IEDs; this requires that we have IEDs available and an engineer that can use the AREVA tools and operate the AREVA IEDs. <i>Note: depending on the needs we will use some live demos during the first days as well.</i>	255	09:00 – 10:30
<b>Break</b>					10:30 – 10:45
		cont.			10:45 – 13:30
<b>Lunch</b>					13:30 – 14:30
40		Q&A	Open question and answer session, final remarks and next steps	120	14:30 – 16:00
<b>Break</b>					16:00 – 16:15
40		cont.			16:15 – 16:45