

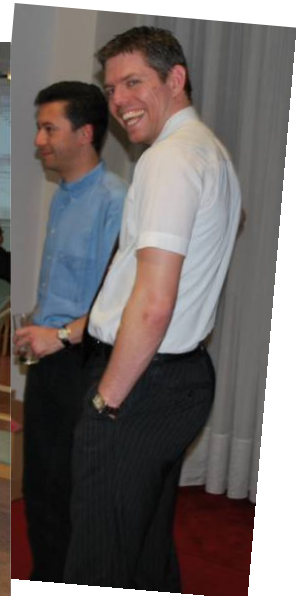
## IEC 61850 Comprehensive & Independent Hands-on Training

### The Future of Power Systems Requires Comprehensive Know-how

IEC 61850 is the global standard for Power System Automation (generation, transport, distribution ... high, medium and low voltage levels). It allows for an open and "future proof" design, different architectures and possibilities to combine products from multiple vendors. In order for users and system integrators to utilize the benefits of IEC 61850 it is necessary for power utilities, integrators and vendors to education their most crucial asset – people, and start the migration to IEC 61850.

Local Support in Argentina by Artec [www.artecing.com.ar](http://www.artecing.com.ar)

Local Support in Brazil by Instronic [www.instronic.com.br](http://www.instronic.com.br)



*Training is performed in small groups mixing theory and practice*

The popular STRI and NettedAutomation hands-on training provides both theory and practice on the application of IEC 61850 in a substation. During the training we follow the planning, design and engineering process for real applications all the way to configuration and testing on a real multivendor test installation. We believe real understanding is the result of both knowledge and hands-on experience. Therefore the training offers a unique combination of presentations, demonstrations and practical workshops in smaller groups.

**NettedAutomation** (Germany) provide training, consultancy and product support services for the application of distributed automation systems and open communications.

**STRI** (Sweden) is an accredited high voltage laboratory and independent technical consulting company. We offer IEC 61850 consulting services and independent multivendor interoperability testing. STRI's IEC 61850 lab comprises IEDs and tools from ABB, Areva, Siemens and SEL together with test sets from Omicron, Doble and Megger.

## Overview of Training Content

The three day training consists of the following modules (registration and detailed program are attached):

- ❖ **Module 1:** Gives a basic introduction to the IEC 61850 standard for substation applications, power plant applications (hydro, wind, de-centralized energy resources) together with a summary with real applications and the demonstration of IEC 61850 software. The latest developments in the preparation of the second edition of IEC 61850, new extensions for hydro power plants, wind turbines and distributed energy resources as well as the use of IEC 61850 in the U.S. DoE efforts for transforming the electric power system into a Smart(er) Grid (NIST Interoperability roadmap) will be presented and discussed.
- ❖ **Module 2:** Gives an independent and more detailed presentation of the IEC 61850 standard for substation and device modeling as well as communication principles (GOOSE, Sample Values, Client/Server applications). This module tells you what you need to know for specification, evaluation, verification and maintenance of IEC 61850 systems (whole substations and IEDs), with real examples and demonstration of IEC 61850 specification using IEC 61850-6 (SCL) – THE system configuration language for electric power systems. The needs to reach sustainable interoperability of IEDs will be presented. The use of IEC 61499 (Distributed Function Blocks) in cooperation with IEC 61850 for autonomous functions in distribution networks will be presented and discussed.
- ❖ **Module 3:** Gives an independent and more detailed insight into the engineering of IEC 61850 substation as communication principles through real examples. This IEC 61850 hands-on workshop demonstrating interoperability of protection and control devices from various vendors. In subgroups the participants browse the IED model of each device (using self-description, validation of model and SCL file) and create outgoing GOOSE messages. The network traffic is jointly analyzed and the reception of GOOSE messages will be configured and tested using IEC 61850 compatible test devices. Configuration is also demonstrated using vendor independent tools. Experience in system debugging and network traffic analysis using third party and open source tools is gained.



*Hand-on sessions in Ludvika (Sweden), Frankfurt (Germany) and Itaipu (Brazil/Paraguay)*



**Training Schedule for Buenos Aires (Argentina) and São Paulo (Brazil)**

**Day 1 – 26 April 2010 (28. April)**

10 <sup>00</sup> –10 <sup>15</sup>	Welcome and course introduction	Karlheinz Schwarz, NettedAutomation
10 <sup>15</sup> –18 <sup>00</sup>	IEC 61850 Module 1	Karlheinz Schwarz, NettedAutomation
17 <sup>00</sup> –18 <sup>00</sup>	Questions, answers and discussions	All

**Day 2 – 27 April 2010 (29. April)**

08 <sup>00</sup> –13 <sup>30</sup>	IEC 61850 Module 2	Karlheinz Schwarz, NettedAutomation
13 <sup>30</sup> –18 <sup>00</sup>	IEC 61850 Module 3	Nicholas Etherden, STRI

**Day 3 – 28 April 2010 (30. April)**

08 <sup>00</sup> –17 <sup>00</sup>	IEC 61850 Module 3	Nicholas Etherden, STRI
17 <sup>00</sup> –18 <sup>00</sup>	Final questions, answers and discussions	All

The registration form and detailed program are found attached.



*Participants of previous trainings in Ludvika (Sweden), Frankfurt (Germany), Turin (Italy)*

## Curriculum vitae of Lecturers

**Karlheinz Schwarz** received his diploma (masters degree) in Information Technology at the University of Segen (Germany) 1982. He has held a management position within Siemens and has an immense experience in the migration from proprietary or other solutions to standard compliant solutions. He is involved in many standardization activities within IEC, CENELEC, IEEE and DIN since 1985. He received in 2007 the IEC 1906 Award "*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*". He has since many years as an independent consultant provided training courses and consulting services for IEC 61850 all over the world.

[http://nettedautomation.com/download/Netted-Schwarz-Profile-en\\_2009-11-20.pdf](http://nettedautomation.com/download/Netted-Schwarz-Profile-en_2009-11-20.pdf)

**Nicholas Etherden** from STRI has a MSc in Engineering Physics from Uppsala University, 2001. He has several years experience from the development of a new IED family for IEC 61850 as application engineer, project manager and product marketing manager at ABB. He is responsible for the STRI IEC 61850 Independent Interoperability Laboratory and a member of IEC TC 57 working group 10 and UCA Iug testing subcommittee.

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# Program

## IEC 61850 Seminar and Hands-on Training

Buenos Aires (Argentina)

26.-28. April 2010

*São Paulo (Brazil)*

*28.-30. April 2010*

Local Support in Argentina by Artec [www.artecing.com.ar](http://www.artecing.com.ar)

Local Support in Brazil by Instronic [www.instronic.com.br](http://www.instronic.com.br)

### General

IEC 61850 is the global standard for Power System Automation (generation, transport, distribution ... high, medium and low voltage levels). It allows for an open and "future proof" design, different architectures, and possibilities to combine products from multiple vendors. In order for users and system integrators to maximize the benefits of IEC 61850 it is necessary for power utilities, integrators and vendors to educate their most crucial asset – people, and start the migration to IEC 61850.

During the training we follow the planning, design and engineering process for real applications all the way to configuration and testing on a real multivendor test installation. We believe real understanding is the result of both knowledge and hands-on experience. Therefore the training offers a unique combination of presentations, demonstrations and practical workshops.

This course describes the latest developments in the standardization process; IED and tool implementation; project implementation; and related applications. It also covers:

- The end-to-end engineering process for IEC 61850 based protection and automation.
- The engineering of a small IEC 61850 system from start to finish.
- Implementation philosophies of the major vendors (ABB, Areva, Siemens, ...).
- Tools and configuration philosophies of various vendors (ABB, Areva, Siemens, ...) and users.
- Conversion tools for interworking of SCL (CIM) with enterprise systems (e.g. asset and connectivity databases).
- Interoperability of design tools with third party IED configurators.
- Conversion tools for interworking of SCL (CIM) with SCADA/EMS/DMS configuration tools.
- Support for commissioning and test equipment (demonstration depends on the availability of a suitable test set).
- Usability issues of tools for various use cases.
- Fundamental capabilities of available tools and their support of the various SCL options taking into account the system engineering philosophies of various vendors and users (e.g. functional naming versus product naming).

### 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, 26.04.2010 (Wednesday, 28.04.)

### Module 1

Gives a basic introduction to the IEC 61850 standard for substation applications, power plant applications (hydro, wind, decentralized energy resources) together with a summary with real applications and the demonstration of IEC 61850 software. The latest developments in the preparation of the second edition of IEC 61850, new extensions for hydro power plants, wind turbines and distributed energy resources as well as the use of IEC 61850 in the U.S. DoE efforts for transforming the electric power system into a Smart(er) Grid (NIST Interoperability roadmap) will be presented and discussed.

#	Module	Topic	Description	Min	Time
<b>01</b>	S-0000 P009	Welcome, opening, refresh IEC 61850, Edition 2	Welcome, opening, roll call, and IEC 61850 in brief, expectations, ... what is IEC 61850, what is it not, market situation (global situation), ...	120	10:00 – 12:00
<b>02</b>	S-0200 P038	IEC 61850 series – overview and update Ed 2	Communication networks and systems for power system automation: general introduction on whole series IEC 61850 and IEC 61400-25	90	12:00 – 12:30
<b>Lunch</b>					12:30 – 13:30
		cont.			13:30 – 14:30
<b>03</b>	S-0800 P066	Practical experience	IEC 61850 devices, tools, projects; use of IEC 61850 (61400-25) in the global market	45	14:30 – 15:15
<b>Break</b>					15:15 – 15:35
<b>04</b>	S-0201 P080	IEC 61850 Application modeling principles	Modeling protection, substation automation, other applications (Logical nodes, data and data attributes, function modeling, extension of the models, monitoring)	60	15:35 – 16:45
<b>05</b>	S-0202 P095	IEC 61850-6 engineering process	Engineering process using the configuration language according to IEC 61850-6 SCL; demo of ICD File of real devices using the ICD Editor of TMW. The ICD Editor should be installed by attendees prior to the event.	45	16:45 – 17:30
<b>06</b>		Q&A	Questions, answers and discussions	30	17:30 – 18:00

## Tuesday, 27.04.2010 (Thursday, 29.04.)

### Module 2

Gives an independent and more detailed presentation of the IEC 61850 standard for substation and device modeling as well as communication principles (GOOSE, Sample Values, Client/Server applications). This module tells you what you need to know for specification, evaluation, verification and maintenance of IEC 61850 systems (whole substations and IEDs), with real examples and demonstration of IEC 61850 specification using IEC 61850-6 (SCL) – THE system configuration language for electric power systems. The needs to reach sustainable interoperability of IEDs will be presented. The use of IEC 61499 (Distributed Function Blocks) in cooperation with IEC 61850 for autonomous functions in distribution networks will be presented and discussed.

#	Module	Topic	Description	Min	Time
<b>07</b>	S-0207 P101	Substation configuration language (SCL)	System configuration language: basics and details; Engineering process and SCL, SCL object model, SCL syntax (IEC 61850-6 (SCL)); all aspects of SCL will be presented and discussed (design, engineering, IED capability files, IED configuration, static/dynamic configuration, subsets (options) implemented by different vendors, interoperability issues, binding models to process at publisher and subscriber, testing driven by SCL, documentation, functional/product naming, available tools, client and sever configuration, device simulation, device model verification, ...)	120	08:00 – 09:30
<b>Break</b>					09:30 – 09:50
<b>08</b>		cont.		40	09:50 – 10:30
<b>09</b>	S-0700 P125	Extracting data from field devices	General SCADA services, GOOSE, Sampled Values – configuration of reports, logs, GOOSE, SV, ... (IEC 61850-7-2)	60	10:30 – 11:30
<b>10</b>	S-0701 P140	Monitoring for SCADA applications	Fundamentals of special SCADA services (IEC 61850-7-2): model basics for monitoring, event reporting, event logging, ...	60	11:30 – 12:30
<b>Lunch</b>					12:30 – 13:30



### Module 3

IEC 61850 hands-on workshop demonstrating interoperability of protection and control devices from ABB and Siemens (GE and SEL subject to local availability). In subgroups the participants browse the IED model of each device (using self-description, validation of model and SCL file). Experience in system debugging and network traffic analysis using third party and open source tools is gained. Configuration is also demonstrated using vendor independent tools.

IEC 61850 engineering in vendor tools to create outgoing GOOSE messages. After lunch on the final day the network traffic is jointly analyzed and the reception of GOOSE messages will be configured in subgroups and tested using IEC 61850 compatible test devices.

		Introduction	Introduction to the hands-on training		13:30 – 14:00
<b>11</b>		Hands-on sessions 20-30 minutes at each workstation	In small groups with 4-5 participants each. 1) Analyze IEC 61850 with Wireshark and IED Scout (Nicholas E) 2) SCL hands-on with ICD Editor and IED Scout 3) Testing IEC 61850 with IEC 61850 test set 4) Working with an IEC 61850 vendor IEDs	90	13:30 – 15:00
<b>Break</b>					15:00 – 15:20
<b>12</b>	H-0101	cont.		40	15:20 – 16:00
<b>13</b>	H-0101	IEC 61850 engineering process	-Bottom up engineering, multiple vendor tools for exporting/importing SCL files -SCL language, different files (SCD, ICD, CID and edition 2 IID and SED file types)) -One common engineering tool for creating the horizontal communication strategy (multivendor application) -Vendor tools to manage horizontal communication with IEDs of the same vendor	40	16:20 – 17:00
<b>14</b>		Final Q&A	Demonstration of independent engineering tool Atlan61850 and/oOr Helinks	60	17:00 – 18:00

### Wednesday, 28.04.2010 (Friday, 30.04.)

#	Module	Topic	Description	Min	Time
<b>15</b>	H-0101	IEC 61850 engineering process	- Bottom up engineering, multiple vendor tools for exporting/importing SCL files - SCL language, different files (SCD, ICD, CID) - One common engineering tool for creating the horizontal communication strategy (multivendor application) - Vendor tools to manage horizontal communication with IEDs of the same vendor	60	08:00 – 09:00
<b>Break</b>					09:30 – 09:50



<b>Module 3 (cont.)</b>					
#	Module	Topic	Description	Min	Time
<b>16</b>	H-0102	Engineering the GOOSE – publishing with vendor software tools	<ul style="list-style-type: none"> <li>- Configuration of GOOSE publishing in selected IEDs Configuration based on step-by step instructions</li> <li>- Analysis of small IEC 61850 system, Communication supervision</li> </ul>	120	08:00 – 10:00
<b>17</b>	H-0103 H-0104	Testing a 61850 system – horizontal communication	<ul style="list-style-type: none"> <li>- Verification of network traffic with different testing solutions</li> <li>- Verification of the GOOSE trip</li> <li>- What is available today on the market, what can be done</li> </ul>	60	10:00 – 11:00
<b>18</b>	H-0102	Engineering the GOOSE subscription in the IEDs with vendor software tools	<ul style="list-style-type: none"> <li>- GOOSE subscription implemented with vendor tools (intertrip among different IEDs)</li> <li>- Verification of Intercommunication with network traffic analysis and feedback from IEDs that the communication is running</li> <li>- Test of the communication with relay test equipment</li> <li>- Troubleshooting in IEC 61850 horizontal communication</li> <li>- IEC 61850 performances measurement of the relays. Loop-back time tests.</li> <li>- Actual situation with tool interoperability and file exchanges between different vendor tools</li> <li>- The need of ONE engineering tool (master tool) when different vendors are involved</li> </ul>	90	11:00 – 12:30
<b>Lunch</b>					12:30 – 13:30
<b>18</b>		Cont.		90	13:30 – 15:00
<b>Break</b>					15:00 – 15:20
<b>18</b>		cont.		100	15:20 – 17:00
<b>19</b>		Final Q&A		60	17:00 – 18:00

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## Registration Form

### IEC 61850 Comprehensive & Independent Hands-on Training with Multivendor IEDs

**Buenos Aires** (Argentina), 26.-28. April 2010  
**São Paulo** (Brazil), 28.-30. April 2010

The registration fee for the event is 950.00 EURO (plus local tax if applicable).

The fee includes documentation, food and beverages. Accommodation is not included.

We allow a discount if more than one (1) person per company attend – ask for details please.

#### Personal data

Name		Company
E-mail		Department
Telephone	Fax	Address for invoicing
Occupation (E.g. planning engineer)		<b>Signature</b>

#### I will participate in the three (3) day Hands-on Training Course scheduled for

Buenos Aires (Argentina), 26.-28. April 2010

São Paulo (Brazil), 28.-30. April 2010

#### Meeting location, accommodation, and invoicing

The meeting place for both events will be selected in due time – we will select a convenient hotel. We may help you in finding a reasonable hotel accommodation.

Please indicate the payment method you would prefer: **credit card, bank account transfer, or cash.**

Please return the filled out and signed form by e-mail or fax, no later than **April 05, 2010** to [seminars@nettedautomation.com](mailto:seminars@nettedautomation.com) or Fax +49 721 679387; You may also send a purchase order.

NettedAutomation GmbH will send you a **confirmation** as soon as we have your registration.

For your convenience we are cooperating **with local companies** in Argentina and Brazil to help us organizing the event and **to invoice you for the event in local currency**. The invoice will be sent to you in due time before the event.

Argentina: support by Artec [www.artecing.com.ar](http://www.artecing.com.ar)

Brazil: support by Instronic [www.instronic.com.br](http://www.instronic.com.br)

For further information please visit: <http://www.nettedautomation.com/seminars/> or [www.stri.se](http://www.stri.se) or contact:

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#### Privacy Policy

STRI and Nettedautomation GmbH take precautions (including administrative, technical, and physical measures) to safe-guard your personal information against loss, theft, and misuse, as well as unauthorized access, disclosure, alteration, and destruction.

#### Cancellation Policy

Cancellations received up to 10 business days prior to the start of the event will be fully refunded. Cancellations within 9 business days to the start of the workshop are subject to the entire event fee. If you don't cancel and don't attend, you are still responsible for payment. Substitutions can be made at any time.