Substation Automation with IEC 61850
Hands-on training course

STRI is an accredited high voltage laboratory and independent technology consultant with highly experienced engineers and specialists within network communication, power systems and high voltage technology.

We work with the state-of-the-art technologies for the power system. This course will merge theory with practice to ensure directly applicable solutions for power utility engineers. Information and Communication Technology (ICT) is becoming even more important in the power system.

IEC61850 has been identified both as one of the key standards to enable with interoperability between equipment and systems from different manufacturers. IEC61850 is much more than a new protocol. It is an architecture with many new advantages that will influence design, engineering, operation and maintenance. It can be said to be both the language and the “Internet” for the power system. Therefore it is of outmost importance for transmission and distribution companies as well as manufacturers to learn how to master IEC61850.

Within the area of Substation Automation STRI has built up a unique and transportable interoperability laboratory for the IEC61850 standard including IEDs, switches, software and test sets from a large number of manufacturers. The ambition is to test and verify IEDs for protection and control as well as Ethernet switches and configuration tools for interoperability. In addition STRI has performed a large number of projects and hands-on-training courses around the world. (Reference list available on request).

STRI has developed unique step-by-step instructions to allow participants to configure and test a small multi-vendor system in small group exercises. With a learning by doing approach we blend theory and practices and assist users to understand and implement IEC61850 in their applications.

Since we work with many different suppliers and in addition use own and partner independent tools we can facilitate multivendor, open and “future proof” implementation of this important standard. This includes the whole process from specification and application to engineering and testing. The training gives you the tools and means to take control of your Substation Automation assets.
Training Content

The training course will be held in Gothenburg from Wednesday the 28th of September until Friday the 30th. The course is in English with documentation in English. The course includes devices and tools from different vendors including ABB, Areva and Siemens. Other manufacturers can be included on request and participants may also bring their own equipment for use in the exercises. The use of Megger, Doble and Omicron test equipment as well as different software tools furthermore stress the open multi vendor environment used to demonstrate and verify interoperability between IEDs, switches and tools.

Module 1 – What is IEC61850?
Specification and Design Process

Module 2 – How can we obtain interoperability?
Configuration & Interoperability Demonstration

Module 3 - Where shall we use IEC 61850?
Application & Testing

- **Module 1** (Day 1, 10-17h) **Specification & Design Process** gives an introduction to the use of IEC 61850 for Substation Automation including IEDs for protection and control. This covers the basic of both vertical communication (RTU and SCADA) as well as horizontal bay-to-bay communication (GOOSE). The module will cover the possibilities and challenges with the new standard, planning and specification of IEC61850 based substation automation as well as defining the overall implementation process.

- **Module 2** (Day 2, 9-17) **Configuration & Interoperability Demonstration** will review the process of SCL configuration using IED manufacturer’s tools. Independent tools will be demonstrated for verifying the communication and interoperability. Two typical IEDs and a switch will be used for the demo. A workshop in smaller groups are arranged to practice the process. Participants are asked to bring at least one PC per 2-3 persons for this workshop. If module 3 is ordered this workshop will be done using STRI mobile multivendor (ABB, Areva and Siemens) interoperability laboratory which also will be used for module 3.

- **Module 3** (Day 3, 9-16) **Application & Testing** will present possible functional allocation and architecture for a substation automation system with protection and control for transmission and distribution. (On request we can also cover typical IED for generator protection) This covers possible arrangements of the Ethernet for different requirement on redundancy and cyber security. The STRI interoperability lab is used to demonstrate an application with incoming HV transmission line, HV busbar, transformer, MV busbar and MV feeders. Both horizontal and vertical communication is covered. In the workshop the network traffic is jointly analyzed and the reception of GOOSE messages will be configured and tested using IEC 61850 compatible test devices. Experience in system debugging and network traffic analysis using third party and open source tools is gained.

Participants of previous trainings
Training Program

Module 1 - Day 1 Specification & Design Process

10:00–11:00 Introduction - Advantages & challenges with IEC61850
11:00–12:00 IEC 61850 Basics and status of the standard
12:00–13:00 Lunch
13:00–14:00 Use of IEC 61850 for Substation Automation
14:00–15:00 The process from Specification to Documentation
15:00–15:15 Refreshments
15:15–16:30 Demonstration of an IEC 61850 system, including short exercise
16:30–17:00 Summary and questions

Module 2 - Day 2 – Configuration & Interoperability Demonstration

09:00–12:00 SCL configuration using IED manufacturer’s tools
12:00–13:00 Lunch
13:00–17:00 Interoperability demo and demonstration of top-down engineering using Helinks third-party system configuration tool

Module 3 - Day 3 – Application & Testing

09:00–12:00 Functional allocation and architecture for different applications
12:00–13:00 Lunch
13:00–14:30 Testing of IEC 61850 systems
14:30–16:00 Work shop with available testing equipment and tools

IEC 61850 training system used during the course, hand-on exercises at previous trainings
Costs & Registration

This course is intended for engineers working with the design, engineering, commissioning or maintenance of substation automation who need a good and practical understanding of IEC 61850.

The cost of the training is 18 000 SEK (Swedish crowns). Course fee includes lunches and coffee. Participants will be invoiced from STRI AB. Computers are available for the exercises but participants are encouraged to bring their own lap tops for some exercises.

The number of participants is limited on the hand-on sessions. Please email a non-binding “Interest to participate” to lena.lore@stri.se before 28th of September, 2011. We reserve the right to cancel the training course if the number of registered participants is less than 10 at that date.

For additional dates and in-house training courses please contact us (contact see below). Please read www.stri.se/iec61850 for more information.

Curriculum vitae of Lecturers

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.

Carl Öhlen from STRI has a MSc in Electrical Engineering at The Royal Institute of Technology in Stockholm, 1973. He has more than 30 years of experience in protection, control and substation automation working for Vattenfall, Programma and ABB in Sweden, Switzerland, Brazil and USA. He is author of several CIGRE & IEEE papers as well as books within this field and has held a management position within ABB during the introduction of IEC 61850 IED product family. He is at present STRI Technology Manager for Power Utility Automation.

Lei Zhou from STRI has a MSc in Electrical Engineering at Chalmers University of Technology Gothenburg and a BSc in Electrical Engineering and Automation at Shanghai University Shanghai, China. He has within STRI participated in various projects including IEC61850.

The course will be held at the STRI office in Lindholmen, central Gothenburg. The office is reached by ferry from the town centre (3 min) or by frequent busses (4 min) from the central bus station.