TRAINING SERIES

SMART GRID FORUMS

Fundamentals of IEC 61850 Sept 2023

Very Early Bird: Friday 26th May 2023

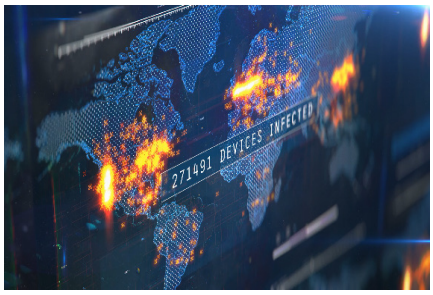
12-Week Online Training for Electrical Engineers New to IEC 61850

Modules 1 to 12: 16:00 - 17:30 CET Every Wednesday

Wednesday 6th September to 29th November 2023

Final Exam: Wednesday 6th December 2023

Group Booking Discounts!
Save 10% on 3+ delegates
Save 20% on 5+ delegates
Save 30% on 10+ delegates
Booked from the same organisation at the same time!



Programme Themes Include:

- Core concepts of IEC 61850 as well as the history and business case that led to its development
- Engineering and configuration of IEC 61850 systems according to the guidelines laid out in the standard
- Testing IEC 61850 systems using the latest testing tools and equipment as well as an introduction to cybersecurity for IEC 61850 systems

Programme Format Includes:

- **Programme:** 12 x 90-min weekly modules every Wednesday afternoon
- **Modules:** Speaker presentation, practical problem-solving exercise, Q&A, multiple choice quiz
- **Certification:** Weekly 10-question quiz plus final exam to achieve CPD certification

Module Leaders Incude:

Christoph Brunner
Convenor
TC57 WG10

Alex Apostolov
Editor in Chief
PacWorld

Renaud Drouin
Automation Engineer
Hydro Quebec

Bas Mulder
Consultant Digital Substations
DNV

Frances Cleveland
President
Xanthus Consulting

Maik Seewald
Senior Technical Lead, Industrial IoT, Automation Networks & Security
Cisco

Jörg Reuter
Managing Director
Helinks

Thomas Sterckx
Expert, Engineering Secondary Systems
Elia

David MacDonald
Grid Automation System Architect
GE Renewable Energy

Herb Falk
Managing Director
Outside the Box Consulting

Ovidiu Serban
Senior Consultant Digital Systems Operations
DNV

Fred Steinhauser
Digital Substation Evangelist
OMICRON Consulting

Strategic Partner: IEC

Certification Partner: CPD MEMBER The CPD Certification Service

Produced By: SMART GRID FORUMS Driving Clean Energy

TRAINING SERIES

Dear Colleague,

We are delighted to bring you this Fundamentals of IEC 61850 online training programme. This 12-week community-based learning event has been developed in collaboration with 20+ IEC 61850 specialists from across the European smart grid sector, to ensure that your engineers have all the theoretical and practical knowledge they need to embark on their IEC 61850 journey with confidence.

IEC 61850 is far more than a communication protocol. It is an engineering philosophy and a common language for all those working with digital substation technology. As the use of IEC 61850 becomes business-as-usual for substation automation, it is essential for the technicians, design specialists and specification engineers involved to have a solid grounding in the standard.

Through 12 x 90-minute modules delivered over 12 weeks, this programme provides a thorough, up-to-date understanding of IEC 61850, including:

- **Core concepts** of IEC 61850 as well as the history and business case that led to its development
- **Engineering and configuration** of IEC 61850 systems according to the guidelines laid out in the standard
- **Testing** IEC 61850 systems using the latest testing tools and equipment as well as an introduction to cybersecurity for IEC 61850 systems

Each module is comprised of a speaker-led presentation, break-out group problem solving exercise, reporting back and Q&A, and a 10-question quiz. Participants accumulate points during the course of the 12 weeks and take a final exam to achieve CPD certification.

The programme is overseen by Christoph Brunner, Convenor of TC57 WG10, supported by the IEC, and certified by the CPD. Places are strictly limited to 30 to ensure an interactive learning environment.

Don't delay! Book your places today and ensure that you and your colleagues are equipped with the crucial IEC 61850 skills and knowledge you need to prepare for a fully digital substation of the future.

Kind Regards,

Mandana White
CEO | Smart Grid Forums

PS: Very Early Bird – Save up to €1,000 on Delegate places by booking before Friday 26th May 2023

PSS: Group Booking Discount - 10% discount for 3+ delegates, 20% discount for 5+ delegates and 30% discount for 10+ delegates booked from the same organisation at the same time!

Learnworlds Platform

The 12-week programme and final exam will be conducted on the Learnworlds platform which is optimised for training, learning, and examination.

Participants will receive their unique login details the day that the programme begins so that they may set up their user profile and familiarise with the platform features and functionalities in advance of the programme commencing.

All speaker presentations, break-out problem solving sessions, group Q&A sessions, the weekly multiple-choice quiz, and final examination will be conducted on this platform.

Programme Format

The 12-week programme is overseen by Christoph Brunner, Convenor of TC57 WG10, supported by the IEC, and certified by the CPD.

Each module will be led by a different speaker, and consist of:

- 30-min speaker presentation
- 30-min problem solving exercise
- 20-min Q&A session
- 10-min multiple choice quiz

Final Exam & Certification

To achieve CPD certification participants must:

- Attend 70% or more of the modules live
- Review recordings of all missed modules
- Take the 90-min final exam and achieve 70% pass

Testimonials of our Past IEC 61850 Events

"Fantastic virtual platform and great opportunity to get to know the latest and greatest from utilities and vendors regarding IEC 61850."
Birkir Heimisson, Specialist in Digital substation – **Landsnet**

"As usual high-quality presentations and relevant topics."
Anders Johnsson, Power system specialist – **Vattenfall Eldistribution**

"In my opinion this is the best industrial conference about smart grid and IEC 61850."
Andrea Bonetti, Senior Specialist – **Megger Sweden**

PROGRAMME

Module 1: Wednesday 6th September 2023

Overview – **Understanding the history of substation automation and the reasons behind the development of the IEC 61850 standard**

• Building the business case for IEC 61850 as a facilitator of multi-vendor interoperability
• Comparing IEC 61850 with other protocols and understanding its role in smart grid communications architectures
• Mapping out the contents of IEC 61850 and understanding the range of possibilities afforded by the standard
• Understanding the difference between Station Bus and Process Bus IEC 61850 architectures, and the level of data exchange possible
• Reviewing recent and future developments to IEC 61850 and understanding how it will evolve alongside the smart grid

Alex Apostolov, Editor-in-Chief, PacWorld

Module 2: Wednesday 13th September 2023

Data Modelling – **Introducing IEC 61850 data exchange and functional modelling concepts**

• Understanding the OSI 7 Layer Model and the stack of protocols specified by IEC 61850
• Understanding the hierarchical data model and how devices exchange data in IEC 61850 systems
• Introducing IEC 61850 objects, Logical Nodes and other IEC 61850 data constructs
• Introducing IEC 61850 semantics and nomenclature
• Understanding different vendor interpretations of IEC 61850 modelling concepts

Renaud Drouin, Automation Engineer, Hydro Quebec

Module 3: Wednesday 20th September 2023

Communication services – Understanding the core communication services used to exchange information in IEC 61850 systems

- Understanding the Abstract Communication Service Interface and its role in achieving interoperability
- Introducing the IEC 61850 communication services and establishing their uses within IEC 61850 systems
- Using MMS for client/server communication
- Using GOOSE messages for time-critical publisher/subscribe communication
- Using Sampled Values for transmitting digitized power system measurements
- Introducing buffered/non-buffered reporting and logging

Bas Mulder, Consultant Digital Substations, DNV

Module 4: Wednesday 27th September 2023

IEC 61850 Outside the Substation – Understanding the use of IEC 61850 to control & monitor grid-edge assets

- Understanding the monitoring, protection and control requirements of DERs in the energy system
- Identifying IEC 61850 features and related standards that facilitate the control of renewable power, microgrids, EV and battery storage systems
- Introducing data models for use with inverter-based DERs
- Examining the use of IEC 61850 to communicate over public networks with XMPP
- Modelling DER activation schedules with IEC 61850

Frances Cleveland, President, Xanthus Consulting

Module 5: Wednesday 4th October 2023

Networking – Introducing basic networking concepts that underlie IEC 61850 systems

- Understanding the role of Ethernet and TCP/IP in IEC 61850 systems
- Introducing Ethernet addresses, physical connections, frames and collisions
- Understanding different types of networks, including LAN, VLAN, WAN and VPN
- Assessing the redundancy requirements of IEC 61850 systems and evaluating suitable protocols including HSR and PRP
- Understanding the additional networking and time synchronization requirements of process bus IEC 61850 systems

Maik Seewald, Senior Technical Lead, Industrial IoT, Automation Networks & Security, Cisco

Module 6: Wednesday 11th October 2023

Engineering process overview – Understanding the IEC 61850 engineering process from start-to-finish

- Introducing the IEC 61850 engineering process and identifying differences with traditional approaches
- Understanding top-down and bottom-down IEC 61850 design approaches
- Understanding the use of engineering tools for design & configuration of IEC 61850 systems
- Examining the engineering process in detail across the whole lifecycle of a substation

Jörg Reuter, Managing Director, Helinks

Module 7: Wednesday 25th October 2023

Specifying IEC 61850 Systems – Using engineering tools accurately capture functional requirements of IEC 61850 systems in SCL files

- Introducing Substation Configuration Language (SCL) and examining its application in substation engineering
- Understanding how engineering tools are used to create and exchange SCL files and the differences between different types of file
- Creating a System Specification Description (SSD) file from single-line diagrams and substation functional specifications
- Selecting IEDs that fulfil functional requirements based on IED Capability Description (ICD) files

Thomas Sterckx, Expert, Engineering Secondary Systems, Elia

Module 8: Wednesday 1st November 2023

Configuring IEDs – Using configuration tools to configure devices for a wide range of IEC 61850 functions

- Understanding how engineering tools are used to configure IEC 61850 devices
- Creating a System Configuration Description (SCD) file based on a system communication diagram
- Creating IID and CID files using an IED configuration tool
- Configuring GOOSE & Report Blocks
- Configuring Gateways to interface IEC 61850 equipment with other systems

David MacDonald, Grid Automation System Architect, GE Renewable Energy

Module 9: Wednesday 8th November 2023

Quality Assurance – Ensuring all IEC 61850 devices and systems closely match specified requirements

- Understanding the different QA requirements of IEC 61850 systems vs. traditional substation equipment
- Introducing the IEC 61850 QA process as laid out in the standard
- Understanding IEC 61850 conformance testing and certification
- Guidelines for Factory Acceptance Testing
- Guidelines for Site Acceptance Testing

Herb Falk, Managing Director, Outside the Box Consulting

Module 10: Wednesday 15th November 2023

Testing Overview – Understanding the testing requirements of IEC 61850 systems and identifying features and tools that facilitate effective testing

- Understanding the components of an IEC 61850 test system
- Introducing the use of testing tools based on SCL
- Understanding IEC 61850 test-related features
- Understanding the difference between functional and system testing
- Using the IEC 61850 test mode to test live systems

Ovidiu Serban, Senior Consultant, Digital Systems Operations, DNV

Module 11: Wednesday 22nd November 2023

Practical Testing – Detailing the practical approaches for testing a wide-range of IEC 61850 functionality

- Testing GOOSE messages, Sampled Values and report control blocks
- Testing IEC 61850 supervision functions
- Testing distributed functions encompassing multiple IEC 61850 devices
- Testing redundancy and time synchronization of IEC 61850 systems

Fred Steinhauser, Digital Substation Evangelist, OMICRON

Module 12: Wednesday 29th November 2023

Cybersecurity – Evaluating the latest cybersecurity threats and identifying effective mitigation strategies for IEC 61850 systems

- Understanding the increased attack surface introduced by IEC 61850 systems
- Introducing IEC 62351 and understanding its role in securing IEC 61850 systems
- Understanding encryption and user authentication
- Understanding Role-Based Access Control (RBAC) and Access Control Lists
- Deploying Ethernet-based security features such as VPNs and Firewalls

Frances Cleveland, President, Xanthus Consulting

MODULE SPEAKERS

Christoph Brunner, Convenor – **TC57 WG10**

Christoph Brunner graduated as an electrical engineer at the Swiss Federal Institute of Technology in 1983. He is a Utility Industry professional with over 25 years of industry experience with both knowledge across several areas within the Utility Industry and of technologies from the Automation Industry. He is president of it4power in Switzerland, a consulting company to the power industry. He has worked as a project manager at ABB Switzerland Ltd in the business area Power Technology Products in Zurich, Switzerland where he was responsible for the process close communication architecture of the substation automation system. He is convenor of the working group (WG) 10 of the IEC TC57 and member of WG 17, 18 and 19 of IEC TC57. He is IEEE Fellow, member of IEEE-PES and IEEE-SA. He is active in several working groups of the IEEE-PSRC (Power Engineering Society – Relay Committee) and member of the PSRC main committee and the subcommittee H. He is international advisor to the board of the UCA international users' group

Alex Apostolov, Editor in Chief – **PacWorld**

Dr. Alexander Apostolov received his MS degree in Electrical Engineering, MS in Applied Mathematics and Ph.D. from the Technical University in Sofia, Bulgaria. He is Principal Engineer for OMICRON electronics in Los Angeles, CA. He is an IEEE Fellow and Member of the PSRC and Substations C0 Subcommittee. He is past Chairman of the Relay Communications Subcommittee, serves on many IEEE PES WGs. Alex is a member of IEC TC57 WGs 10, 17, 18, 19, Convenor of CIGRE WG B5.53 and member of several other CIGRE B5 WGs. He is a Distinguished Member of CIGRE. He holds 4 patents and has authored and presented more than 500 technical papers. He is an IEEE Distinguished Lecturer and Adjunct Professor at the Department of Electrical Engineering, Cape Peninsula University of Technology, Cape Town, S. Africa. Alex is Editor-in-Chief of PAC World Magazine.

Renaud Drouin, Automation Engineer – **Hydro Quebec**

Renaud graduated from Sherbrooke university (Canada) in 2009 with a bachelor's in electrical engineering, He started his career at Schneider Electric. Working on multiple projects internationally, he acquired extensive experience and knowledge in IEC61850 systems. In 2018, Renaud moved to Hydro-Québec to jumpstart a new generation of P&C systems based on IEC 61850.

Bas Mulder, Technologist OT – **Tennet**

Bas is a recognized expert in substation automation (IEC 61850) and tele-control (IEC 60870-5) standards (communication protocols, data modelling, specifications) and wide and local area networks including cyber-security standards such as IEC 62351 for a reliable and secure exchange of process and automation data inside and outside the substation. Since August 2020 Bas has been at TenneT as Technologist for OT - developing the framework for future digital substations of TenneT including process bus and vendor independent utilizing IEC 61850 and security standards such as IEC 62351. Between May 2019 and August 2020, he worked as Expert OT in Stedin where he supported different departments with knowledge and experience on IEC 61850 and telecommunications. From 2005 to April 2019 he worked at KEMA/DNVGL as a consultant in different (inter)national projects to support technology providers and network operators in the implementation of IEC standards.

Frances Cleveland, President – **Xanthus Consulting**

Ms. Cleveland has managed and consulted on Smart Grid information and control system projects in the electric power industry for over 35 years. Her expertise has focused primarily on Smart Grid information interoperability standards, grid codes and market-based functionalities for utility-scale Inverter-based Resources (IBR) and Distributed Energy Resources (DER), cybersecurity standards and best practices, and the integration of systems, including SCADA systems, plug-in electric vehicles (PEV), Advanced Metering Infrastructures (AMI), Distribution Automation (DA), substation automation, and energy market operations. Recent work includes consulting on: IEC 61850-7-420 semantic data model standard, California Public Utilities Commission (CPUC), IEEE 1547-2018 standard, among others.

Maik Seewald, Senior Technical Lead, Industrial IoT, Automation Networks & Security – **Cisco**

Maik Seewald has thirty-three years of engineering and security experience. He works as a Senior Technical Leader in Cisco's Intent Based Networking Group. He focuses on the development of Industrial IoT architecture, network convergence, security, and standards for Cisco's Intent-based Networking CTO team. Before Cisco, Maik was a senior research and development architect and CISSP for Siemens, specializing in systems, software, and security architectures in energy and industrial automation. Earlier, he held project management, architecture, and engineering positions at Infineon, Audi, Siemens COM, and AMD. Maik received a degree in Informational Techniques and a Qualified Engineer degree from Dresden University. His special fields of interest comprise cyber security, system and software architecture of Industrial IoT/M2M systems and distributed intelligence. Maik Seewald is Cisco's representative for communication, security and automation in IEC TC 57, IEC TC 65, DKE, IEEE, OPC UA, and UCA. He participates actively in standard development with the focus on Deterministic Networking (in IEC, IEEE and OPC UAFX), IEC 61850, IEC 62351, and IEC 62443/ISA99 with strong domain expertise in power grid and industrial automation, smart grid architecture, and cyber security for industrial control systems. He is a frequent public speaker and technical writer with a focus on cyber security and Industrial IoT.

MODULE SPEAKERS

Thomas Sterckx, Expert, Engineering Secondary Systems – **Elia**

Thomas graduated in 2007 with a degree in Industrial Engineering. After gaining experience as project leader and engineering manager at Engie, he is now working at Elia since 2014. Currently working as an expert within the Virtual Substation department with a focus on the top-down (IEC61850) engineering process and data modelling. Member of B5.68 and IEC61850 WG10, with a focus on modelling and engineering.

David MacDonald, System Architect, Standardisation – **General Electric**

David works within Grid Automations Office of Innovation at General Electric where he helps define system and solutions standardization. Prior to this he worked in the standardized design and industrialized engineering process of the Substation Automation System at Iberdrola Distribution. .He received his MEng degree in Electrical and Mechanical Engineering, from the University of Strathclyde, and is a member of Cigre Working group B5.68 and IEC61850 WG10.

Herb Falk, Managing Director – **Outside the Box Consulting**

Herb is one of the Editors of IEC 61850, US Lead on cyber security to IEC TC57, and leads the development and management of the IEC 61850 Testing program for the UCA International Users Group (www.ucaiug.org). He has been involved with the product development including base protocol and product development. He has also worked on several IEC 61850 integration projects involving advanced testing methodologies.

Ovidiu Serban, Senior Consultant, Digital Systems Operations – **DNV**

Ovidiu Serban is senior consultant in Intelligent Networks & Communication at DNV GL Netherlands Energy Advisory with a focus on digital grid operations, design, deployment and testing, including cybersecurity. Prior to joining DNV GL, Ovidiu has been working for 11 years as a designer, automation engineer, technical lead and project manager on different projects in the energy sector that involved SCADA EMS/DMS deployment and upgrade, substation automation based on IEC 61850 including replacement of legacy protocols and renewables installation and grid interconnection. In 2018 he joined DNV GL as a senior consultant and protocol test engineer and since 2019 he is an active member of IEC TC57 working group 15 and 17. His work is focused on IEC 61850 system engineering and implementation, testing of cybersecurity protocol extensions based on IEC 62351 and SCADA/ADMS/EMS Implementation & QA Consultancy. He has master's degrees in project management and High-Performance Power Systems, he studied Power process informatization and control in Bucharest and Fuel Cell Simulation and Control in Perugia, Italy.

Fred Steinhauser, Digital Substation Evangelist - **OMICRON**

Fred Steinhauser works for OMICRON, and is dedicated to Power Utility Communication and IEC 61850, serving as a Digital Substation Evangelist. He is a member of IEC TC57 WG10, contributing to IEC 61850 and one of the main authors of the UCA Implementation Guideline for Sampled Values (9-2LE). He is also active within CIGRE and IEEE.

Jörg Reuter, Managing Director – **Helinks**

Jörg is founder and CEO of HELINKS LLC. HELINKS LLC is a Swiss company focusing on the development of SAS Engineering tools. With a background of 30 years' experience in software development, process and power automation, Jörg's work is driven by the vision of a device independent, IEC 61850 based SAS engineering process and the appropriate tool support. He is an active member of the IEC 61850 standardization body (IEC TC57 WG10).

REGISTRATION

SMART GRID FORUMS

Fundamentals of IEC 61850 Sept 2023

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Save 10% on 3+ delegates
Save 20% on 5+ delegates
Save 30% on 10+ delegates
Booked from the same organisation at the same time!

To find out how you can participate as a Delegate:

Call: +44 (0)20 8057 1700
Email: registration@smartgrid-forums.com
Visit: www.smartgrid-forums.com/iec-61850-fundamentals

Packages & Prices	Very Early Bird Rate Until Friday 26th May 2023	Early Bird Rate Until Friday 28th July 2023	Standard Rate
Delegate Ticket 12 weeks + final exam	€3,995.00	€4,495.00	€4,995.00
Delegate Ticket 3+ at 10% discount	€3,595.50	€4,045.50	€4,495.50
Delegate ticket 5+ at 20% discount	€3,196.00	€3,596.00	€3,996.00
Delegate Ticket 10+ at 30% discount	€2,796.50	€3,146.50	€3,496.50

Terms & Conditions

Payment: for both in-person and virtual event delegate bookings, payment must be made at the time of booking, by credit card or paypal, or within 7 days by invoice and bank transfer, to guarantee your place. For sponsor and exhibitor bookings, the client will be invoiced 100% of the package fee on signature, and this fee must be settled by bank transfer within 7 days or before the first day of the event, whichever falls soonest.

Participant Inclusions: the delegate, exhibitor and sponsor fee for both in-person and virtual events covers attendance of the conference sessions, access to the exhibition area, and receipt of the speaker presentation materials. For in-person events this fee also covers provision of lunch and refreshments during the course of the conference and networking reception. This fee does not cover the cost of flights, hotel rooms, room service or evening meals.

Participant Restrictions: two or more delegates may not 'share' a place at the conference, separate bookings must be made for each delegate. The exhibitor and sponsor benefit structure detailed in the associated order form may not to be sub-divided, shared or distributed with any firm other than the signatory of the order form and therefore excludes but is not limited to partners, affiliates, clients, suppliers and associates. Using the conference as a platform to promote competing events is strictly forbidden, and failure to observe this clause will result in attendees being removed from the event without any entitlement to refunded fees or incurred expenses.

Event Cancellations: once booked delegate, exhibitor and sponsor cancellations cannot be facilitated. You may however nominate in writing, another delegate, exhibitor or sponsor to take your place at any time prior to the start of the conference. In the event that Smart Grid Forums Ltd postpones an event, the delegate, exhibitor or sponsor fee will be credited toward the re-scheduled event. If you are unable to participate in the re-scheduled event, 100% refund of your fees will be made but we disclaim further liability.

Event Alterations: it may be necessary for us to make alterations to the content, speakers, timing, venue, format or date of the event as compared with the original programme.

Fortuitous Events: Smart Grid Forums Ltd shall assume no liability whatsoever if an event is altered, re-scheduled, postponed or cancelled due to a fortuitous event, unforeseen occurrence or any other event that renders performance of this event inadvisable, illegal, impracticable or impossible. For the purposes of this clause, a fortuitous event shall include, but shall not be limited to: an Act of God; government restriction and/or regulations; war or apparent act of war, terrorism or apparent act of terrorism; civil disorder, and/or riots; curtailment, suspension, and/or restriction or transportation facilities/means of transportation; or any other emergency.

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Governing Law: this agreement shall be governed and construed in accordance with the laws of England and the European Union.

VAT Treatment: the customer must supply their VAT number at the point of registration to ensure the correct VAT treatment for in-person and virtual events. For in-person events VAT is charged to all participants at the VAT rate of the country the event is taking place in as that is considered the place of supply. For virtual events VAT is charged only to those customers who reside in the UK since the location of the organiser and the place of supply to the customer are both in the UK. Please note that these VAT rules are specific to 'ticketed b2b events' and that VAT rules for other types of events supplied by other types of organisers will vary.