



Achieving Multi-vendor Interoperability in the Implementation of IEC 61850

Pre-Conference Workshop: Wednesday 22nd May 2013
2-Day Conference: Thursday 23rd & Friday 24th May 2013

NH Hotel Prague, Czech Republic

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26th April 2013

Hear In-Depth Insights On:

- ✓ **Achieving Multi-vendor Interoperability**
– managing the complexities of multiple vendors' devices and tools and developing open vendor-neutral configuration tools to achieve seamless engineering
- ✓ **Implementing IEC 61850 in Legacy Substations** – adapting implementation to manage the lifecycle challenges and backward compatibility aspects of substation replacement, refurbishment, and expansion
- ✓ **Ensuring Robust Testing and Maintenance**
– modifying existing testing strategies and preparing appropriate documentation to mitigate failures, and identify and correct faults in the absence of wires to track
- ✓ **Driving Workforce Skill and Knowledge Development** – identifying and cultivating the new engineering skills required to understand the complexities and meet the demands of IEC 61850, and capitalise on the full benefits
- ✓ **Enhancing Communication and Data Transfer**
– effectively transitioning from hardwiring to Ethernet and overcoming the challenges around GOOSE messaging when performing time-critical functions
- ✓ **Applying IEC 61850 in New Domains** – reviewing implementation in distributed energy, hydro, wind and solar power plants

Plus – not to be missed Pre-Conference Workshop

The Fundamentals of IEC 61850

Gain a comprehensive overview of this complex standard and its key features and requirements in a hands-on learning environment

See inside for full details...

Utility Case Studies From:

John Fitch
*Protection and Control Technical
Leader, Asset Management
Directorate*
National Grid

Grégory Huon
*Substation Replacement Projects -
Team Leader*
Elia
& Leader of the IEC 61850 Taskforce
ENTSO-E

Julio E. Dominguez
Power System Automation Expert
Gas Natural Fenosa
& Member of the Technical Committee
E3 Group on IEC 61850

Hans-Jørgen Stahl
Senior Engineer – Renewables SCADA
DONG Energy

Alberto Cerretti
**Roberto Calone &
Pietro Tumino**
Engineers
Enel

Patrick Lhuillier
Senior Engineer and R&D Expert
RTE

Tim Manandhar
*Low Carbon Solutions Design
Manager, Technical Lead – The Flexible
Plug and Play*
UK Power Networks

Han Lauw
Senior Consultant
Joulz

Hans de Raaf
*Manager of the Network Automation
Group*
Joulz

Claude Racine
Head of Station Automation
Axpo Power

**Amadou Louh &
Ekaterina Makhu**
Specialists Asset Management
Stedin

András Woynárovich
Relay Protection Advisor
**MAVIR Hungarian Independent
Transmission Operator
Company**

Eric van Aken
*Industrial Control Telecommunication
and Security Consultant*
Alliander

Vladan Cvejić
*Substation Control System Unit
Manager*
Elektromreža Srbije Serbian TSO

**Thibaut Gazet &
Aurélié Dehouck**
Research Engineers
EDF – R&D

Igor Mets
Specialist, Substation RTU Systems
Elering

Carlos Rodríguez del Castillo
*Technical Project Manager for IEC
61850 Substation Automation System
R&D Projects*
Red Eléctrica de España

Expert Advice From:

Christoph Brunner
*President, it4power
& Convenor, IECTC 57 WG 10*

Bas Mulder
Senior Consultant
DNV KEMA

Alex Apostolov
Principal Engineer
OMICRON Electronics
Editor-in-Chief
PAC World Magazine

Maurizio Scavazon
*Principal Engineer and Global
Product Manager for the
Communication Protocols*
TÜV SÜD

Technology Innovations From:

Laurent Guise
*Smart Grids Standardisation
Director*
Schneider-Electric

Henry Dawidczak
Standardisation Manager
Siemens

Andreas Procopiou
*Systems Architecture and
Upstream Marketing Manager*
Substation Automation Solutions
Alstom Grid

Luc Hossenlopp
CTO
**Schneider Electric Energy
Division**

Doug Arnold
Principal Technologist
Symmetricom

Jorge Seco
Solution Architect, Grid Automation
GE Digital Energy

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Dear Colleague,

As the drive to make the smart grid concept a practical reality across Europe gains momentum, the pressure to implement IEC 61850 intensifies. Now widely recognised that this protocol is here to stay, utilities and vendors alike are making their own interpretations of this complex standard and taking steps towards implementation. With issues arising around multi-vendor interoperability, backward compatibility, and a lack of workforce skills to meet the new demands, to name a few, it is clear that this will be a road not without its challenges.

However, with far-ranging potential benefits to capitalise upon, it is imperative that the hurdles are overcome and implementation strategies are put into action.

Recognising that you have heard the theory, we bring you the only conference to provide real-life, practical experience-based examples of actual IEC 61850 implementation within European utilities. Attend this 2-day case-study driven conference to hear first-hand how European TSOs and DSOs are tackling IEC 61850 implementation. Discover the challenges your peers are finding and the implementable solutions they are developing to take their IEC 61850 implementations to the next level.

Highlights of this practical, business-critical conference programme include:

- ✓ **In-depth Case Study Presentations** – hear real-life, practical, IEC 61850 implementation-focused presentations from key European utilities such as RTE, National Grid, Gas Natural Fenosa, EDF, DONG Energy, UK Power Networks, Elia, Alliander, Joulz, Elektromreža Srbije Serbian TSO, Axpo Power, MAVIR Hungarian Independent Transmission Operator Company, Enel, Elering and Stedin amongst others
- ✓ **Open Dialogue and Debate** – benefit from panel discussions focused on the most pressing issues within IEC 61850, featuring speakers from TSOs, DSOs, manufacturers, system integrators, testing labs, consultants and key Working Group members from across Europe. Put your concerns to the experts, hear the views of all the key stakeholders and develop implementable solutions and a united approach to overcoming the practical challenges of IEC 61850
- ✓ **Interactive Champagne Roundtable Discussions** – join our break-out session of small working groups, providing you with the perfect opportunity to bring your IEC 61850 challenges to the table and brainstorm solutions with fellow delegates, speakers and exhibitors and benefit from the advice of the wider IEC 61850 community
- ✓ **High Impact Networking in the Solution Zone** – meet likeminded colleagues from across the European utility landscape, benefit from the advice and expertise of our exhibitors in the IEC 61850 Solution Zone, and take away information on the products, services and solutions you need to drive your IEC 61850 implementation forward
- ✓ **Hands-on pre-conference workshop: The Fundamentals of IEC 61850** – attend this interactive learning opportunity, designed specifically to simplify the complex IEC 61850 – get to grips with the latest developments and requirements so that you are fully equipped to benefit from the practical lessons shared during the main conference days

To secure your place at **IEC 61850 Europe 2013**, visit the event registration page at: www.iec61850-europe.com. Remember, the sooner you book the more money you save with our Early Bird Discount scheme. And with our great value Group Booking Discounts it makes sense to bring your team and make sure everyone is up to speed and on the same page.

We look forward to welcoming you to the event in May.

Kind regards,

Rebecca Davison
Programme Director
IEC 61850 Europe 2013

Who Should Attend?

This unique conference, focused on real-life implementation of IEC 61850, is essential for all those charged with driving forward the smart grid concept within their organisations. It is designed so that the entire spectrum of relevant stakeholders benefit from this opportunity to gather and share actual practical information on IEC 61850 – TSOs, DSOs, technology suppliers, testing labs, system integrators, and consultants will all be in attendance.

Professionals within the following job functions will benefit:

- | | |
|----------------------------------|--------------------------------|
| ✓ Protection and Control | ✓ Smart Grid/Grid Operations |
| ✓ Network/Electrical Engineering | ✓ R&D |
| ✓ Standardisation | ✓ IEC 61850 Product Management |
| ✓ Automation | ✓ System Integration |
| ✓ Asset Management | ✓ Future Networks |
| ✓ Project Management | ✓ Innovation |

No matter what your implementation approach, whether piecemeal or whole systems, we have practical examples that will be relevant to you and your company, and will put you firmly on the path to leveraging the full benefits of IEC 61850.

The Fundamentals of IEC 61850 Pre-Conference Workshop

Wednesday 22nd May 2013, 10:30am-17:00pm
NH Hotel Prague, Czech Republic

Led by **Christoph Brunner**
CEO, **it4power** & *Convenor*, **IECTC 57 WG 10**

As IEC 61850 continues to evolve, understanding and implementing this complex standard is proving no easy task. But with potential benefits including multi-vendor interoperability, cost-effective, standardised substation automation, and enhanced data sharing and communication, it is critical that IEC 61850 is embraced to realise its full capabilities and support the evolution of the smart grid.

This hands-on workshop, led by IEC 61850 expert, Christoph Brunner, will deliver the complete A-Z of IEC 61850. Through in-depth presentations, break-out group discussions, practical simulations and problem solving exercises, Christoph will take you through the building blocks of IEC 61850, providing you and your team with a thorough introduction to this vast standard, simplifying its key complexities. Put your questions to the leader in the field and benefit from the expert guidance and interactive learning you need to help you fully get to grips with IEC 61850.

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|-------|---|
| 10:30 | Registration and coffee |
| 11:00 | Introduction to IEC 61850
Understanding the basic concepts and key features of IEC 61850 |
| 11:45 | Edition 2 of IEC 61850
Examining what is addressed in Edition 2, how it has moved on from Edition 1, and the compatibility considerations between different editions |
| 12:30 | Lunch and networking |
| 13:30 | Data Modelling Introduction and Break-out Exercise
After an introduction to the data modelling concepts, in small groups undertake this practical exercise to determine how to model a protection or control device in practice |
| 14:30 | Communication Practical Simulation
In this practical demonstration see first-hand how to configure the data exchange through report control blocks and GOOSE control blocks |
| 15:15 | Afternoon tea and networking |
| 15:45 | Future Direction and New Activities
Identifying the likely changes on the horizon, the development work taking place in the key working groups, and what these will mean for future IEC 61850 implementation |
| 16:30 | IEC 61850 Q&A Surgery
Put your final questions and concerns to the IEC 61850 expert |
| 17:00 | Close of Pre-conference Workshop |

**Book both the workshop and
the conference to benefit from
the biggest savings!**

See the booking form for full details.

About the Workshop Leader



Christoph Brunner

President
it4power
& *Convenor*
IECTC 57 WG 10

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 IECTC57 and member of WG 17, 18 and 19 of IECTC57. 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.

Conference Day One

Thursday 23rd May 2013

08:30 Registration and coffee

09:20 Opening address from the Chair

Grégory Huon, *Substation Replacement Projects – Team Leader, Elia & Leader of the IEC 61850 Taskforce, ENTSO-E*

09:30 **IEC 61850 Drivers and Landscape: Establishing the progress being made in implementing IEC 61850 to make the smart grid concept a practical reality**

- Reviewing uptake of the standard across TSOs and DSOs globally to identify where implementation is most advanced, the challenges encountered and how IEC 61850 is changing the market
- Examining how companies are migrating in stages towards implementation and where efforts are most focused to identify applicable learnings for future progress
- Evaluating the success to date in leveraging IEC 61850 to achieve the goals of multi-vendor interoperability, data sharing and standardised, cost-effective substation automation
- Outlining the key developments since Edition 2 and determining when this will become fully standardised and compatible with previous versions to facilitate its application
- Understanding how harmonisation between CIM and IEC 61850 is developing to enable a common communication tool and enhanced information sharing
- Assessing the latest vendor tools and technologies to support the ease of implementation for utilities

Christoph Brunner, *President, it4power & Convenor, IEC TC 57 WG 10*

10:00 **Asset Lifecycle Management Panel: Examining the reality of seamlessly integrating IEC 61850 into legacy substations, and those built to legacy standards, and enabling a flexible infrastructure that allows for future changes**

- Establishing the lifecycle cost of implementation compared to replacement of old equipment:
 - » Up-front investment
 - » Rewiring and recommissioning work
 - » Support and maintenance
 - » Regularity of replacement
 - » Risk of becoming obsolete
 - » Retraining staff
 - » The different cost possibilities of full process bus and non-conventional instrument transformer technologies
- Weighing the costs against the long term benefits of:
 - » Data sharing
 - » General capital savings on a project
 - » Ease of replacement if plug and play
 - » Cost savings from standardisation
- Managing multiple legacy protocols in addition to the extra resources required to engineer IEC 61850 solutions with existing equipment to support the development of digital substations
- Determining whether implementation of standardized data exchange and configuration will be possible in a legacy system
- Evaluating the ease of refurbishment in 15 years and the requirements for investment in firmware upgrades and further engineering
- Modifying the way the standard is adopted to manage the lifecycle challenges of primary and secondary equipment:
 - » Adopting IEC 61850 selectively at the primary interface where the equipment will not change
 - » Deploying the IEC 61850-9-2 process bus, and selectively, non-conventional instrument transformers
 - » Designing the substation secondary systems to support ease of replacement
- Overcoming the challenges of mixing old and new logic: Deciding whether to adapt/upgrade old hardware to meet the requirements of the new standard or to modify the data model to fit the existing legacy substation hardware
- Evaluating if it is only possible to reap the benefits of IEC 61850 when implemented on a whole system basis rather than piecemeal, and whether this is feasible in a legacy infrastructure

John Fitch, *Protection and Control Technical Leader, Asset Management Directorate, National Grid*
 Amadou Louh, *Specialist Asset Management, Stedin*
 Luc Hossenlopp, *CTO, Schneider Electric Energy Division*
 Andreas Procopiou, *Systems Architecture and Upstream Marketing Manager, Substation Automation Solutions, Alstom Grid*
 Bas Mulder, *Senior Consultant, DNV KEMA Energy & Sustainability*

11:30 Morning coffee, networking and exhibits

12:00 **Replacement, Refurbishment and Retrofit: Managing the interoperability and backward compatibility aspects of maintaining the system when implementing IEC 61850 in legacy substations**

- Identifying and managing the integration issues when replacing systems within an existing substation with IEC 61850 compliant technology – mixing old and new
- Ensuring replacements interface with traditional systems in a non-limiting way and interoperability is maintained between legacy and digital technology
- Adapting engineering to enable refurbishment to be carried out in a top-down approach
- Managing the impact of software evolution: Redesigning the system and tools to maintain functionality when replacing IEDs in the absence of plug and play
- Identifying a robust selection criteria when replacing devices from different vendors and updating software to ensure backward compatibility
- Managing the lack of compatibility between Edition 1 and Edition 2 equipment when carrying out maintenance and replacement

Han Lauw, *Senior Consultant, Joulz*

Hans de Raaf

Manager of the Network Automation Group, Joulz

12:30 **Substation Expansion: Ensuring the seamless integration of new IEC 61850 compliant bays into existing substation infrastructure**

- Examining the integration and compatibility issues between new IEC 61850 compliant bays and existing equipment, and when communication in the existing substation is IEC 61850 based or if legacy protocols are used
- Understanding the gateway concept and the potential communication issues when the existing substation is not IEC 61850 compliant
- Applying IEC 61850 based separated relay protection to automation and control systems in transmission system substations
- Managing the redundancy issues and avoiding single mode of failure in the IEC 61850 communication architecture
- Determining the level of IED upgrading necessary when carrying out substation extensions after 5-10 years of operation
- Understanding the implications for the whole substation when testing an additional new bay and the problems experienced in system maintenance when expanding existing substations

András Woynárovich
Relay Protection Advisor

13:00 **MAVIR Hungarian Independent Transmission Operator Company**

Process Bus in Distribution Substations: Examining practical experiences of applying IEC 61850 process bus in distribution substations in New Zealand and the US

- Assessing the installation methods for process bus in distribution substations at 2 different utilities to meet the requirements of both small rural, and larger, substations
- Identifying the business drivers of each utility for adopting process bus

- Analysing real life examples and architectures to understand how process bus can be leveraged to help utilities meet technical and business goals including speed of execution and critical cyber security requirements
- Determining how process bus can contribute to the simplification of the distribution substation design

Jorge Seco, *Solutions Architect, Grid Automation, GE Digital Energy*

Lunch, networking and exhibits

New Substations: Understanding the practicalities and cost implications of IEC 61850 implementation in a greenfield site

- Leveraging the advantages of IEC 61850 implementation when developing a new substation from scratch including the avoidance of mixing different standard editions, enhanced flexibility, a more unified data model, and simpler testing procedures
- Understanding the cost implications and skilled personnel requirements when investing in new substation development
- Evaluating the extent to which existing assets and support systems can be used in new IEC 61850 compliant substations
- Building an infrastructure to effectively specify relevant requirements and find qualified contractors with a deep knowledge of IEC 61850 to support the instalment of fully compatible equipment
- Establishing the optimal way to allow the transfer of critical information and robust failure tracking in future years, and support maintenance and expansions
- Leveraging the technical assistance of vendors to ensure that the whole substation is connected and tested appropriately and multi-vendor interoperability is achieved in a greenfield site

Vladan Cvejić, *Substation Control System Unit Manager, Elektromreža Srbije Serbian TSO*

Testing and Maintenance: Examining how existing testing strategies need to be adapted for the IEC 61850 environment to mitigate failures and service disruptions

- Understanding the new testing requirements when transitioning from the classic substation model with a central testing module
- Adapting diagnostics to the new environment where the structure of the device, the message, and the configuration tools are all different
- Training personnel in LAN and Ethernet technology to effectively test system integration and identify faults in the absence of wires to track
- Examining the sophisticated tools available to open IEDs in an IEC 61850 system and identify problems and failures
- Managing the interdependence of IEDs: Undertaking testing when there are interlocking or protection schemes with functionalities that go beyond one bay with a knock-on effect on other system components
- Carrying out testing in system expansion: Determining whether to simulate the whole substation or test with part of the system in service
- Evaluating the use of remote tools and diagnostics to support maintenance in IEC 61850 systems

Bas Mulder

Senior Consultant

DNV KEMA Energy & Sustainability

15:30 **Time Synchronisation: Examining the latest technological developments and requirements for time synchronisation to support its implementation and improve maintenance in an IEC 61850 compliant system**

- Understanding the importance of time synchronisation in IEC 61850 compliant substations to time stamp efficiently and track problems and failures to specific devices at specific times
- Determining the investment required to facilitate the installation of highly accurate time synchronisation technology to be used in combination with IEC 61850
- Evaluating the requirements and costs of the new IEEE 1588 protocol to enable its implementation in substations to allow time synchronisation and support IEC 61850
- Using the existing network to leverage time synchronisation to connect substations and enable improved monitoring and data sharing
- Examining the applicability and expense of a GPS system as used in the US

Doug Arnold, *Principal Technologist, Symmetricom*

Afternoon tea, networking and exhibits

16:30 **Workforce Training and Education: Driving the skill and knowledge development of internal resources to capitalise on the full capabilities of an IEC 61850 compliant system**

- Identifying the new skills required of an IEC 61850 system engineering workforce and effectively combining the skill set of multiple roles – telecom experts, protocol analysers, energy technology engineers, electrical engineers, software engineers, protection and control experts
- Determining the need for new roles within the substation to manage multi-vendor interoperability and the constantly evolving network of data
- Adapting organisational culture and educating the substation workforce to manage the transition from conventional wire by wire systems to more “virtual” working and deep product knowledge
- Engaging commissioning engineers early on in the design stage to start planning the tools needed for future commissioning
- Effectively supervising implementation and developing a flexible workforce to configure, operate and maintain systems that are continuously advancing
- Partnering with vendors to promote implementation through vendor maintenance, vendor-led training and development of tools to support procurement, testing and documentation
- Working with universities to start developing the new enhanced skill set in engineers that the standard demands
- Managing the impact of a higher skilled workforce on retention rates to ensure system maintenance in the long term

Alex Apostolov

Principal Engineer, OMICRON Electronics, and Editor-in-Chief, PAC World Magazine

17:00 **In-house versus Contracting: Leveraging outsourcing to generate cost savings and streamline implementation of IEC 61850 without adversely impacting the build-up of internal expertise**

- Evaluating the options for outsourcing when implementing IEC 61850 including device configuration, system integration and maintenance
- Determining which activities should be outsourced, which managed in-house and when to use turnkey projects to support the effective implementation of IEC 61850
- Finding and attracting highly qualified contractors and vendors with a robust understanding of IEC 61850 and thorough product knowledge
- Utilising contractors as systems integrators to achieve mixed vendor systems
- Practical strategies to effectively contract out maintenance to contractors qualified in IEC 61850-testing and monitoring their performance accordingly
- Managing the potential risks of inhibiting internal knowledge and experience development for future implementations and maintenance when outsourcing

Claude Racine, *Head of Station Automation, Axpo Power*

17:30 **IEC 61850 in the Process Bus: Translating practical experiences of IEC 61850 in the station bus into future implementation plans for the process bus**

Igor Mets, *Specialist, Substation RTU Systems, Elering*

18:00 **Champagne Roundtable Discussion**

During this session the group will break into several smaller working groups, each focused on one of the most critical themes emerging from the day's discussions. This highly interactive session will enable you to bring your real-life challenges to the table, hear multiple perspectives and gather practical solutions to drive forward your implementation of IEC 61850. And a l with a relaxing glass of champagne in hand!



19:00 End of conference day one

Conference Day Two

Friday 24th May 2013

08:30 Registration and coffee

09:20 Opening address from the Chair

09:30 **The Multi-vendor Interoperability Debate: Stakeholder Collaboration Panel Promoting an open dialogue and cooperation between all key stakeholders to better address individual needs, support interoperability and optimise substation automation**

- Clarifying the current interoperability landscape between vendors and products from the same vendors
- Examining what vendors and standardisation bodies are currently doing independently and collaboratively to achieve a multi-vendor network
- Increasing utility involvement in standards development and the design of IEC 61850 equipment and tools to ensure that protocols meet user needs
- Practical strategies to standardise the implementation of IEC 61850 in different devices by different vendors to combat the effects of individual interpretation
- Understanding the need for a universal, generic, vendor-independent tool to work with each vendor's IEDs and support configuration of a multi-vendor system – will this ever be a reality given proprietary concerns? What progress is being made in this direction?
- Establishing scope for product differentiation within the context of IEC 61850 compliant IED and tool development
- Encouraging manufacturers to build as much IEC 61850 compatibility into their IEDs and files as possible and develop one common CID file to simplify the process
- Reviewing the use of single vendor systems and one box solutions and identifying learnings to support the transition to multi-vendor interoperability
- Is multi-vendor interoperability truly achievable or will the addition of every new vendor device add complications and result in the need for replacement in future years?
- Determining whether Edition 1 and Edition 2 equipment will ever be compatible and able to communicate with each other to enable mix mode working

Patrick Lhuillier, Senior Engineer and R&D Expert, RTE
Laurent Guise, Smart Grids Standardisation Director, Schneider-Electric
Henry Dawidczak, Standardisation Expert for IEC 61850, Siemens
Alberto Cerretti, Engineer, Enel
Maurizio Scavazon, Principal Engineer and Global Product Manager for the Communication Protocols, TÜV SÜD

11:00 **Multi-vendor Interoperability in Practice: Achieving centralized, seamless configuration of the system through the IEC 61850 standard to enable the integration of multi-vendor solutions and ensure device compatibility**

- Developing an open vendor-neutral tool as an alternative to the complexities of working with multiple vendors' configuration tools with specific proprietary extensions and their own interpretation of IEC 61850 implementation
- Leveraging the tool to perform the top-down engineering and configuration of the whole SAS from a single workplace without the need for vendor-specific software
- Carrying out thorough monitoring to ensure that all vendors are compliant with the standard in order to integrate them into the system
- Investing in training to increase software knowledge and improve conformance testing to support multi-vendor interoperability
- Ensuring contractors have a thorough product knowledge when working with them on multi-vendor project implementation
- Examining the application of an IEC 61850-80-1-based, double-modelling approach to an intelligent substation gateway in the substation central unit

Julio E. Dominguez, Power System Automation Expert, Gas Natural Fenosa & Member of the Technical Committee, E3 Group on IEC 61850

11:30 Morning coffee, networking and exhibits

12:00 **Communication and Data Transfer: Transitioning from hardwiring to Ethernet to connect devices and enable interoperability and automation across the network**

- Leveraging the benefits of using a well-known proven technology to allow high speed communication, smart management of IEDs, standardisation of data and flexibility
- Understanding the initial investment requirements and potential cost savings when moving from copper cables and DNP3 to Ethernet
- Assessing the complexity of implementation when extending, expanding or replacing in existing substations with cabling already in the ground
- Retraining teams to manage constantly evolving software and high volumes of network data, and meet stringent maintenance requirements
- Carrying out failure tracking in the absence of physical wiring to solve problems without interrupting the connection and wider infrastructure
- Examining concerns over bandwidth limitations and determining the possibility of operating without fibre optics – how will radio communication need to be adapted?
- Prioritizing traffic to reach performance requirements and avoid overloading and latency
- Implementing IT security solutions to mitigate the cyber security risks involved in an open, easy access network transporting large amounts of data
- Evaluating the long term flexibility of the system to allow future device interchangeability, software updates and platform integration
- Determining the business case for investing in an in-house telecoms network to support IEC 61850 implementation
- Reviewing the recommendations in Edition 2 of the standard around Ethernet switching to HSR/PRP to understand the potential integration issues and new possibilities

Tim Manandhar, Low Carbon Solutions Design Manager, Technical Lead –The Flexible Plug and Play, UK Power Networks

12:30 **GOOSE Messaging: Clarifying the IEC 61850 standard on GOOSE multicast messages to develop a common language between IEDs and determining the practicalities of its use for time-critical messages**

- Examining the potential of transitioning from a hard wired system to GOOSE messaging to achieve fast communication between specific devices and its implications for time, bandwidth and message repetition
- Evaluating when and how the internet will be able to fully support the level of service, reliability and timing requirements necessary to shift GOOSE application from just simple interlocking to time-critical functions including protection tasks
- Understanding the need for a deep familiarity with each IED, software tool and file in order to configure GOOSE messaging
- Examining the risks associated with GOOSE messaging when a fault in a device occurs and the potential knock-on impact on the network
- Determining how GOOSE protocols can be stretched to work on long distances
- Increasing awareness of the technology and its capabilities, to improve knowledge of testing GOOSE, fault location and failure solving in the absence of easy to analyse wiring pictures
- Understanding the risks involved when different parties are responsible for the generation, transportation and receiving of the GOOSE message

Carlos Rodríguez del Castillo
Technical Project Manager for IEC 61850 Substation Automation System R&D Projects
Red Eléctrica de España

13:00

Cyber and Physical Security: Examining the heightened cyber and physical security risks of IEC 61850 and evaluating the options available for protecting the network

- Analysing the potential cyber security vulnerabilities when all systems are linked by IT and determining the best solutions to mitigate risk
- Assessing how the challenge of cyber security can increase when using remote tools and diagnostics for maintenance
- Outsourcing cyber security to develop a unified cyber security model applicable to all automation systems based on IEC61850
- Mitigating the risk of exposing all systems to attack if a virus penetrates the outsourced security system unit
- Understanding the potential risks around physical security and who is entering the substation when all systems and stations are interlinked within the network
- Raising awareness within the organisation of both cyber and physical security and installing the necessary precautions and solutions
- Separating protection and control either physically or virtually to improve security and establishing physical boundaries to contain the systems

Eric van Aken, Industrial Control Telecommunication and Security Consultant, Alliander

13:30

Lunch, networking and exhibits

14:30

Writing Specifications: Building the requirements of IEC 61850 into specifications to ensure that tenders going forward are compliant and support multi-vendor interoperability

- Understanding the full requirements of IEC 61850 and what to consider when creating specifications for substation refurbishment, expansion and development
- Opening up dialogue with vendors to establish functionality and support requirements, leverage vendor knowledge and solutions, and ensure effective vendor interpretation of the standard for their own devices
- Determining which requirements of the standard and new technology should be included and translating these into thorough explanations in written specifications
- Addressing the need for multi-vendor solutions and replacement compatibility in written specifications
- Building technical protocol into specifications to ensure integration of the standard into procedures and achieve increased awareness throughout the organisation
- Evaluating the work by ENTSO-E on developing a technical specification to outline TSO requirements for IEC 61850

Grégory Huon, Substation Replacement Projects – Team Leader, Elia & Leader of the IEC 61850 Taskforce, ENTSO-E

15:00

Preparing Documentation: Presenting information in an effective way in an IEC 61850 compliant system to support robust failure tracking and future maintenance

- Incorporating a high level of detail and comprehensive overview of configuration into documentation in the absence of diagrams when implementing IEC 61850
- Building adequate guidance into documentation on coping with problems and failure tracking without hardwired systems
- Ensuring information can be passed from the design stage and easily interpreted in later years when carrying out maintenance and refurbishment
- Preparing documentation in a way that allows the exchange of critical information between key personnel to support ease of comprehension and system integration
- Presenting interlocking or intertripping schemes on a GOOSE interface in a simple way

Amadou Louh, Specialist Asset Management, Stedin
Ekaterina Makhu, Specialist Asset Management, Stedin

15:30

Afternoon tea, networking and exhibits

16:00

IEC 61850 in New Domains: Reviewing the latest developments in the application of IEC 61850 in distributed energy, hydro, wind and solar power plants

Leveraging the IEC 61850 protocol for communication and local substation control in wind farms

- Establishing the design parameters and selecting the appropriate turnkey systems
- Using fibre networks to enable concurrent offshore and onshore wind farm implementation and creation of a local network
- Examining the advantages and disadvantages of IEC 61850 in wind farms

Hans-Jørgen Stahl, Senior Engineer – Renewables SCADA, DONG Energy

Implementing the hydro extension of IEC 61850, 61850-7-410, in practice

- Effectively setting up a platform to reproduce the instrumentation and control of an existing hydro power plant whilst following the IEC 61850 standard
- Examining the correspondence between the IEC 61850 hydro data model and the data used in existing power plants
- Adhering to the engineering process as described in IEC 61850 and determining the differences between theory and practice
- Replacing every aspect of communication with IEC 61850 including GOOSE, reports and commands
- Assessing the interoperability derived from IEC 61850 in a multi-vendor environment

Thibaut Gazet, Research Engineer, EDF – R&D
Aurélié Dehouck, Research Engineer, EDF – R&D

Developing a solution based on IEC 61850 to manage the control of Distributed Energy Resources (DER) while maintaining and improving the quality of supply

- Evaluating the possibility of adding new logical nodes to enhance the effectiveness of IEC 61850 for new required devices including evolved Fault Passage Indicators
- Implementing a complex communication architecture to enable the transport of IEC 61850 messages, and testing these services in both the WAN and LAN networks
- Leveraging IEC 61850 to achieve communication between the SCADA control centre, the primary (HV/MV) substations, the secondary (MV/LV) substations, and several Customers plants, including general protection, lower level internal plant protection and interface protection relays
- Developing a customer plant controller for the management of energy flows at the delivery point for use on generic controllable plants, including DER such as photovoltaic or hydroelectric
- Ensuring controllable loads, an effective energy storage system and the performance of other ancillary functions

Roberto Calone, Engineer, Enel
Pietro Tumino, Engineer, Enel

17:00

Emerging Issues and Next Steps: Reviewing the work currently shaping the future direction of IEC 61850 and the likely implications for implementation and substation automation

- Understanding what is currently happening in the IEC TC 57 Working Groups and in what direction plans and solutions are heading
- Outlining the current thinking around Edition 3, the timeframe for its implementation and the likelihood of its compatibility with previous versions
- Examining the need for protocols to work on long distances and understanding the plans for achieving this
- Reviewing the current work of the EDSO and ENTSO-E and its future implications for IEC 61850 implementation within DSOs and TSOs
- Discussing how implementation of IEC 61850 in the process bus is likely to pan out
- Examining how IEC 61850 is being applied to complex SCADA infrastructure needs

Patrick Lhuillier, Senior Engineer and R&D Expert, RTE
Christoph Brunner, President, it4power & Convenor, IEC TC 57 WG 10

17:30

Closing remarks from the Chair and end of conference

Speaker Biographies



Christoph Brunner
President, it4power & Convenor
IEC TC 57 WG 10

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 IEC international users group.



Han Lauw
Senior Consultant
Joulz

Han has an IR (MSc) degree from Delft Technical University. He is presently working as a consultant within Joulz. He has been involved in Substation Automation and SCADA/EMS systems for more than 20 years. He has worked with VA Tech SAT as Managing Director of their Dutch subsidiary for 15 years before joining Joulz. With Joulz he is involved in development of business in the field of Substation Automation and

Smart Grids. He is a strategic consultant to the Management of Joulz in the field of Smart Grids. Joulz is involved in maintenance and construction of Energy infrastructures for DSOs in the Netherlands. This includes Substation Automation systems where they act as System Integrator specialized in replacing, extending and refurbishing SA systems in HV and MV substations. Their specialty is integration using IEC 61850 as a technological platform in a multivendor environment. The group has completed and delivered successfully over 50 Substation Automation systems based on IEC 61850.



Hans de Raaf
Manager of the Network Automation Group
Joulz

Hans de Raaf is a respected professional and specialist in the field of Protection, Control and Substation Automation. He has worked in this field for 35 years. He started his career as a protection and control engineer and during his career he has held several leading positions as Team Manager in Engineering, Realization and Maintenance of Protection & Control and Substation Automation systems. In his career he has worked with systems of many different vendors and in different generations of technology. Hans is currently Manager of the Network Automation Group.



András Woyńarovich
Relay Protection Advisor
MAVIR Hungarian Independent Transmission Operator Company

András Woyńarovich is Relay Protection Advisor at MAVIR Hungarian Independent Transmission Operator Company. He graduated from the Budapest University of Technology and Economics, he is M.Sc. Electrical Engineer, majors in Electric Power Systems and Power System Information. His main duties in MAVIR: IEC 61850 Substation communication systems – plan judgement, commissioning, maintenance; Central Disturbance Record Archiving System – maintenance, upgrading; Teleprotection systems – commissioning, maintenance. He leads Laboratory training on overcurrent protection in the Budapest University of Technology and Economics. He is a member of Cigré WG B5.2.2. He was member of organizing committee PAC World Conference Budapest 2012, and presented his paper on Alcantara 750 / 400 kV Substation's Relay Protection and Automation System.



Vladan Cvejić
Substation Control System Unit Manager
Elektromreža Srbije Serbian TSO

Vladan Cvejić graduated from the University of Belgrade in 2001 with Dipl.-Ing. degree in Electrical Engineering. After graduation, Vladan started working at National Transmission Company of Serbia as protection engineer. In May 2004, he was hired by VA TECH Ltd as SCMS leading commissioning engineer in UAE projects. Next year he joined EXOR-ESI, Serbia where he was involved in protection testing and SCADA system development and commissioning on various project including Serbian first IEC 61850 standard compliant substation. Since June 2010 Vladan is Manager of Substation Control systems unit of Serbian TSO, Elektromreža Srbije where he is deeply involved in implementation, FAT, SAT, maintenance, lab. testing and training activities related to SCADA systems



Laurent Guise
Smart Grids Standardisation Director
Schneider-Electric

Laurent Guise, graduated from the Ecole Supérieure d'Electricité (ESE SUPLEEC Engineering school) in 1981 and has been working for Schneider-Electric in Electrical network protection, monitoring and control system for more than 20 years. Within Schneider-Electric, Laurent Guise is leading, at Corporate level, the definition, the co-ordination and implementation of the standardisation policy in the area of the Smart Grids. L. Guise is an

active French member of IEC TC 57 committee (WG 10, WG17, WG19 and WG21) especially in the area of the leading IEC 61850 standard. In this environment, he has been leading the move of the IEC 61850 to a UML representation, and also the impacts on the concerned standardisation processes. He also participates in the IEC Smart Grid Strategic Group SG3, and is in charge of leading the TF related to the IEC Smart Grid roadmap amendment. At European level within the CEN-CENELEC-ETSI Smart Grid Co-ordination Group, he is also acting as the Convenor of the "First (Second) set of standards" group, in charge of delivering one of the packages expected from the M/490 mandate issued by the European Commission. In this same area he is the convenor of the WG of CENELEC TC57 in charge of answering the M/490 mandate.



Bas Mulder
Senior Consultant
DNV KEMA Energy & Sustainability

Mr Mulder is working as an International Business Developer, Consultant and Project Manager in the field of IEC 61850 Substation Automation together with other IEC standards like IEC 60870-5 for substation to control centre communication and CIM (IEC 61968, 61970) for control centre applications. Mr Mulder has gained expert knowledge of IEC 61850 by developing conformance test tools and performing conformance

tests for many numerous suppliers of substation automation equipment. Next to conformance testing Mr Mulder performed several international training sessions for utilities and technology providers.



Alex Apostolov
Principal Engineer
OMICRON Electronics
and Editor-in-Chief
PAC World Magazine

Alexander Apostolov received MS degree in Electrical Engineering, MS in Applied Mathematics and Ph.D. from the Technical University in Sofia, Bulgaria. He has more than 35 years experience in power systems protection, automation, control and communications. He is presently Principal Engineer for OMICRON electronics in Los

Angeles, CA. He is IEEE Fellow and Member of the Power Systems Relaying Committee and Substations C0 Subcommittee. He is the past Chairman of the Relay Communications Subcommittee, serves on many IEEE PES and CIGRE B5

Working Groups. He is member of IEC TC57 and Convenor of CIGRE WG B5.27 "Implications and Benefits of Standardised Protection Schemes". He holds four patents and has authored and presented more than 400 technical papers. He is IEEE Distinguished Lecturer. He is Editor-in-Chief of PAC World.



Alberto Cerretti
Engineer
Enel

Dr. Eng. Alberto Cerretti works in Engineering and Standardization department inside Enel's Infrastructure and Network Division. From September 2009 he is in charge of Comitology activities concerning electric distribution inside the Division. His main expertise is in protection systems, connection criteria of passive loads and generators ("passive" and "active" customers) to the electric distribution networks, power quality, SCADA systems, operation of MV network according to neutral point status (especially grounded through Petersen coils), MV network automatic fault selection and supply restore systems, fault detectors, operation criteria and protection settings and regulations, "smart grid" system architecture. He is a Lecturer at PhD International Course on Electric Power Systems at Politecnico di Milan, Lecturer at Specialist University Degree in Electric Engineering, University of Padua, and has written more than 60 papers and scientific publications, mainly at an international level.



Henry Dawidczak
Standardisation Expert for IEC 61850
Siemens

Dipl.Ing-oc. Henry Dawidczak (54) studied automation systems in the energy domain in Moscow. After his study he worked in a software development department for substation automation in Dresden. Since 1991 he has been working for Siemens. First he was responsible for sales and marketing of substation automation for East European Countries, later he worked as a technical expert of substation automation in the training center. For more than 10 years he has been working as a standardization expert for IEC 61850. He is member of several international standardization bodies such as IEC Technical committee TC57 Working Group 10, 17, 19 and the IEC international users group (UCAIug). Also he is member of the National committee K952 of the DKE Germany and here he leads the Working Group 10 related to IEC 61850.



Julio E. Dominguez
Power System Automation Expert
Gas Natural Fenosa
& Member of the Technical Committee
E3 Group on IEC 61850

Julio E. Dominguez graduated in Physics, with a specialization in Electronics (University of Salamanca) and received an MSc in Information Systems from the University of Portsmouth. Since the early nineties, he has worked in information systems for electrical utilities. In 2006 his career became focused on power system automation and protection, and has been involved in several activities related to the IEC 61850 standard, such as the execution of a pilot project for substation automation and the specification and design of IEC 61850-based solutions for Gas Natural Fenosa as a power distribution company. He belongs to the technical committee of the Spanish E3 Group of electrical utilities for studies on IEC 61850.



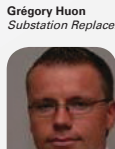
Tim Manandhar
Low Carbon Solutions Design Manager, Technical Lead – The Flexible Plug and Play
UK Power Networks

Tim Manandhar is currently working as Low Carbon Solutions Design Manager at UK Power Networks (UKPN). Tim has over 11 years experience in both power systems, SCADA and Telecommunications. He completed his Bachelor's Honours degree with one year sandwich placement with London Underground working. Tim joined UKPN in 2002 as part of London's Power system protection team. He joined Operational Telecoms team in 2005 where he was then heavily involved in UKPN's flagship Satellite project from 2006 to 2007 carrying out design, testing and commissioning. The satellite project enabled a complete migration of legacy SCADA and telecommunications infrastructure to new SCADA platform, new IP based protocol and infrastructure over 1000 substations in UKPN. He then took the lead role in implementing and managing the new system. He joined Future Networks team as Low Carbon solutions Design Manager in 2012. He currently holds overall responsibility of Technical Design Authority in UKPN flagship LCNFTier 2 project, Flexible Plug and Play.



Eric van Aken
Industrial Control Telecommunication and Security Consultant
Alliander

Eric van Aken is a Consultant for Liander (an Alliander company). He gained his Bachelor of Engineering degree in engineering and telecommunication in 1997, after completing in order basic and medium engineering education and duty. He has 15 years of experience with various companies in communications and utilities industries. Involved in several projects of which the most applicable are - Alliander telecom vision, security and resilience of communication networks and information systems for Smart Grids in support of Mandate M490, interaction with DG Info on Utility-Telco cooperation on EU goals. He is actively involved in the Dutch "Smart grid Cyber Security working group" on using the draft EU-M/490 SGIS toolbox. Involved in the setup of a Dutch "Industrial Security Platform" related to NEC/TC65 which is also covering the IEC62443 standardization. Topics of expertise are: Smart grid communication, Substation Automation Communication, Process/Industrial Control Security, ISO 9001 Auditing.



Grégory Huon
Substation Replacement Projects – Team Leader
Elia
& Leader of the IEC 61850 Taskforce
ENTSO-E

Grégory Huon was born in 1977. He received degrees of Master of Engineering (Electrical engineering), Institut Supérieur Industriel de Mons, Belgium – 2000) and Master of Science (IT and Management, Faculté Polytechnique de Mons, Belgium – 2003). Grégory began his career in the Transmission field in 2000. After an experience as Project Leader (2001-2006) and Team Leader (2006-2008) in infrastructure projects, Grégory was between 2008 and 2012 head of Secondary Systems governance & expertise level within Elia TSO in Belgium. Since 2013 Grégory is responsible for the infrastructure replacement projects – primary and secondary systems – for the Elia network in Belgium. Grégory is specialised in infrastructure project management, asset management and secondary systems expertise. Grégory published recently different papers regarding Elia's strategy over IEC61850 standard implementation and leads the ENTSO-E Task Force on IEC61850 standard and the Cigré Working Group B5.50 "IEC 61850 Based Substation Automation Systems – Users Expectations and Stakeholders Interactions".



Hans-Jørgen Stahl
Senior Engineer – Renewables SCADA
DONG Energy

Hans-Jørgen Stahl received his diploma as Power System Engineer in 1991 and started his professional career as project engineer in the power supply sector delivering systems for Substations. He is now project manager within the SCADA Management department in the Wind Power division of DONG Energy and has now the responsibility for SCADA and Communication at the offshore Wind Farm Borkum Riffgrund 1 in Germany. DONG Energy is one of the leading companies in the field of erecting offshore Wind Farms. During his career Hans-Jørgen has been responsible for several larger projects within automation and communication. In the past 5 years Hans-Jørgen has been a vital part of developing the requirements and the design for Substation Control Systems in Wind Farms within DONG Energy.



Thibaut GAZET
Research Engineer
EDF - R&D

Thibaut Gazet received a master degree in engineering from Supélec, Paris, France, in 2007. He joined the I&C department of EDF R&D, as a research engineer in 2008. He works on nuclear I&C renovation of 1300 MW power plants, network interconnection issues on gas combined cycle and nuclear power plants. He takes part in a research project to improve V&V methods of logical applications. He is involved in 61850 and engineering methods improvement for hydraulic power plant.



Roberto Calone
Engineer
Enel

Roberto Calone is Team leader Protection System in the Engineering and Standardization Department, Infrastructures and Network Division (ENEL Distribuzione Headquarters). He is involved in activities regarding technical specifications, homologations, international standardization, manufacturers qualification, operation support, foreign ENel companies support, specific territorial needs. The activities are related to the Protection Device and Protection System. Previously he was a Technical specialist in ENEL S.p.A. for the activities of commissioning and maintenance for the Primary Substation. He is Deputy Secretary of CEI (Comitato Elettrotecnico Italiano) – Technical Committees: 94/95 (Protection relé), and Member of the CEI – Technical Committees: 313 (Smart Grids), 316 (Network connection rules for HV, MV and LV). He is a member of the CIRE Working Group on Smart Grids, and CIRE Session 3 Advisory Group.



Pietro Tumino
Engineer
Enel

Pietro Tumino received the M.S. degree in Electrical Engineering from University of Catania, Italy. He has worked in Enel Distribuzione S.p.A., Central Office, Roma, Italy on devices and algorithms for remote control and automation of the distribution networks since May 2012. He is involved in the experimentation regarding the installation of Energy Storage Systems in Enel Distribuzione network and he has worked on the communication model of these ESSs based on IEC 61850. He collaborated in the development of a new communication architecture, for Enel, between the SCADA system and the several IEDs of the network, based on IEC 61850, and development of a customer controller plant IED and its data model compliant with IEC 61850 and with DSO requirements. Since 2013 he has worked in the new "Smart Cities Research Centre" of Enel in Bari, as senior researcher, on new devices and new techniques of regulation, automation and control for the low voltage networks, with modelling for real time simulations.



Patrick Lhuillier
Senior Engineer and R&D Expert
RTE

Patrick Lhuillier graduated from ESIEE, a French engineering school. He joined the EDF Group in 1980. For 29 years his field has been telecontrol for either distribution, generation, transmission and international departments. At present he works for RTE the French TSO, subsidiary of EDF group, where he has to study the impact regarding the implementation of the 61850. He is a member of the IEC TC57 committee: WG3 (101/104), WG10 (61850) and WG19 (harmonisation). He just led the "Substation-Control Centre communication" task force (WG19) in order to take the lead of the "user feedback" task force (WG10).



John Fitch
Protection and Control Technical Leader, Asset Management Directorate
National Grid

John Fitch is the Policy P&C Technical Leader for National Grid, Asset Management, where National Grid is the TSO for the 400kV and 275kV Transmission Network in England and Wales. John has worked for National Grid for more than 25 years, mainly in the area of secondary systems, primary interfaces and SCADA communications and has been involved in most technical areas including design, application, specification, equipment procurement and assessment. As P&C Technical Leader, John is establishing a consolidated vision and supporting delivery strategies for a digital substation solution for National Grid's Transmission substations, optimised for cost, risk and performance. This needs to be suitable for both AIS and GIS installations applied to new substation designs, substation bay extension and primary asset replacement projects. It is planned to use a modular approach using interoperable IEC 61850 standards, interfaces and equipment, operating over defined station and process bus network architectures. John is based in Warwick, England and is a UK committee member for IEC TC57 and TC95 standards bodies, participating in a number of Working Groups and the UK Regular Member for CIGRE B5 (Protection & Automation).



Carlos Rodriguez del Castillo
Technical Project Manager for IEC 61850 Substation Automation System R&D Projects
Red Eléctrica de España

Carlos Rodriguez del Castillo received his Telecommunication Engineering degree from the Seville University of Engineers in 1997. After graduation Carlos moved to Madrid and joined ELIOP, S.A. in 1998 where he worked for several years in SCADA development projects. Carlos has been involved in the design and implementation of multiple SCADA communication system solutions with legacy protocols, and has a field experience in working with standards. In 2005 Carlos joined Red Eléctrica de España, S.A.U. where he is currently working as a substation engineer and is the technical project manager for IEC 61850 substation automation system R&D projects. He is also responsible for certification testing of telecontrol equipments and interoperability testing between equipments with legacy protocols. He is member of the Spanish E3 Group, member of the IEC TC57 WG10 and member of the ENTSO-E IEC 61850 Task Force.



Amadou Lough
Asset Management
Stedin

Amadou Lough is a specialist in asset management within Stedin. He holds a MSc in Telecommunication (Wireless Communication) and High Voltage engineering from Delft University of Technology. He has worked for the Stedin Asset Management department since 2009. His main area of concentration is substation automation and data communication. This mostly comprises design and maintenance specifications for substation automation systems and data communication networks. For the last two years, his main activities were: Writing functional specifications for substation automation systems; Design of Stedin edge and access tele- and data communication network; Design of Stedin physical security platform including video surveillance an access control; Determining Stedin maintenance strategy based on asset state estimation; Designing Smart metering systems in Stedin distribution networks to facilitate demand supply load management; and Implementing Stedin Secondary Systems Management tool (SAMS).



Ekaterina Makhru
Stedin
Stedin

Ekaterina Makhru works as specialist asset manager within Stedin. She holds MSc in Sustainable Energy Technology from Eindhoven University of Technology, and Engineering (Metrology and Metrological Assurance) from Moscow State University of Railway Engineering. She has worked for the Stedin Asset Management department since March 2012. Her current area of concentration is protective relaying and substation automation. The current projects include implementation of IEDs at Stedin MV and LV stations and preparing standardization documentation (incl. Visual Specification Method of IEC 61850).

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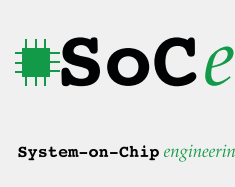
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