



pacworld
PROTECTION, AUTOMATION & CONTROL WORLD



Customized Continuing Education



What are we doing?

PAC World is offering the electric power industry a set of continuing education options covering IEC 61850 and its Smart Grid related applications.

Why are we doing it?

The electric power industry is going through significant changes driven by continuously increasing requirements for improvements in the reliability, security and efficiency of its operations. At the same time the electric power systems are also changing due to the significant penetration of renewable distributed energy resources. And last, but not least are the developments in computer and communication technologies that are used in modern protection, automation and control (PAC) systems. All of this results in the transition of many utilities towards the Smart Grid concept of a digital grid based on the IEC 61850 standard for power utility automation.

Even that IEC 61850 is already a well-established technology supported by all major protection, automation and control manufacturers and successfully running in thousands of substations, there are still a lot of people in our industry who are afraid of it. This fear is because many people are not comfortable with the new technology and the many benefits that are almost never discussed.

That is why PAC World decided to offer to the PAC community a range of customer-oriented continuing education options to help with the better understanding of the principles, applications and benefits of IEC 61850 in the Smart Grid.

How are we doing it?

We offer a selection of 50 topics covering different aspects of IEC 61850 and its application in Smart Grids.

Each topic is covered in a 50 minutes presentation followed by a 10 min discussion.

The material can be presented in flexible formats:

- Half day seminar
- One day seminar
- Two days seminar
- Three days seminar

Each can be with a pre-defined agenda or customized agenda.

Executives seminar

The goal of this seminar is to provide utility executives with a brief overview of the IEC 61850 standard and its development, followed by a detailed description of the benefits of its use related to improvements in reliability, security and efficiency of utility operations.

In principle this is intended to be a 2 hours seminar, but the format can be customized.

The content of the seminar is:

1. IEC 61850 overview
2. The business case for IEC 61850

Half-day Seminar

The goal of this seminar is to provide participants with an overview of the IEC 61850 standard and its development, followed by a description of the benefits of its protection, automation and control applications. An introduction of the engineering and testing features of the standard is later presented.

In principle, this is intended to be a 3.5 hours seminar, but the format can be customized.

A coffee break is between lectures 2 and 3.

The content of the seminar is:

1. IEC 61850 overview
2. IEC 61850 protection, automation and control applications
3. IEC 61850 based systems engineering and testing

Discussion

At the end of the seminar, the attendees receive a Continuing Education certificate.

One-Day Seminar

The goal of this seminar is to provide participants with an overview of the IEC 61850 standard and its development, followed by a description of the fundamentals of the different types of communications and the modeling principles.

A detailed description of GOOSE and sampled values communications and the benefits of their use in protection, automation and control applications is later presented.

An introduction of the engineering and testing features of the standard is later presented.

In principle, this is intended to be a 7-hours seminar, but the format can be customized.

A coffee break is between the second lectures in the morning and the afternoon.

The content of the seminar is:

1. IEC 61850 overview
2. Power system communications
3. IEC 61850 modeling principles

Discussion

Lunch break

4. GOOSE – principles, applications and benefits
5. Sampled values – principles, applications and benefits
6. IEC 61850 based systems engineering and testing

Discussion

At the end of the seminar, the attendees receive a Continuing Education certificate.

Two-Day Seminar

The goal of this seminar is to provide participants with an overview of the IEC 61850 standard and its development, followed by a description of the fundamentals of the different types of communications and the modeling principles.

A detailed description of GOOSE and sampled values communications and the benefits of their use in protection, automation and control applications is later presented.

The second day covers the engineering and testing features of the standard, as well as the business case for IEC 61850 and its applications in the Smart Grid.

In principle this is intended to be a 14- hours seminar, but the format can be customized.

A coffee break is between the second lectures in the morning and the afternoon of each day.

The content of the seminar is:

Day 1

1. IEC 61850 overview
2. Power system communications
3. IEC 61850 modeling principles

Discussion

Lunch break

4. GOOSE – principles, applications and benefits
5. Sampled values – principles, applications and benefits
6. Substation-to-substation communications

Discussion

Day 2

7. IEC 61850 based systems engineering
8. IEC 61850 based systems testing
9. Digital substations

Discussion

Lunch break

10. The business case for IEC 61850
11. IEC 61850 migration strategies
12. Smart Grids and the role of IEC 61850

At the end of the seminar, the attendees receive a Continuing Education certificate.

Three-Day Seminar

The goal of this seminar is to provide participants with an overview of the IEC 61850 standard and its development, followed by a description of the fundamentals of the different types of communications and the modeling principles. A detailed description of GOOSE and sampled values communications and their use in protection, automation and control applications is presented.

The second day covers the engineering and testing features of the standard, as well as the business case for IEC 61850 and its applications in the Smart Grid.

The third day of the seminar expands beyond the fundamentals of the standard and its applications and covers topics such as cyber security, wide area communications and their applications.

In principle this is intended to be a 21-hours seminar, but the format can be customized.

A coffee break is between the second lectures in the morning and the afternoon of each day.

The content of the seminar is:

Day 1

1. IEC 61850 overview
2. Power system communications
3. IEC 61850 modeling principles

Discussion

Lunch break

4. GOOSE – principles, applications and benefits
5. Sampled values – principles, applications and benefits
6. Substation-to-substation communications

Discussion

Day 2

7. IEC 61850 based systems engineering
8. IEC 61850 based systems testing
9. Digital substations

Discussion

Lunch break

10. The business case for IEC 61850
11. IEC 61850 migration strategies
12. Smart Grids and the role of IEC 61850

Discussion

Day 3

13. IEC 61850 and synchrophasor communications
14. Cyber security for IEC 61850 based systems
15. Integration of Distributed Energy Resources (DER)

Discussion

Lunch break

16. Evolution of IEC 61850
17. Non-conventional instrument transformers in digital substations
18. IEC 61850 for Wide Area Monitoring, Protection, Automation and Control Systems (WAMPACS)

Discussion

At the end of the seminar the attendees receive a Continuing Education certificate.

Logistics

To organize a seminar, you need to contact PAC World at pacw_ce@pacw.org and request a Seminar Order Form.

The seminars are held at a facility that you own or rent.

Coffee breaks and lunch breaks are provided by the organizer.

The number of seminar participants is not limited. The participants receive PDF files of the presentations included in the seminar.

The seminar fee that you pay to PAC World depends on the duration of the seminar and the seminar location (time to travel). The organizer also covers the speaker's expenses – travel, hotel and meals.

Certificates will be sent digitally by email after the seminar - the attendee details will need to be provided electronically.

List of Topics for Customized Seminars

The following is a list of topics to choose from to customize your seminar.

For a one-day seminar you can choose 6 topics.

For a two days seminar you can choose 12 topics.

1. Smart Grids and the role of IEC 61850
2. IEC 61850 overview
3. IEC 61850 Systems and their Components
4. The evolution of IEC 61850
5. From conventional substation design to IEC 61850
6. Compatibility between multiple versions of the standard – what needs to be considered
7. Communication services in IEC 61850
8. Ethernet Communications in Substations
9. Wide area communications
10. Networking in IEC 61850 substations
11. GOOSE Messages, Publishing and Subscription
12. IEC 61850 Process Bus: Sampled Values Publishing and Subscription
13. The semantic data model defined in IEC 61850
14. Advanced application modeling concepts
15. IED Object Models
16. Application modeling for PACS
17. IEC 61850 Testing - Equipment Requirements and Tools
18. Substation-to-substation communications
19. Substation-to-control center communications
20. IEC 61850 GOOSE based protection applications
21. IEC 61850 Sampled Values based protection applications
22. Migration strategies
23. IEC 61850 related standards – CIM, IEC 61499, IEEE C37.238

24. What is new in IEC 61850 Edition 2
25. IEC 61850 Edition 2 and beyond
26. Communication networks for IEC 61850 systems
27. Synchrophasor communications in IEC 61850
28. Time synchronization and Precision Time Protocol
29. Redundant communications in IEC 61850 based systems
30. Wide area GOOSE and Sampled value communications and their applications including phasor measurements
31. The IEC 61850 System Configuration Language
32. Engineering and design of IEC 61850 based systems
33. System Testing Concepts
34. The quality assurance process for IEC 61850 based systems
35. Maintenance testing of IEC 61850 based systems
36. The future of IEC 61850 and the Smart Grid / IEC 61850 for Smart Grids
37. Integration of Distributed Energy Resources
38. Digital Substation – the future of substation protection and control systems (SPACS)
39. Centralized Substation protection, automation and control systems
40. Non-conventional Instrument Transformers and their role in digital substations
41. Digitization of the electric power grid – principles and benefits
42. The business case for IEC 61850
43. Improving the efficiency of transmission line protection
44. Improving the efficiency of distribution protection
45. IEC 61850 applications to System Integrity Protection Schemes (SIPS)
46. IEC 61850 applications to distribution automation
47. IEC 61850 applications to condition monitoring
48. IEC 61850 based disturbance recording systems
49. IEC 61850 and cyber security
50. UML and XML – what they are and why we need to know them

Principal Presenter



Dr. Alexander Apostolov received MS degree in Electrical Engineering, MS in Applied Mathematics and Ph.D. from the Technical University in Sofia, Bulgaria. He has 45 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 IEEE PES Power Systems Relaying and Control (PSRC) Committee and the Power System Communications and Cybersecurity (PSCC) Committee. He is past Chairman of the Relay Communications Subcommittee and serves on many IEEE PES Working groups.

He has been involved in the development of IEC 61850 for 25 years and is member of IEC TC57 working groups 10, 17, 18 and 19.

He is Convenor of CIGRE WG B5.69 "Experience gained and Recommendations for Implementation of Process Bus in Protection, Automation and Control Systems (PACS)" and member of several other CIGRE B5 working groups.

He is Distinguished Member of CIGRE.

He holds four patents and has authored and presented more than 500 technical papers.

He is IEEE Distinguished Lecturer and Adjunct Professor at the Department of Electrical Engineering, Cape Peninsula University of Technology, Cape Town, South Africa.

He is Editor-in-Chief of PAC World.