

IEC 61850 BEYOND SUBSTATIONS – THE STANDARD FOR THE WHOLE ENERGY SUPPLY SYSTEM

IEC 61850 “Communication networks and systems in substations” is THE base standard for modelling of meaningful power system information, information exchange between intelligent electronic devices (IEDs) and the configuration of systems and devices for the whole electrical energy supply. The project “IEC 61850” has been started in 1995. Just a few years later utility experts of non-substation related application domains began to realize the benefits of a single international standard for the electric energy supply chain. Major vendors and users of wind turbines decided in 2001 to apply the coming standard IEC 61850 and to extend it for wind turbines. The IEC TC 88 “Wind Turbines” started the project “Communications for monitoring and control of wind power plants” in 2001. Experts in several other application domains of the electrical energy supply chain follow in the footsteps of the TC 88 experts. This paper first provides an overview about the common aspects of the new international standard IEC 61850 and how it is applied and extended to meet the requirements for almost the whole electrical energy supply chain:

- IEC 61850 extensions for Power Quality Monitoring
- IEC 61850 common extensions for monitoring, statistical and historical information
- IEC 61850 extensions for wind power plants including the new communication service mapping to web services (IEC 61400-25-x),
- IEC 61850 extensions for distributed energy resources (DER) (IEC 61850-7-420),
- IEC 61850 extensions for hydroelectric power plants (IEC 61850-7-410),
- IEC 61850 profile and extensions for high voltage switchgears (IEC 62271-3).

The IEC TC 57 has decided to publish all extensions of IEC 61850 under the single number “IEC 61850” with the following single new and extended title: “Communication networks and systems for power utility automation” to reflect the harmonized efforts of having one single harmonized standard for the whole electrical energy supply chain.

Secondly, this contribution shows how the life cycle of intelligent electronic devices (protection, control, monitoring and supervising devices) and primary equipment (circuit breaker, transformers, turbines, generators, etc.) is accompanied by a comprehensive set of meaningful information useful for the whole life cycle from production, over commissioning, operation, and condition monitoring to maintenance.

Finally, the paper shows also how the various information models can be easily mapped to state-of-the-art communication protocols like MMS (ISO 9506 – Manufacturing Message Specification according to IEC 61850-8-1), web services, IEC 60870-5-101/104 and DNP3 (according to IEC 61400-25-4).

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2. This paper has not been previously presented.
3. This paper is best-suited for the following topic categories:
4. Transmission & Distribution (T&D) Networks - Substation and distribution automation
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