

ENTSO-E statement on the IEC61850 standard

ENTSO-E calls for all IEC61850 stakeholders to take the appropriate actions in order to ensure the success of IEC61850 and to make sure the standard – and the technologies developed around it – remain sustainable and provide significant benefits for all stakeholders and the community.

This statement addresses the main stakeholders involved in the development and product implementation of the IEC61850 standard on communication networks and systems for power utility automation: secondary systems suppliers, International Electrotechnical Commission (IEC TC57, WG10 and others), conformance testing companies, third-party tool developers. This standard is of potentially large benefit to electricity transmission system operators (TSOs) as it addresses across different vendors many crucial aspects of TSO communications, with the promise of seamless interoperability of different vendors' subsystems within the overall TSO system management architecture.

As the single association representing 41 TSOs from 34 European countries, ENTSO-E makes the following observations and recommendations regarding the development of this important worldwide standard.

History:

In 1987, EPRI¹ kicked off the initial discussion on a new approach to communication and information technologies for utilities² via its Utility Communication Architecture (UCA) project. In the mid-1990s, the International Electrotechnical Commission (IEC) began developing standard IEC 61850 based on input from the UCA 2.0 project. In 2003-2004, the IEC published the first version of this standard, which was initially called Communication Networks and Systems in substations. The essence of this standard, apart from the adoption of the widely used Ethernet communication protocol and new engineering methods, lies in the promised interoperability between IEDs (protection relays, BCUs, PLC) made by different manufacturers. Such interoperability opens up interesting prospects for users, such as potential cost savings on cabling in a multi-vendor environment.

Issues to be addressed:

Nearly 25 years after the first considerations and 10 years after the publication of the 1st edition of the IEC61850 standard, we can unfortunately observe that **deployment of IEC61850 multi-vendor solutions is very scarce**, as opposed to the rather widespread applications of single-vendor solutions.

Feedback based on recent experiences with IEC61850 clearly demonstrated several major issues related to:

- **Instantaneous interoperability** between different suppliers is **not optimal and does even not currently work** in some vendor combinations.
- **Engineering efforts** required to implement the standard in a substation **are huge**:
 - There is currently no mature³ third-party tool available on the market. Grid operators are forced to use specific vendor tools that are not optimal in a multi-vendor environment and train staff to use a wide range of tools to configure the system. **A clear move by the market to a top-down approach using standardized third-party tools** is needed.
 - Transmission system operators want to be able to develop and manage by themselves – and possibly with the help of integrators – the technical knowledge and skills that are required to design and maintain IEC61850 substations. TSOs are unable to cope with this challenge with

¹ Electric Power Research Institute

² Services company

³ At transmission level

the **complexity of the tools** currently available. On the contrary, all of this complexity counteracts this objective and erodes the real added value of the standard.

- **Interoperability over the lifetime** of secondary systems equipment in a substation is **crucial** for protection and control applications. After less than 10 years of operation, some grid operators are already facing major issues with legacy solutions for which substation extensions and/ or upgrades are very difficult or even impossible to develop or find. In some cases, an extension is only feasible by replacing all the secondary systems in the substation, and accordingly by cancelling out a lot of residual financial value⁴ on the assets.

These experiences encourage grid operators to remain reluctant with regard to future applications.

Also, unfortunately and paradoxically, IEC61850 multi-vendor solutions seem to be even more risky than legacy ones in terms of guarantees, warranties, support and responsibility in case of difficulties: many vendors, many software tools (vendors and/or third-parties), a lot of firmware (and updates) and many potential evolutions of the standard itself⁵. Nevertheless, multi-vendor solutions stay the target to reach.

ENTSO-E suggestions:

We believe that all of these instances of experience feedback deserve clear and common answers, in particular from the vendors, in order to go further with the deployment of IEC61850 solutions in transmission system applications.

The final goal of the IEC61850 standard should be to contribute **a solution based on optical fibre and digital communication that offers all of the flexibility of copper wiring**, specifically in terms of interoperability and ease of configuration.

Standardisation committees should from the TSO perspective be more directive within the standard. **They should not allow different suppliers to implement standards differently**. In particular, **a strong standardization degree at the interfaces between tools (vendor specific or third-party) is required**. Moreover, **stability, or at least backward compatibility of the standard should be guaranteed**.

There is also a need to perform a harmonization between IEC 61850 and IEC CIM (Common Information Model) Standards. ENTSO-E TSOs are implementing IEC CIM Standards for data exchanges. There are applications which use both set of standards and significant improvements on interoperability and data exchange between the applications should take place. Without the harmonization of these standards, the development and the implementation of systems and applications will result in a significant amount of engineering and design that applies to specific implementation.

Conformance certifications of products and tools should be **reinforced and unambiguous**.

TSOs are responsible for **transmitting energy to consumers as efficiently as possible**. In this context, in order to ensure cost effectiveness, **innovation** must be considered as one of the means that can help us **optimise the ratio between “quality of services” and “solution costs”**.

Consequently, we would like to strongly suggest to all IEC61850 stakeholders to take the appropriate actions in order to ensure the success of IEC61850 and **to make sure the standard – and the technologies developed around it – remain sustainable and provide significant benefits for all stakeholders and the community**.

⁴ Depending on the amortisation rate of secondary systems

⁵ Edition 2 has just been published, and edition 3 is already in preparation.