

Current and future smart grid standardization activities of IEC TC57 “Power system management and associated information exchange”

Thierry Lefebvre, TC57 Chairman, EDF, France

Heiko Englert, TC57 Secretary, Siemens AG, Germany

Abstract

Standardization in the context of smart grids is predominantly characterized by focusing on interface specifications enabling the interoperability of systems, devices and equipment. Developing standards for the syntactic and semantic understanding between the information and communication technology (ICT) systems and devices in the field of power system management makes IEC TC57 one of the key smart grid committees. This poster is intended to highlight the portfolio of TC57, its architectural framework, current standardization projects and future plans. It shall make aware and encourage experts to participate and contribute to IEC work.

1 Introduction

In 1964 technical committee IEC TC57 was established because of the urgent need to produce international standards in the field of communications between the equipment and systems for the electric power process, including telecontrol, teleprotection and all other telecommunications to control the electric power system. Today TC57 standards are critical subset of standards to realize the smart grid.

The scope of TC57 comprises communication interfaces, information security and data model specifications covering power utility automation (protection, substation automation, distribution automation), DER management, SCADA, EMS, DMS, market communication as well as information exchange between power system and home-, building- and industry automation.

TC57 has published 130 standard documents. Currently 41 projects are in development by 12 working groups. Over 530 experts in total reflect strong interest and participation of 32 member and 12 observer countries [1].

2 Structure & Strategy

TC57 is organized in the following active working groups [1]:

- WG 03 Telecontrol protocols
- WG 09 Distribution automation using distribution line carrier systems
- WG 10 Power system IED communication and associated data models
- WG 13 Energy management system application program interface (EMS - API)
- WG 14 System interfaces for distribution management (SIDM)
- WG 15 Data and communication security
- WG 16 Deregulated energy market communications
- WG 17 Communications systems for distributed energy resources (DER)

- WG 18 Hydroelectric power plants – Communication for monitoring and control
- WG 19 Interoperability within TC 57 on long term
- WG 20 Planning of (single-sideband) power line carrier systems
- WG 21 Interfaces and protocol profiles relevant to systems connected to the electrical grid
- AHG8 Relevance of IPv6 Technology across TC57
- Chairman Advisory Group

Having both product and system aspects under consideration TC57 has intensive cooperation to other technical committees and organizations through joint working groups and liaisons.

In order to provide future-proof and consistent standards in reasonable time for an immediate reaction on market needs TC 57 applies the following strategy:

- Apply use case and requirements oriented approach for standards development
- Open proprietary structures by standardization of data exchange interfaces among IT systems and software applications, avoid to standardize applications themselves
- Use of state of the art standard information and communication technology platforms wherever available and applicable
- Ensure quality, consistency and compatibility of TC57 standards portfolio

3 Architecture Framework

IEC/TR 62357-1 [2] defines a reference architecture that describes all the existing object models, services, and protocols within TC 57 and how they relate to each other. Furthermore it helps to direct longer term goals and activities, specifically to ensure compatibility of all new standards developed in TC57. This architecture provides the user of standards a framework as basis to develop implementation strategies and architectures for specific project realizations.

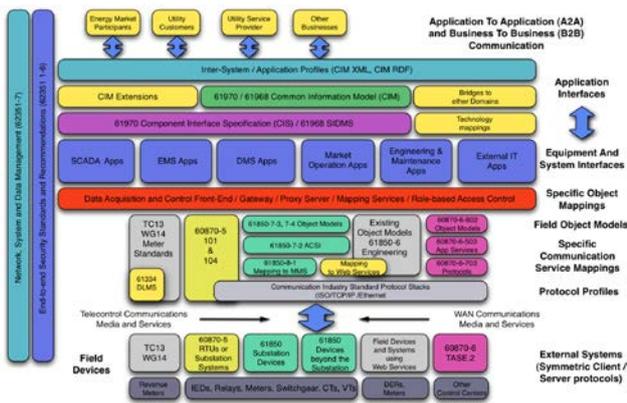


Figure 1 Reference Architecture

4 Core Semantic Standards

The Common Information Model (CIM) (IEC 61968, IEC 61970 and IEC 62325 series) and IEC 61850 series, have been recognized as pillars for realization of the Smart Grid objectives of interoperability and device management. These series define the semantic domains of power system management [3]. Figure 2 depicts the application coverage of CIM and IEC 61850 in the Smart Grid Architecture Model (SGAM).

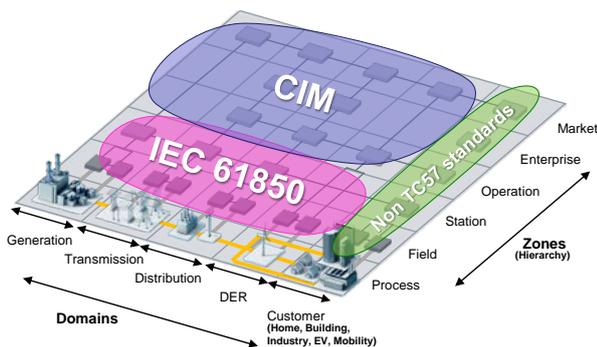


Figure 2 Semantic Domains in Smart Grid Architecture Model

The concept of decoupling data models from communication protocols and technologies is the key to achieve long-term interoperability. By introducing an adaptation layer between data model and communication services (e.g. Abstract Communication Service Interface (ACSI) in IEC 61850), this allows the flexible use of different communication technologies. This technology independence guarantees long-term stability for the data model and opens up the possibility to cope and benefit with the evolution of communication technologies.

In addition figure 2 shows locations where coordination with other committees and organizations is required when crossing from customer to power system domains.

5 Current and future projects

TC57 is responding to the market needs by extending and developing its standards portfolio through various pro-

jects. These projects are initiated by new work item proposals requested by national committees, in many cases fed through the gap analyses of smart grid standardization initiatives e.g. NIST, EU M490 or Strong and Smart Grid China.

In the following smart grid related project clusters are highlighted which are currently ongoing or in preparation:

Power utility automation

- System management of large scale device deployments in public communication networks
- Integration and management of DER, information exchanges for electric vehicles and storage systems.
- Guidelines for testing and commissioning

Electricity market communication

- Transaction profiles for North American and European style markets
- Semantic profiles for weather forecasts

Transmission / Distribution Management

- Semantic profiles for generation, maintenance and construction, meter reading and control, asset management, customer support

Customer Energy Management

- Semantic profiles for demand response (in coordination with TC13, TC65 and PC118)
- Communication profiles for load and generation management

Cyber security

- Key management for end-to-end security
- XML security features

6 Conclusion

IEC being an open, transparent and consensus oriented standardization organization provides the basis for future-proof and internationally accepted standards. Based on this platform TC57 offers a smart grid standards portfolio which is being today highly adopted by industry. Active participation and contribution of experts around the world is crucial requirement to ensure that TC57 will deliver standards which fulfill the market needs today and in the future. Therefore interested experts are encouraged to join and support the ongoing and future TC57 projects.

7 References

- IEC TC57 Dashboard: <http://www.iec.ch/tc57>
- IEC/TR 62357-1 Ed.1: „Power system management and associated information exchange – Reference architecture”, 2012.
- Cired Report “Smart Grids on the Distribution Level – Hype or Vision?” <http://www.cired.net/working-groups/smart-grids-on-the-distribution-level-hype-or-vision>, 2013.