



CONSEIL INTERNATIONAL DES GRANDS RÉSEAUX ÉLECTRIQUES
INTERNATIONAL COUNCIL ON LARGE ELECTRIC SYSTEMS

STUDY COMMITTEE D2
INFORMATION SYSTEMS AND TELECOMMUNICATION

Study Committee D2 Annual Report 2016

Mr. Joël NOUARD – SC D2 Technical Secretary

INTRODUCTION

SC D2 is focused on the study of information systems and telecommunication technologies and their application in the power utility environment.

SC D2 mission is:

- To facilitate and promote the progress of engineering and the international exchange of information and knowledge in the field of information systems and telecommunications for power systems;
- To add value to this information and knowledge by means of synthesizing state-of-the-art practices and drawing recommendations.

The evolution of the power utilities in all their activities has been linked to the evolution of the information and telecommunication systems, offering new opportunities, new capabilities, new capacities thereby allowing the utilities to be more efficient in their core business. In fact, ICT play a capital role in the evolution of power systems. The deployment of new advanced functionalities such as the smart grid architecture, distributed generation, power system efficiency optimization, etc. will only be possible with the latest generations of information systems and telecommunication technologies.

As defined by Cigré structure, SC D2 is a horizontal SC which means that its purpose is to interact with the rest of SCs in order to gather their specific requirements and disseminate the knowledge and capabilities in the field of information and telecommunication technologies.

The members of the SC D2 come from power utilities, manufacturers, consultants and research institutes. The balance between information technology and telecommunication specialist guarantees a seamless approach to the power utility challenges. There are 24 regular members and 12 observer members; in 2016 some members having reached the term of their mandates, 8 new regular members and 6 new observer members have been appointed.

Currently, there are about 190 experts from 34 countries contributing to the working bodies (3 advisory groups, 5 working groups and 3 joined working Groups) of SC D2.

At the SC D2 Paris discussion meeting, **Mr. Herwig KLIMA** (AT) received the 2016 TC Awards.

SC D2 has a liaison of type A with IEC TC 57 on “Power System Management and Associated Information Exchange”. Other organisations of interest for SC D2 activities are also monitored, i.e. “IEEE Power Engineering Society”, “Power System Communication Committee” (PSCC), “Internet Engineering Task Force” (IETF) and “World Wide Web Consortium” (W3C).

STRATEGIC DIRECTION

The SC D2 Strategic Plan (2012-2021) defines the organization of the SC D2 to cope with the following objectives:

- To be more customer oriented;
- To foster the participation in the working bodies;
- To be well balanced between information systems, telecommunications, telecontrol and automation;
- To draw the interest of the customers for the work done in the SC.

The following technical and administrative directions have been defined in the SC D2 strategic plan:

- **TD 1: Core telecom network technologies to cope with new requirements.**
 - Studying and considering telecommunication technologies and architecture evolution and how these changes may respond to the challenges and requirements of the new generation of ITS.
 - Technologies and architecture to assure business continuity and disaster recovery is an issue that has to be considered when a new architecture or technologies is being assessed.
- **TD 2: New operational and maintenance concepts and requirements.**
 - Maintenance scope, techniques and tools when deploying new technologies and architectures implementing new services.
- **TD 3: Strategies to deploy the network of the future.**
 - Detailed analysis of the numerous challenges introduced by the smart grid.
- **TD 4: IT Security.**
 - Overcoming security threats is a key issue in the deployment of the networks of the future and especially in the future Smart Grids.
- **AD 1: Widen study committee influence.**
 - Attracting members from non-represented NCs, vendors and Universities.
 - Improving relationship with related organizations.
 - Producing position papers on key issues will position SC D2 in a leading position in our field of influence.
- **AD 2: SC D2 member's involvement.**
 - Members required
 - Volunteers to collaborate in well-defined tasks, position papers, technology reports, etc.

These directions are aligned with the strategic directions defined by Cigré:

- Networks of the future.
 - Core telecom network technologies
 - Strategies to deploy new technologies
 - New IT operational architecture
- Energy efficiency support
 - New applications to improve efficiency
 - New telecom architectures and technologies
- Common aspects
 - New operational and maintenance concepts and requirements
 - Technologies and architecture to assure business continuity and disaster recovery

TECHNICAL ACTIVITIES

The activities carried out by the SC D2 are aligned with the strategic directions and can be classified into the following four technical activities:

TD 1 - Core telecom network technologies to cope with new requirements.

The power system of the future will massively require information sharing between different stakeholders. The implementation of such new approach will require the adoption of new generation of information system and telecommunication networks. The adoption of new network architectures and telecommunication technologies should consider the application of optical multiplexing, the deployment of all optical networks and new networking technologies.

Technologies and architecture to assure business continuity and disaster recovery is an issue that has to be considered when a new architecture or technologies is being assessed.

TD 2 - New operational and maintenance concepts and requirements

Deploying new technologies and architecture and implementing new services will require the revision of maintenance scope, techniques and tools. New operational concepts and technologies will introduce the need for information and telecommunication technologies able to support these new concepts.

TD 3 - Strategies to deploy the network of the future

Building new telecom infrastructure in a sustainable way introduces many challenges that have to be carefully analysed. Sharing infrastructures is a feasible way but requires thoroughly analyse regulations, new operational modes, new management schemes, etc. Service modelling to provide a straightforward integration of new Information technologies and the new operational architecture required by the networks of the future is also a relevant topic to be considered.

TD 4 - IT security

Overcoming security threats is a key issue in the deployment of the networks of the future and especially in the future smart grids. Assessing security risks, defining the proper security framework, architecture and best practices in the scope of legal requirements and other internal practices of the power utilities is a key topic to be developed. Deploying security over all the aspects of power system protection, control and operation is a strategic issue included in this technical direction. The study of international standards and their applicability to power utilities is also an aspect to be considered.

AD 1 and AD 2 - Widen SC influence and member's involvement

As part of its mission, the SC D2 maintains relationship with a number of different international organisations. Thanks to this, power utilities IT and telecom requirements and practices can be shared in other forums contributing to a better understanding and communications outside Cigré.

MEETING AND EVENTS

SC D2 regular meeting and discussion meeting (Paris - France)

The SC D2 regular meeting was held on the 23rd of August 2016 in Paris and the discussion meeting on the 26th of August 2014.

The preferential subjects of the 2016 SC D2 discussion meeting were:

PS1, New applications to control power systems.

- Smart Grid applications for DSO and TSO.
- Big data, applications and solutions.
- Convergence of SCADA, EMS, DMS and MMS applications.

The development of smart grids around the world represents new challenges to ICT systems, due to the insertion of new devices on the grid, such as smart meters, sensors and PMUs. In order to extract useful information to power companies from the great amount of data generated by these devices, new information systems should be developed. Also, the networks that should transport this data must be reliable, with adequate bandwidth and speed. New technologies demand the adoption of new topologies inside and between substations. However, at the same time, legacy systems still have a place in this transition and should not be discarded. Also, to guarantee interoperability between equipment from different vendors, there should be a standardization of information exchange models.

PS2, EPU response to evolving cyber security landscape.

- Protection of digital systems against current and upcoming threats.
- Impact of evolving cyber security regulations.
- Security architecture for power system information infrastructure.

Today electricity generation, transmission, and distribution operations are increasingly dependent on digital systems including information systems and communication networks. This evolution poses new challenges to the reliability of electricity supply, based on the introduction and exposure of vulnerabilities in digital systems, architectures, and communications. It has become essential therefore for electric power utilities (EPU) to consider cybersecurity threats and risks across all the organization and raise awareness from an operational to executive level, including vendors, partners, and third parties.

This situation calls for new security requirements for digital systems and the underlying architectures used in EPU. Security requirements have to be derived from appropriate risk assessments and general architectural decisions.

PS3, Mobile operational applications, systems and infrastructure.

- Wireless access to EPU field assets, operation and support platforms.
- Service continuity during disaster or blackout situations.

Smart Grids require of mobile operational applications, systems and infrastructure to face challenges derived from the complexities of the new scenarios of the electric industry for

example metering infrastructure, demand response, PMUs technology, distribution automation, integration of renewables sources like solar and wind, and keeping all this information secured and preventing hackers from getting into the grid. Therefore reliable, scalable, secure, and interoperable communications play a key role to fulfil the requirements of the new applications. The cost and performance of communications need to be in optimal balance when selecting designs and technologies, therefore electric utilities must carefully consider strategies for managing, integrating and operating various technologies to optimize their networks necessarily multiplatform.

Mr. Marcelo Costa de Araujo (BR) acted as special reporter for PS1, **Mr. Jens-Tobias Zerbst** (SE) as special reporter for PS2 and **Mr. Isaac Alberto Parra Ramirez** (MX) as special reporter for PS3. The event attracted about 100 persons; 47 prepared contributions and 31 spontaneous contributions from 13 different countries were presented.

RECENTLY COMPLETED WORK

SCD2 published in 2016 a Green Book GB3 “**Utility Communication Networks and Services**”. This book starts a new sub-serie "CIGRE Compact Studies" to satisfy the need of some Study Committees for a more concise book format covering a specific subject from the scope of a Study Committee. This CIGRE Green Book begins by addressing the specification and provision of communication services in the context of operational applications for electrical power utilities, before subsequently providing guidelines on the deployment or transformation of networks to deliver these specific communication services. Lastly, it demonstrates how these networks and their services can be monitored, operated, and maintained to ensure that the requisite high level of service quality is consistently achieved.

SC D2 also published in 2016 the Technical Brochure: TB668, WGD2.34 “**Telecommunication and information systems for assuring business continuity and disaster recovery**”. The occurrence and impact of natural catastrophe in recent years has proved that even the most prepared Electrical Power Utilities (EPU) experience unexpected difficulties facing these extraordinary situations. This Technical Brochure aims to provide a background for Business Continuity Management (BCM) for EPUs from the perspective of information systems and telecommunications as well as a comparison of experiences and procedures among utilities in order to set guidelines and best practices for the power community. The occurrence and impact of natural catastrophe in recent years has proved that even the most prepared Electrical Power Utilities (EPU) experience unexpected difficulties facing these extraordinary situations. This Technical Brochure aims to provide a background for Business Continuity Management (BCM) for EPUs from the perspective of information systems and telecommunications as well as a comparison of experiences and procedures among utilities in order to set guidelines and best practices for the power community.

The following WG has been dismantled as per decision of the SC D2 Chair:

- WGD2.34 “Telecommunication and information systems for assuring business continuity and disaster recovery”

FUTURE ACTIVITY

Two new WGs aligned with the above-mentioned strategic direction have been launched in 2016:

- WGD2.42 “Synchronization and time distribution in communication networks for time-sensitive distributed operational applications in the power grid”
- WGD2.43 “Enabling software defined networking for EPU telecom applications”

A third one related to IoT is in preparation: “Usage of Public or Private Wireless Communication Infrastructures for Monitoring and Maintenance of Grid Assets and Facilities”.

In 2017, SCD2 Colloquium will be held 20th-21st September in Moscow. More than 50 synopsis have been received for these preferential subjects:

PS1, Software platforms for control of distributed energy resources:

- Optimized interaction of distributed generation and distribution grids
- Tools providing economically efficient use of DER and Microgrid technologies
- Microgrid control in emergency and post-emergency conditions

PS2, Resilience to cyber threats of information and telecommunication systems in the power industry:

- Cybersecurity of DER control systems
- Cloud computing and IoT technologies: application limits from the view of cybersecurity provision
- Certification of information systems and telecommunications for resistance to cyber threats
- Modeling tools for cyber threats and cybersecurity measures

PS3, Highly reliable communication infrastructure for traditional and new applications in EPI:

- Digital communication systems in transmission and distribution grids
- Modern telecommunication networks for protection and control in EPI
- Developing secure and reliable ICT systems infrastructure

SC D2 can provide tutorials and workshops on information technology and telecommunication. Such events are typically organized by Cigré national Committees. Please contact the SC Chairman Philippe Quenaudon, or the SC Secretary Joël Nouard for further information. Contact details can be found on D2 web page d2.cigre.org.