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

STUDY COMMITTEE D2
INFORMATION SYSTEMS AND TELECOMMUNICATION

Study Committee D2 Annual Report 2011

Mr. Maurizio MONTI – SC D2 Secretary

STRATEGIC DIRECTION

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 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 directions have been defined in the Strategic Plan:

- Technical Directions:
  - ✓ Core Telecom network technologies to cope with new requirements.
  - ✓ New operational and maintenance concepts and requirements.
  - ✓ Strategies to deploy the network of the future.
  - ✓ IT Security.
- Administrative Direction:
  - ✓ Widen Study Committee influence.

SC D2 published in 2011 four Technical Brochures:

- TB 450, WGD2.24 – "EMS for the 21st Century – System requirements" February 2011.
- TB 459, WGD2. 18 – "Metering, revenue protection, billing and CRM/CIS functions" April 2011.
- TB 460, WGD2.23 – "The use of Ethernet technology in the power utility environment" April 2011.
- TB 461, WGD2.26 – "Telecommunication service provisioning and delivery in the electrical power utility" April 2011.

SC D2 contributed to the Cigré 2011 Symposium in Florence on "The Electric Power System of the Future – Integrating Supergrids and Microgrids" by convening the Session on "ICT and Smart Metering".

The 2011 SC D2 Regular Meeting and Colloquium were held in Buenos Aires (AR) from the 18th to the 21st of October 2011. The Preferential Subjects of the 2011 SC D2 Colloquium were:

- **PS1 – "Communication Technologies and Solutions for Core Networks in Electric Power Utilities"**. The technologies and solutions for core networks are evolving and the utilities are seeing an increasing number of new alternatives. Some of them will not be of interest for EPUs and some others are currently being incorporated gradually and will be widely used in the future. The focus was in the following areas, Applications, Reliability and Availability and Experience.
- **PS2 – "Access solutions to be implemented by Electric Power Utilities"**. The increasing demand of new services, together with the evolution of the core networks, results in the implementation of access solutions that make use of a wide diversity of technologies, making network planners face new challenges. The focus was on Substation and Protection access, Wireless access and Cyber Security.
- **PS3 – "Information Systems to support data interchange between market participants"**. Deregulated markets have proven to be strongly information demanding. The transactions,

among players in this marketplace, require the interchange of a lot of real time information among information systems based on different technologies. Focus is on:

- ✓ Requirements and architecture for data interchange applications
- ✓ Networking solutions for local and cross-border market participants.

A total of 31 papers were presented and discussed. The Colloquium attracted more than 150 persons. Following the SC D2 Colloquium, a Tutorial was held on "Communications for Line Protection Relaying and System Integrity Protection Applications". The following presentations were made:

- "Communication Service Requirements and Quality Objectives for Protection Applications", M. Mesbah (FR),
- "Protection Communications Architectures, Legacy and IEC61850", H. Spiess (CH)
- "Packet Switch Network Technologies & Solutions for Protection Communications", J. Darne (ES)
- "IEC61850 - Coordinating Data Presentation from Substation to Control Centre", T. Lefebvre (FR)
- "IEC61850 in Argentina and the Region", F. González (AR)

TECHNICAL ACTIVITIES

CORE TELECOM NETWORK TECHNOLOGIES TO COPE WITH NEW REQUIREMENTS

The objectives of this technical direction are as follows:

- 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.

The following Working Bodies are contributing to this technical direction.

Telecommunication Networks, Services and Technology

The mission of Advisory Group, AGD2.03 is to monitor these technologies and to foresee its possible use and impact on power utilities.

AGD2.03 has identified the following potential issues of concerns:

- Operation & Maintenance of Telecom and IT systems.
- Sharing of communication infrastructures and resources.
- Communications of microgrids, industrial platforms & smart cities.
- Telecommunication and Information Systems for Assuring Business Continuity and Disaster Recovery.
- Scalable Transport Solutions over Optical Networks.

Telecommunication Service Delivery, Architecture, Management and Support in the Electrical Power Utility

The issue of concerns was that more and more applications although not considered as "operational" ones are critical and necessary for operational purposes.

WGD2.26 was created with the scope of work to analyze and to provide a new insight into the delivery of communication services associated with Operational applications of the Electrical Power Utility.

The work was carried out from April 2009 to April 2011; the Technical Brochure was approved by SC D2.

Power Line Carrier Channel Modelling, Planning and Usage

A lot of work was already achieved within SC D2 on the subject of PLC. However, not so much was carried out related to the modelling.

The scope of work of WGD2.27 is to review and evaluate the existing modelling work and standards, to focus on PLC securities issues as well as to assess the pros and cons of digital/analogue HV PLC communications.

The Technical Brochure is expected by the mid 2012.

NEW OPERATIONAL AND MAINTENANCE CONCEPTS AND REQUIREMENTS

The objective of this technical direction is as follows:

- Revision of maintenance scope, techniques and tools when deploying new technologies and architectures implementing new services.

The following Working Bodies are contributing to this technical direction.

Communication Architecture for IP-based Substation Applications

As more and more IP-based applications are used in substations, a Working Group was started in 2009, WGD2.28, to investigate the performance requirements of these services, and to organize them into a single coordinated communication architecture covering:

- Existing applications evolving into IP communications (Substation Automation Systems and their extension beyond the perimeter of the substation, TCP/IP SCADA, voice communications, etc.);
- New applications necessitating IP connectivity to the substation (Substation Security and Video surveillance, Substation Asset Condition Monitoring and Management, etc.).

A Technical Brochure was drafted and approved in 2011 by the SC D2.

Communications for HV Substation Protection & Wide Area Protection Applications

Several utilities have faced severe problems with non-adequate function when installing modern communication and teleprotection systems due to inadequate coordination between Protection and communication equipment.

Thus, JWGB5/D2.30 was set up and its main objective was to explore the issues related with the correct association of protection and communication equipment and in particular the performance troubles.

The Technical Brochure is under way (completion expected beginning of 2012) and the status of the chapters is as follows:

- Fundamental principles in Protection and Telecommunications enabling to have a common understanding between Protection and Communication engineers finalized in June 2011.
- Line Protection over Digital Circuit communications scanning present issues encountered in associating Protection relays and digital communication channels finalized in June 2011.
- Protection over Packet Switched Networks including System Protection Schemes presently in progress.

STRATEGIES TO DEPLOY THE NETWORK OF THE FUTURE

The objective of this technical direction is as follows:

- Building new telecom infrastructure in a sustainable way introduces many challenges that have to be carefully analysed.

The following Working Bodies are contributing to this technical direction.

Core Business Information Systems

The mission of Advisory Group D2.01, AGD2.01, is to monitor the evolution of the Information Systems. The AGD2.01 has proposed the following two items as potential issues of concerns:

- Smart Grid implications in EMS/DMS, new applications and interoperability requirements;
- Tools and applications to allow residential customer interaction with a smart grid environment.

Metering, Revenue Protection, Billing and CRM/CIS functions

Metering, Billing and CRM are important functions in the liberalized electricity market process. Metering and billing were already basic functions for the electricity supply chain before the liberalization, while CRM in his complete functionality entered in this sector since the market opening.

WGD2.18 carried out:

- A bibliographic investigation on "Standards and Recommendations, State of the Art, Practices and Trends" (more than 50 reviewed documents);
- The drafting and analysis of a technical questionnaire;

Then a Technical Brochure was drafted and approved by the SC D2 for publication.

Communication Access to Electrical Energy Consumers and Producers

A Working Group, WGD2.29, was created to examine the different solutions for providing communication access to consumer and producer premises in different urban, sub-urban and rural environments with an eclectic approach, through a multi-technology group, allowing to deliver a solution-oriented rather than a technology-focused analysis of the appropriate solutions.

This work resulted in a Technical Brochure that was approved for publication by SC D2 end of 2011.

IT SECURITY

The objective of this technical direction is as follows:

- Overcoming security threats is a key issue in the deployment of the networks of the future and especially in the future Smart Grids. Deploying security over all the aspects of the EPU is a strategic issue included in this technical direction.

The following Working Body is contributing to this technical direction.

Security architecture principles for digital systems in Electric Power Utilities (EPU)

The scope of work of WGD2.31 deals with general Security Architecture principles for digital systems, and will also focus on certain aspects:

- Defence in Depth and Graded Approach methodology (zoning principles) in EPUs
- Smart Grid relevant Security Architecture principles, with a focus on Security Architecture of domains interconnectivities, in particular, Generation-Transmission interface and Market domain interface International Standard, recommendations and regulatory demands
- Developments of Security Architecture for digital systems in regards to upcoming threats scenarios as well as business demands
- Supporting technical control structure of the Information Security Architecture

This not only concerns transmission security but is relevant for any digital systems such as nuclear power systems, etc.

WGD2.31 has already finalized some parts of the work and published papers at the SC D2 Colloquium on:

- "Graded approach to cyber-security for EPUs: security levels and zone concepts".
- "Modelling of cyber attacks for assessing smart grid security".

A third part on 3rd party maintenance access tackling with the risk of 3rd party maintenance and information transfer to/from partners as well as rules and best practices for maintenance support is under way.

The Technical Brochure is expected in 2013.

ADMINISTRATIVE ACTIVITIES

To adapt SC D2 structure to on-going activities and where necessary **"Restructure Working Groups**" four WGs having published its work was dismantled:

- WGD2.18, "Metering, revenue protection, billing and CRM/CIS functions".
- WGD2.23, "The Use of Ethernet Technology in the Power Utility environment".
- WGD2.24, "EMS Architectures for the 21st Century".
- WGD2.26, "Telecom Service Delivery Model, Architecture, Management and Support in the Electrical Power Utility".

Following discussions at the last SC D2 Regular Meeting and based on the advices of the Advisory Groups, it is agreed that the creation of the following Working Groups is to be considered:

- Telecommunication and Information Systems for Assuring Business Continuity/Disaster Recovery.
- Smart Grid and communication of microgrid.
- Operation & maintenance of Telecom & IT System.

Terms of Reference will be drafted and submitted to the Technical Committee.

The table provides for each technical area the Working Body in charge of carrying out the tasks.

Title	AG/WG Convener
Advisory Group on "Information Systems"	AGD2.01 Mr. G. Ericsson
Advisory Group on "Communication with other SCs and Cigré Stakeholders"	AGD2.02 Mr. G. Galarza
Advisory Group on "Telecommunication Networks, Services and Technology"	AGD2.03 Mr. M. Mesbah
Power Line Carrier Channel Modelling, Planning and Usage	WGD2.27 Mr. G. Vrabic
Communication Architecture for IP-based Substation Applications	WGD2.28 Mr. H. Riis
Communication access to Electrical Energy Consumers and Producers	WGD2.29 Mr. P. Moray
Communications for HV Substation Protection & Wide Area Protection Applications	JWGD2/B5.30 Mr. M. Mesbah
Security Architecture Principles for Digital Systems in Electric Power Utilities (EPUs)	WGD2.31 Mr. J. Zerbst

A2 WIDEN STUDY COMMITTEE INFLUENCE

SC D2 Members are active in the following organizations:

- IEC TC57, "Power System Management and Associated Information Exchange",
- IEEE Power Engineering Society, "Power System Communication Committee" (PSCC),
- IETF, "Internet Engineering Task Force",
- EUTC, "European UTC".