CIGRE Study Committee B5: PROPOSAL FOR CREATION OF A NEW WORKING GROUP (1)

WG* N° B5.56	**Name of Convener :** Peter Kreutzer (CH) **E-mail addresses**: peter.kreutzer@ch.abb.com
Technical Issues #: 5	**Strategic Directions #: 1, 2**
The WG applies to distribution networks (4): Yes	
Title of the Group: Optimization of Protection Automation and Control Systems	

Scope, deliverables and proposed time schedule of the Group :

Background :

Protection Automation and Control Systems (PACS) cannot be considered isolated from their environment. Overall optimization includes:

- the improvement of PACS themselves (architecture, functional integration, standardisation, digitalisation etc.) taking into account their whole life cycle
- the interaction of the PACS with other equipment in the substation (e.g. auxiliary services, primary equipment).

Depending on the size and voltage level of the substation and on the criteria applied (e.g. cost, reliability, footprint, remote access for operation and maintenance, etc.), the optimization of PACS can lead to a great variety of results, e.g. adapted PACS architectures depending on the voltage level of the substation.

Scope :

The Working Group shall explicitly identify all criteria and parameters impacting the PACS. The impact of each item on the PACS design has to be evaluated.

The WG will conduct a survey amongst utilities and vendors to capture the state of the art and the criteria applied to day and anticipated for the decade to come. This survey should also give a feedback from operation and maintenance staff concerning PACS design constraints.

A method for a multi-criteria approach for PACS optimization shall be proposed on this base. This approach includes, for instance, considerations for:

- Overall PACS Architecture for voltage levels,
- Functional Integration (less bay segregation, reduction of the number of devices),
- PACS foot print,
- LAN design and protocols (e.g. redundancy protocols),
- Time synchronization,
- Bay standardisation (use of bay function templates, definition of user profiles),
- Tools for engineering, configuration, data retrieval and maintenance,
- Management of the firmware/software releases.

The optimization criteria to be considered should include, for instance:

- Interoperability and Interchangeability of PACS components
- Functional Integration of the PACS including integration of protection and control functions in the same IED
- Qualification, validation, FAT and SAT
- Life-time maintenance (including reconfiguration) and asset management,
- Monitoring of primary equipment,
- Monitoring of auxiliary services and substation infrastructure,

- PACS self-supervision,
- Remote accessibility for monitoring of HV primary equipment and PACS themselves,
- Integration of analogue process near sensors (NCIT/current and voltage samples) via process bus,
- Integration of binary process near sensors and actuators (commands/trips, positions) via process bus ,
- Capacity of Implementation and support of functions related to EMS, SCADA, and Network Control Center (e.g. local balancing functions).

This method shall be applied to a limited number of use cases, namely small HV and distribution substations, huge VHV (Very High Voltage) substations with several voltage levels, and substations in an urban environment. Possibilities and options of optimization of PACS already in service should also be evaluated on this base.

Exclusions

The WG should not elaborate on Cyber Security aspects which are covered by other CIGRE WGs.

Deliverables :

- Technical Brochure
- Summary in Electra
- Tutorial Proposal Forms
- Power Point slides for Tutorial

Time Schedule : start : January 2015 **Final report** : 2020

Comments from Chairmen of SCs concerned :

Approval by Technical Committee Chairman :

Date : 08/01/2015

Rev a: Update 13/02/2020 Change of Convener and final date

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows within distribution level and to the upstream network.
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (cf. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non technical audience