CIGRE Study Committee B5

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP (1)

WG* N° B5.59	**Name of Convenor :** Xu Lei **E-mail address**: xul@nrec.com
Technical Issues # (2):6	**Strategic Directions # (3): 1, 2**
The WG applies to distribution networks (4): Yes	
Title of the Group: Requirements for Near-Process Intelligent Electronic Devices	

Scope, deliverables and proposed time schedule of the Group:

Background :

The introduction of communication busses, and namely IEC 61850 based process bus, in Protection, Automation and Control Systems (PACS) of substations enables different architectures of the control system. These new possibilities include the installation of Intelligent Electronic Devices (IED) in the switchyard close to the primary equipment or even to include the IED in the design of the primary equipment. By doing this, the IED has to meet both functional and environmental requirements. Also, use and configuration of the existing IEC 61850 model based on Logical Nodes (LNs) defined in IEC 61850-7-4, and their application recommended in IEC 61850-7-500, has to be considered in order to guarantee interoperability with the rest of the PACS functions.

Equipment susceptible to be installed near the process include:

a. Stand Alone Merging Units (SAMU),
b. Non-Conventional Instrument Transformers (NCIT) and associated Merging Units (MU),
c. IED(s) associated with Circuit Breakers and Disconnector Switches (BIED, SIED),
d. IED(s) providing interfaces for the monitoring of switchyard which may be also be part of the respective BIED(s) and SIED(s),
e. Relay protection IED(s) installed close to the primary equipment to be protected.

Some pilot projects on this field have been reported.

Associated standards existing or in preparation include

- IEC 61850-3 referencing relevant standards,
- IEC 61869 series defining CIT(s), NCIT(s), MU(s) and SAMU(s),
- IEC 61000 series defining electromagnetic compatibility.

Scope:

The aim of the WG is to produce guidelines and propose requirements for the specification and configuration of Near-Process IED(s) and to elaborate recommendations for their design and installation. The following items will be discussed in the TB:

1. Describe standard Use Cases for the equipment “a” to “e” listed above for a stand-alone installation and for an installation in switchyard control cubicles. These use cases include:
    a. SAMU connected to conventional CT / VT of an outgoing feeder,
    b. Non-conventional IT (NCIT) with related MU of an outgoing/incoming feeder,
    c. Near-process IED(s) associated to a transformer (including grounding, primary and secondary feeders and tertiary windings, tap changer, transformer monitoring, monitoring of transformer auxiliary equipment),

d. Near-process IED(s) associated to switchgear of outgoing feeders including monitoring of these equipment,
e. Near-process protection relay IED(s) associated to a primary equipment, including communication interface with other IED(s) on process- or station level.

2. Evaluation of the required Electro Magnetic Compatibility (EMC) class and other environmental requirements concerning the IED design (temperature, humidity, etc.) depending on the installation characteristics.
3. Proposals how to enhance the EMC capability and environment adaptation (temperature, humidity, salt spray, etc.) according to the installation characteristics.
4. Proposals how to optimise the secondary system using near-process mounted IED(s), including simplifying the physical/logical connection between IED(s), and minimizing the size of IED(s). The work of B5.57 will be taken into account.
5. For common understanding of each use case, summarize the IEC 61850 Logical Device model associated to the process interface (binary and analogue inputs and outputs).
6. For each use case, identify requirements to be mentioned in the specification of near-process IED.
7. Identify requirements for replacement, in-service-maintenance and testing depending on the installation characteristics.
8. Identify relevant reliability and redundancy requirements.

Deliverables:

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

Time Schedule : start : March 2016 **Final report** : Spring 2019

Comments from Chairmen of SCs concerned :

Approval by Technical Committee Chairman :
Date : 12/01/2016

(1) Joint Working Group (JWG) - (2) See attached table 1 – (3) See attached table 2
(4) Delete as appropriate

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