CIGRE Study Committee B5

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP[1]

(J)WG N° B5.68	**Name of Convenor:** Camille BLOCH (FR)
Strategic Directions #[2]: 1	**Technical Issues #[3]: 6**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 2, 3	
Title of the Group: Optimisation of the IEC 61850 Protection, Automation and Control Systems (PACS) engineering process and tools	

Scope, deliverables and proposed time schedule of the Group:

Background:

An ever increasing number substation Protection, Automation and Control Systems (PACS) based on IEC 61850 is being commissioned. Users are now asking for interoperable multi-manufacturer PACS and actively evaluate the use of IEC 61850 process bus in addition to the "traditional" substation bus in a movement towards a fully digital substation.
This raises the question of functional interoperability of all the devices having an IEC 61850 access point (Low Power Instrument Transformers (LPITs), Merging Units (Mus), bay level Intelligent Electronic Device (IEDs) and Supervisory Control and Data Acquisition (SCADA)) coming from different manufacturers and the question of the interoperability of the associated engineering tools. Also, users need to have guidance for proper management of PACS and IED configuration files, especially if they contain proprietary information not covered by IEC 61850 consistency checks.
More globally, users start to have quite elaborated requirements for the characteristics of an IEC 61850 PACS engineering tool suite if used for a top-down IEC 61850 based configuration of a multi-manufacturer IEC 61850 based PACS.

Scope:

The general aim of the WG is to elaborate requirements:

- for the characteristics that an IEC 61850 PACS engineering tool should have if used for a top-down IEC 61850 based configuration of a multi-manufacturer PACS;
- for the characteristics of an IEC 61850 IED configuration tool to be used with the PACS configuration tool mentioned above;
- for the elaboration process of PACS engineering from single line diagram to PACS configuration creation;
- to guarantee the consistency and the continuity of the PACS engineering process, including in case of modifications occurring during its whole lifecycle.

The Technical Brochure elaborated by the WG will include:

1. Description of the configuration process defined in IEC 61850 and the associated files.
2. Review of recent publications and discussion sessions related to IEC 61850 PACS and IED configuration tools.

3. Review of best practices related to the engineering of PACS based on IEC 61850.
4. Requirements in addition to IEC 61850 compliance for interoperability between configuration tools:
    - Verifications and consistency check (pre- and post-commissioning)
    - Import / Export functions
    - PACS Human Machine Interface (HMI) / PACS HMI configuration (excluding HMI of IEDs)
    - IED configuration
    - System (PACS) configuration
    - SCADA gateway configuration
    - Comparison of updated configuration files with reference version
    - Testing
5. Harmonisation of the engineering process based on the PACS configuration tool, including project management aspects.
6. “Optimum” boundary between harmonization and customization for the different engineering and configuration tools needed for a PACS integration.
7. Recommendations for the HMI and functions of the configuration tools.
8. Use cases, including:
    - integration of configured bays in a PACS;
    - accommodate partial configuration modification of a separate function;
    - functional integration on operating PACS;
    - engineering of important auxiliary functions (e.g. cyber security, on-line control of data flow, monitoring of availability and performance);
    - extension of an operating PACS with new bays equipped with devices coming from a manufacturer different from the prior.
    - Communication between two different PACS on the same site.
9. Cyber-security of the configuration process, including methods to protect configuration files.
10. Recommendations for the management of IED configuration files (validation, update, comparison, commissioning).
11. Recommendations for revision control, audits, collaboration methods, peer-reviews and documentation associated to the PACS configuration.
12. Management of the engineering and configuration tools over the PACS life cycle, by taking into account external constraints (e.g. evolutions of the operating systems).
13. Recommandations for the testing methods of the PACS configuration (FAT/SAT excluded).

Comments : Reference to IEC61850-6, SICS statement

References to be used as input:

1. IEC 61850 series, especially IEC61850-6, SICS functions
2. IEC 61869 series
3. CIGRE B5 PS1 2017 and PS2 2018 papers, special report and group discussion
4. ENTSO-E discussion regarding harmonisation of top-down engineering process

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial[5]

Time Schedule: start: April 2019 **Final Report**: September 2022

Approval by Technical Committee Chairman:

Date: November 5th, 2018

Notes: [1] or Joint Working Group (JWG), [2] See attached Table 2, [3]See attached Table 1, [4] Delete as appropriate, [5] Presentation of the work done by the WG, [6] See attached table 3

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
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 (ref. 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

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit