

CIGRE Study Committee B5

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG¹ SC B5.84	Name of Convenor: David Macdonald (GB) E-mail address: david.macdonald@ge.com
Strategic Directions #²: 1	Sustainable Development Goal #³: 9
This Working Group addresses these Energy Transition topics: <input type="checkbox"/> Storage <input type="checkbox"/> None of them <input type="checkbox"/> Hydrogen <input checked="" type="checkbox"/> Digitalization <input type="checkbox"/> Sustainability and Climate Change <input type="checkbox"/> Grids and Flexibility <input type="checkbox"/> Solar PV and Wind <input type="checkbox"/> Consumers, Prosumers and Electrical Vehicles <input type="checkbox"/> Sector Integration	
Potential Benefit of WG work #⁴: 1, 2, 3, 4, 5, 6	
Title of the Group: Recommendations and constraints for development and interfacing of virtual Intelligent Electronic Device implemented in Protection, Automation and Control Systems	
Scope, deliverables and proposed time schedule of the WG: Background: <p>There is a growing interest in using virtualised solutions for Protection, Automation and Control Systems (PACS). This approach allows to implement functions in a server structure which takes care of redundancy and availability of the functions.</p> <p>Similar to hardware based Intelligent Electronic Device (IED) implemented in a PACS, the use of virtual IEDs enables the user to combine IEDs from several vendors in one server structure. This constitutes one main difference with a proprietary centralised PACS solution.</p> <p>In order to enable use of virtual IED, the communication interfaces and other characteristics of the virtual IED need to be defined. Regarding communication, the virtual IEDs need to be fitted with an IEC 61850 interface and they have to be configurable based on IEC 61850 configuration rules and files. Other requirements are necessary for the implementation of the virtual IED in the server structure. Consequently, the server structure also needs to fulfil certain requirements.</p> Purpose/Objective/Benefit of this work: <p>The aim of the Technical Brochure developed by the Working Group is to describe the possibilities and requirements for virtual IED and the hosting server structure and to illustrate this with use cases. It should give an overview over the state of the art of the different items and give recommendations about further developments, open-source platforms or standardisation activities.</p> Scope: <p>The TB shall in particular discuss the following points:</p> <ul style="list-style-type: none"> • Virtual IED <ul style="list-style-type: none"> ○ Identify and discuss issues, risks, benefits and solutions 	

- Engineering of IEC 61850 based interface
- IEC 61850 configuration
- Time synchronisation
- Administration and update of virtual IED
- Supervision of virtual IED
- Communication, Memory and CPU capacity evaluation
- Future of Virtual IED concept
- Server structure
 - Requirements for servers hosting virtual IEDs
 - Requirements for the interface provided of the server structure for the virtual IED
 - Industrial Server Requirements for Virtualised PAC
 - Comparison of Hypervisors and their technologies
 - Redundancy Requirements
 - Monitoring of Hardware, Middelware, and Software
- Requirements for IED Configuration Tools (ICT) of virtual IEDs, hosted in the server structure
- State of the art survey
- Interfacing of the virtual IEDs with an existing PACS
 - Interface with other PACS functions implemented in standalone physical IED
 - Process interface
 - Time synchronisation interface
- Testing and Commissioning of Virtual IEDs
- New skills and training requirements for this technology
- Link between virtual IED and Digital Twin concept

Out of scope:

- Architecture of PACS and sever structure (covered by B5.70)
- Centralised PACS

Remarks:


- Liaise with B5.70
- Liaison member from SC D2

Deliverables:

- Annual Progress and Activity Report to Study Committee
- Technical Brochure and Executive Summary in Electra
- Electra Report
- Future Connections
- CIGRE Science & Engineering (CSE) Journal
- Tutorial
- Webinar

Time Schedule:

- Recruit members (National Committees, WiE, NGN) Qtr 1 2024
- Develop final work plan Qtr 2 2024
- Draft TB for Study Committee Review Qtr 4 2027

<ul style="list-style-type: none">• Final TB• Tutorial• Webinar	Qtr 1 2028 Qtr 2 2028 Qtr 2 2028
Approval by Technical Council Chair: Date: March 06 th , 2024	

Notes:

¹ Working Group (WG) or Joint WG (JWG),

² See attached Table 1,

³ See attached Table 2 and CIGRE reference Paper: Sustainability – at the heart of CIGRE's work.

⁴ See attached Table 3

WG Membership: refer Comments at end of document

Table 1: Strategic directions of the Technical Council

1	The electrical power system of the future reinforcing the End-to-End nature of CIGRE: respond to speed of changes in the industry by preparing and disseminating state-of-the-art technological advances
2	Making the best use of the existing systems
3	Focus on the environment and sustainability (in case the WG shows a direct contribution to at least one SDG)
4	Preparation of material readable for non-technical audience

Table 2: Environmental requirements and sustainable development goals

	CIGRE selected the 7 SDGs that are the most relevant to CIGRE. In case the WG work refers to other SDGs or do not address any specific SDG, it will be quoted 0.
0	Other SDGs or not applied
7	SDG 7: Affordable and clean energy Increase share of renewable energy; e.g. expand infrastructure for supplying sustainable energy services; ensure universal access to affordable, reliable, and modern energy services; energy efficiency; facilitate access to clean energy research and technology
9	SDG 9: Industry, innovation and infrastructure Facilitate sustainable infrastructure development; facilitate technological and technical support
11	SDG 11: Sustainable cities and communities Increase attention on sustainable and resilient buildings utilizing local (raw) materials, power for electric vehicles, strengthening long-line transmission and distribution systems to import necessary power to cities, developing micro-grids to reinforce the sustainable nature of cities; protect and safeguard the world's cultural and natural heritage; reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and waste management
12	SDG 12: Responsible consumption and production E.g. Promote public procurement practices that are sustainable; address reducing use of SF6 and promote alternatives, encourage companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle, address inefficient fossil-fuel subsidies that encourage wasteful consumption
13	SDG 13: Climate action E.g. Increase share of renewable or other CO ₂ -free energy; energy efficiency; expand infrastructure for supplying sustainable energy; strengthen resilience and adaptive capacity to climate-related hazards and natural disasters; integrate climate change measures into national policies, strategies and planning; improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
14	SDG 14: Life below water E.g. Effects of offshore windfarms; effects of submarine cables on sea-life
15	SDG 15: Life on land E.g. Attention for vegetation management; bird collisions; integration of substations and lines into the landscape

Table 3: Potential benefit of work

1	Commercial, business, social and economic benefits 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 directions
5	Guide or survey related to existing techniques; or an update on past work or previous Technical Brochures
6	Work likely to contribute to improved safety.

Comments:

1) CIGRE Official Study Committee Rules: WG Membership

<https://www.cigre.org/GB/about/official-documents>

- a. Only one member per country: by exception of SC Chair, WiE and NGN nominees.
- b. WG nominees by NCs must first be supported by their National Committee (or local SC Member) as an appropriate representative of their country.
- c. Acceptance of the nomination is granted by the SC Chair and advised to the WG Convener.

2) Collaboration Space

<https://www.cigre.org/article/GB/collaborative-tools-2>

CIGRE will provision the WG with a dedicated Knowledge Management System Space.

The WG will use the KMS for drafting collaboration, capture and retention of discussion and meeting records.

Official country WG Members will be sent registration instructions by the Convener.

Official country WG Members may request the WG Convener to allow additional access for an extra national subject matter specialist to aid in the work at the national level, including NGN members.