

# Report to the CIGRE Australian Technical Committee 2023

## Study Committee SC B5 and Australian Panel AU B5 Activities



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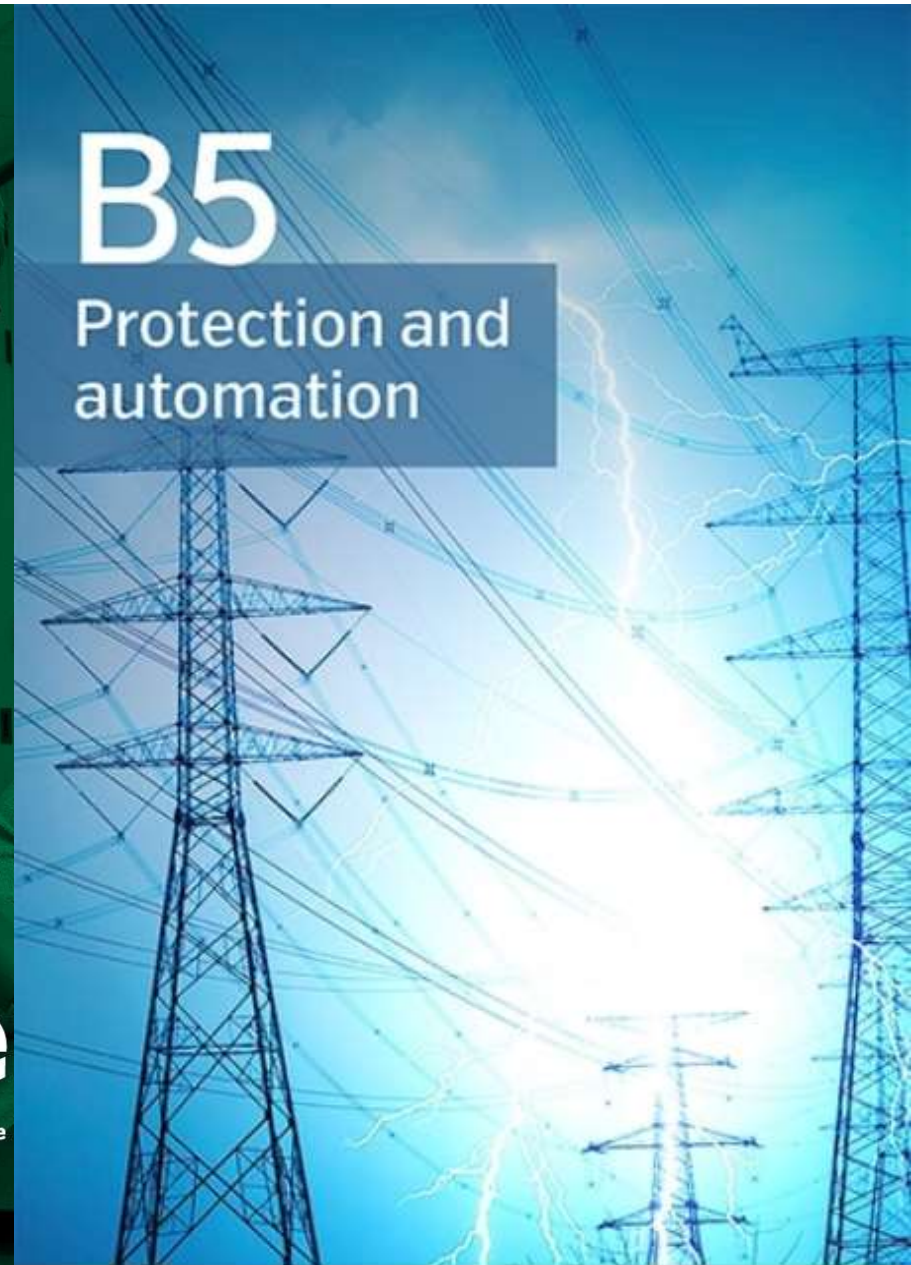


**cigre**

For power system expertise

# B5

Protection and  
automation



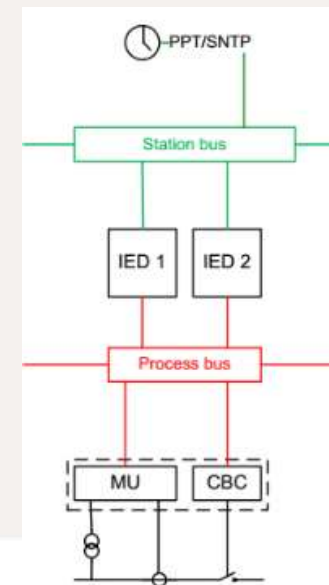
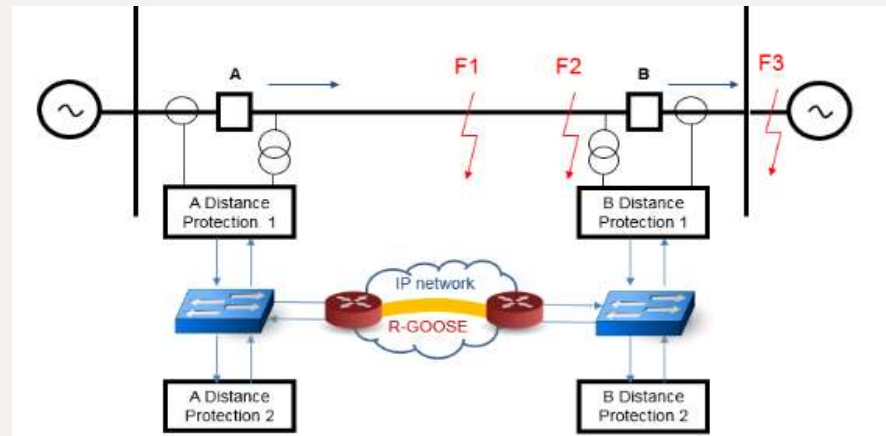
# SC B5 Overview

## Study Committee Purpose

- Protection, Control, Monitoring and Metering
- Covers end to end-to-end power system
- Promotes state of the art practices, recommendations and information
- Covers principles, design, application and management.



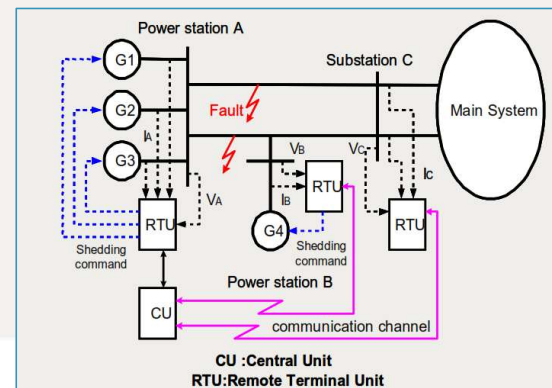
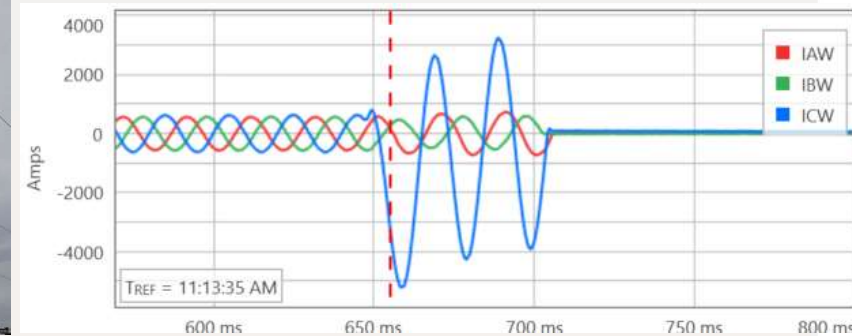
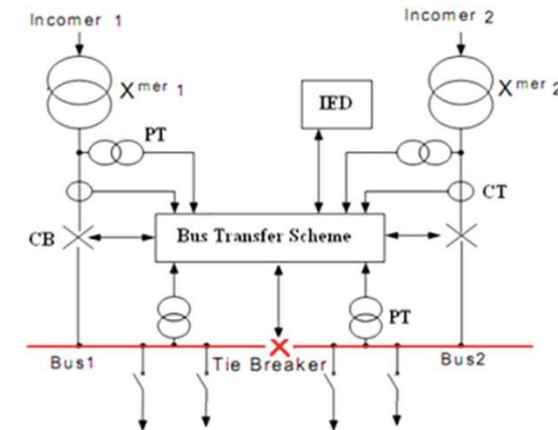
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# SC B5 Overview

## Three Thematic Groups

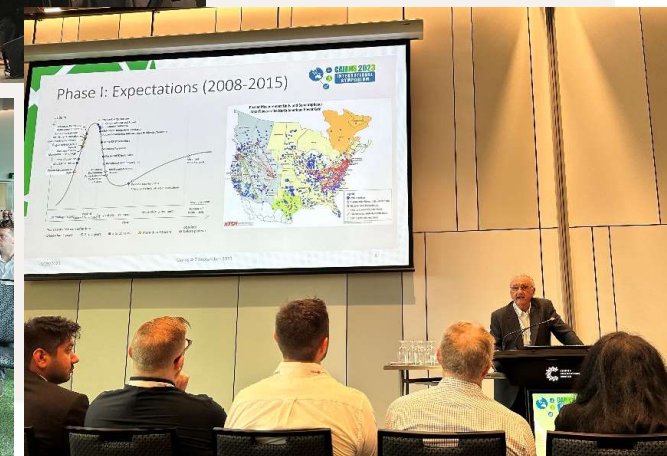
- Substation Automation and Remote Control
- Protection and Monitoring
- New Network Requirements





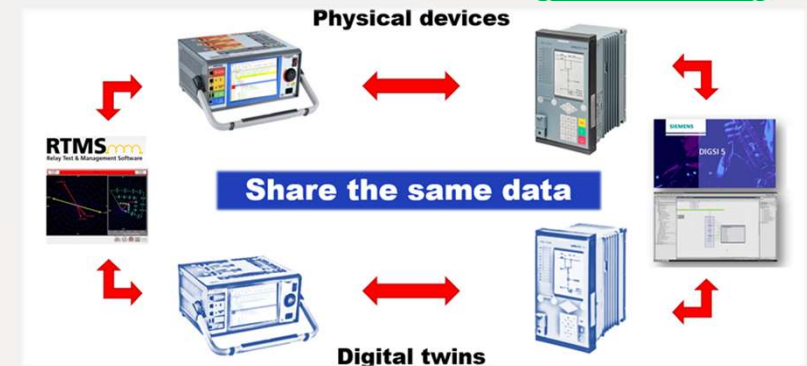
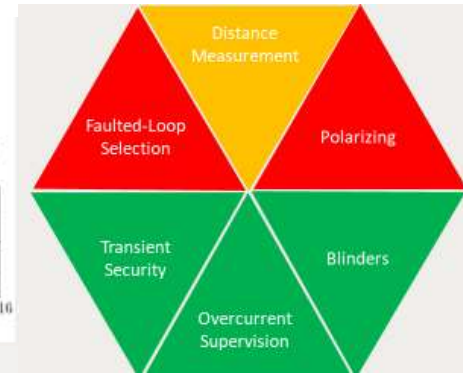
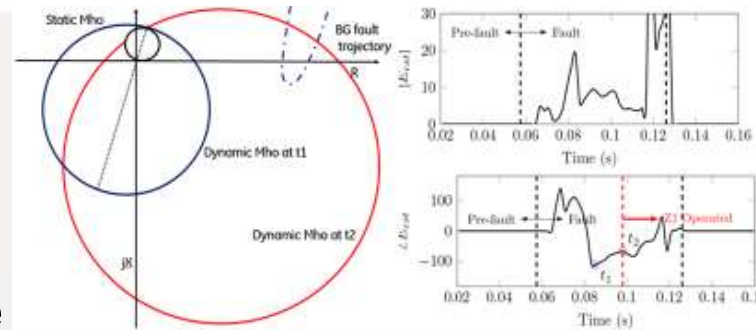
# International B5 Activities – Cairns Symposium Highlights

- International B5 SC arranged sessions
  - Main Symposium B5 Presentations
- Australia B5 arranged sessions
  - SEAPAC 2023 Presentations
  - B5 Tutorial - Applying Synchrophasors Technology for Protection
- Australian/New Zealand participation in presentations, question time and working groups

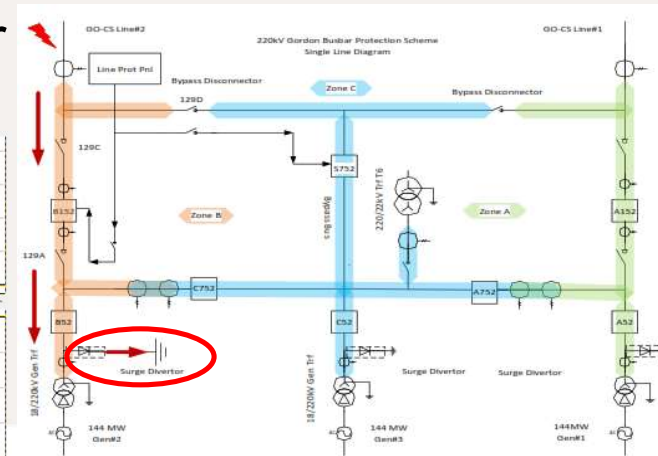
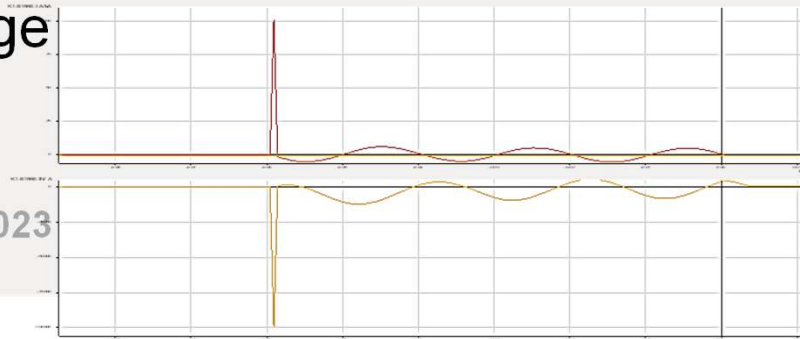


# Cairns Symposium – SEAPAC Presentations

- South East Asian Protection Automation & Control conference
- Impact of inverter based resource generation on protection – experience & mitigations
- Use of digital protection twins
- Special protection schemes - considerations when designing and implementing
- Power system fault experience - busbar protection tripped for a 1msec lightning discharge



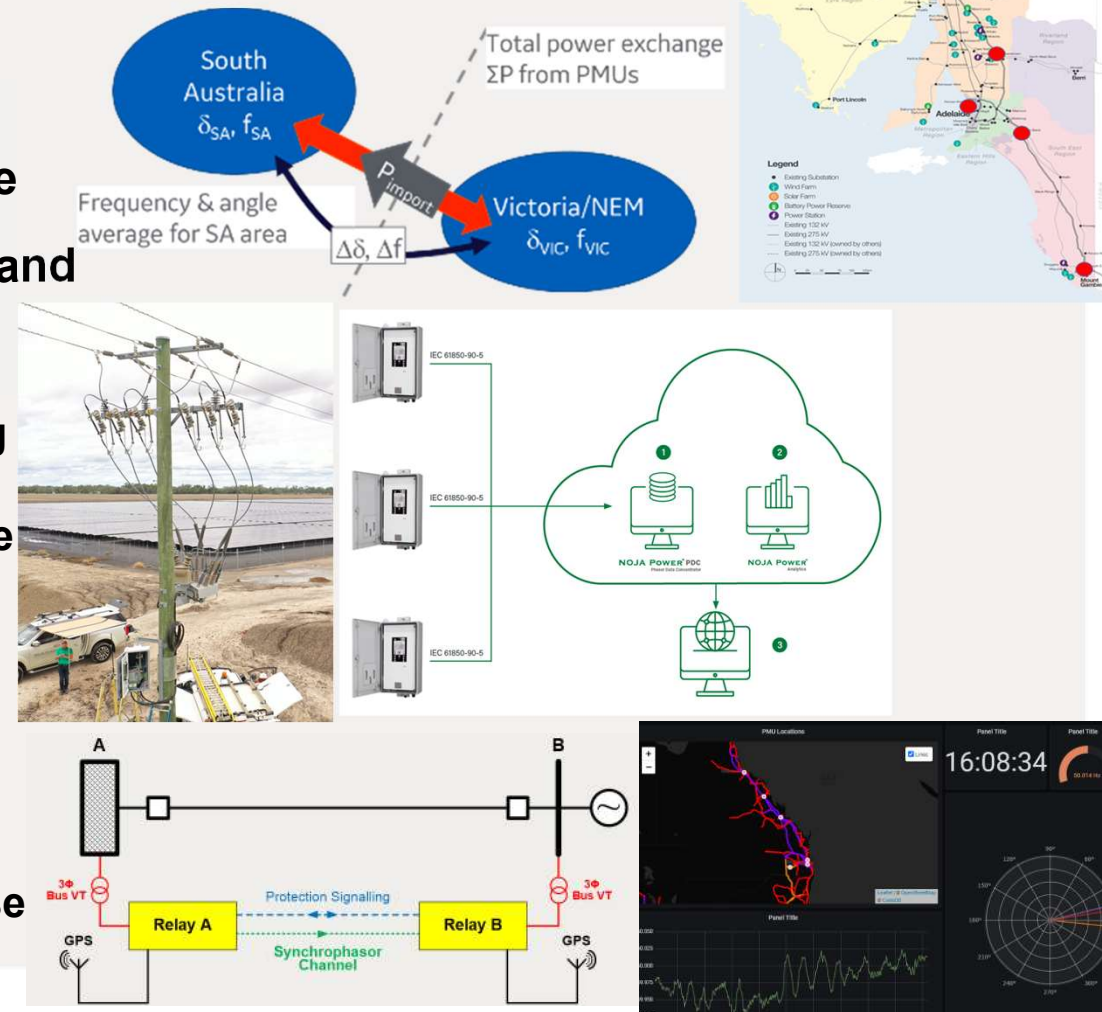
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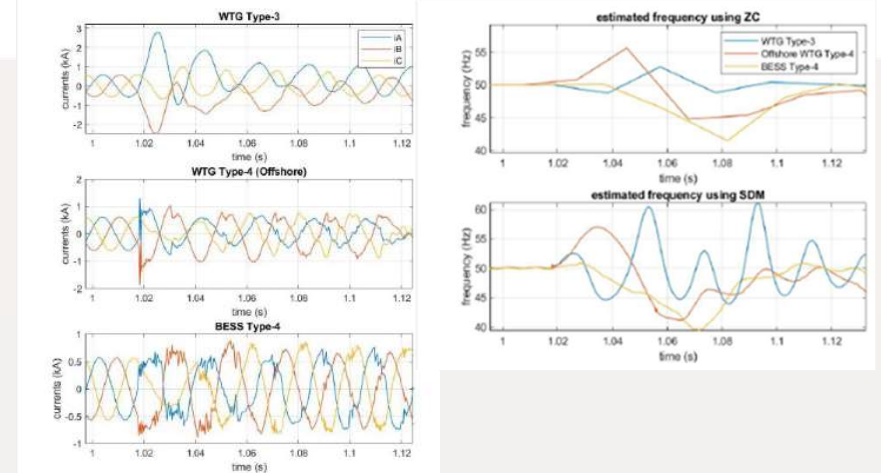
# Cairns Symposium - B5 Tutorial - Applying Synchrophasor Technology for Protection

- Introduction to synchrophasors
- Summary of new Technical Brochure on 'Life cycle testing of synchrophasor based systems used for protection, monitoring and control'
- Australia/NZ Application summaries:
  - Market Operator AEMO **Wide Area Monitoring System (WAMS)** Project
  - South Australia **Wide Area Protection Scheme (WAPS)** Application associated with increased renewables and interstate connection
  - Powerlink WAMPAC **Anti-islanding scheme**
  - TasNetwork's Experience and Applications
  - **Applications to distribution networks** - An evaluation of a grid scale data acquisition trial
  - Transpower **Synchronism Check Auto-reclose** Application & Experience



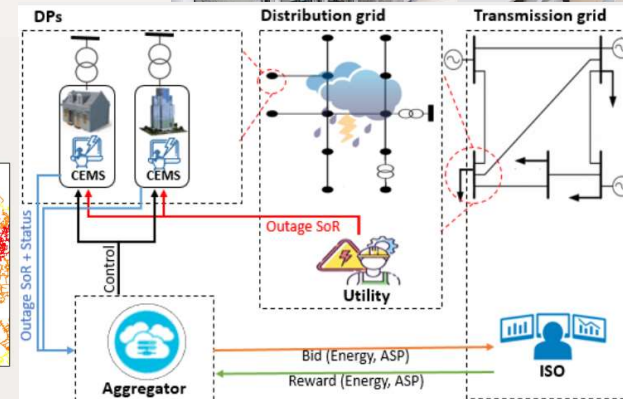
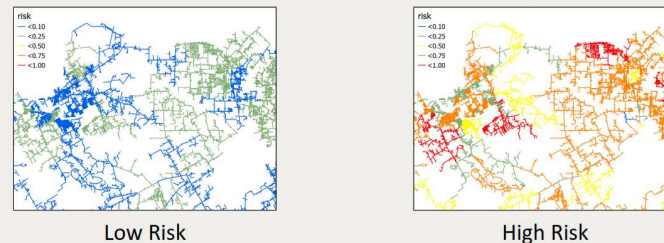
# Cairns Symposium – Main Symposium B5 Presentations

- Protection of Systems with **Unconventional Sources**
- The Implementation and Design Decisions of **Process Bus Technology** for **Distribution Substations** at Endeavour Energy
- Use of **Machine Learning and Artificial Intelligence** for automated outage prediction and risk management for improved system resilience



SoR Maps

- Algorithm outputs risk maps in GIS
- Allows operators to assess the situation immediately





# Other Australia/New Zealand B5 Activities (1)

- 43 organisations represented across Australia/New Zealand
- Members on 18 international working groups including:-
  - Enhancing Protection Performance by **Optimising the Response of Inverter-Based Sources**
  - **PAC Communication Requirements for Inter-Substation and Wide Area Applications**
  - **Obsolescence Management** for Protection, Automation and Control
  - Protection for **Modern Distribution Networks**

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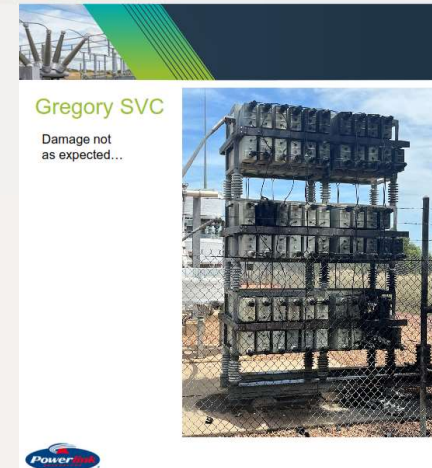
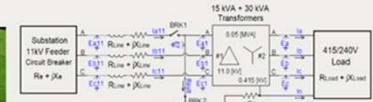




## Other Australia/New Zealand B5 Activities (2)

- 2 Day Perth Panel Meeting in June 2023 which included:-
  - Discussion & sharing on **downed conductor fault protection experience & IEC 61850 testing best practice**
  - Local presentations on **SVC faults, substation flooding, auto-reclose techniques, arc flash protection journey** and South Australia **wide area protection**
  - Planning for **2025 AU B5 SEAPAC conference** in Melbourne
- Working to increase activities and involvement via webinars etc

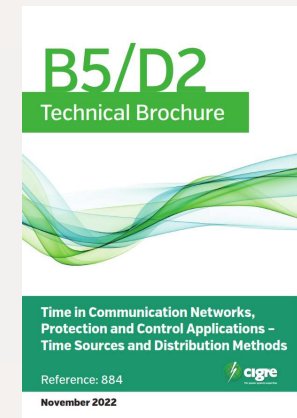
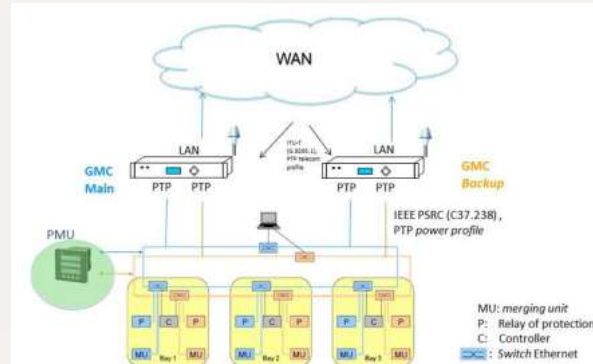
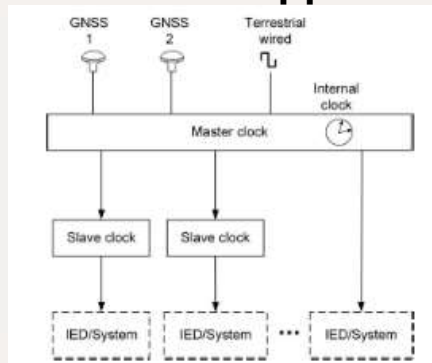
Utility B: Detection of downed HV distribution lines using LV measurements



# 2023 Deliverables – Documents Published

AU/NZ  
Representatives

- WG B5/D2.67 – TB 884 - Time in Communication Networks, Protection and Control Applications – Time Sources and Distribution Methods



- Victor Tan

- WG B5.60 – TB 891 - Protection, Automation and Control Architectures with Functionality Independent of Hardware

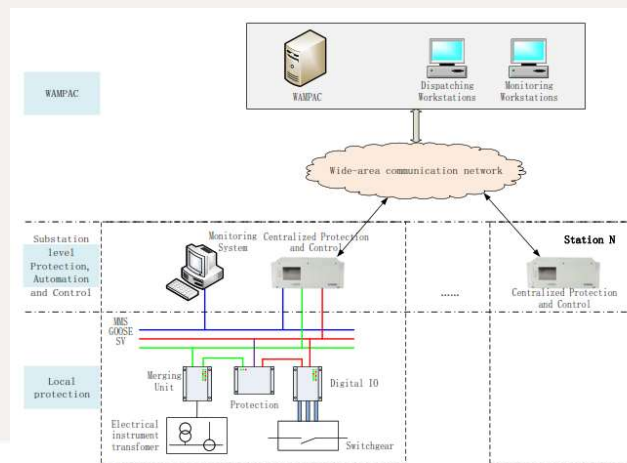
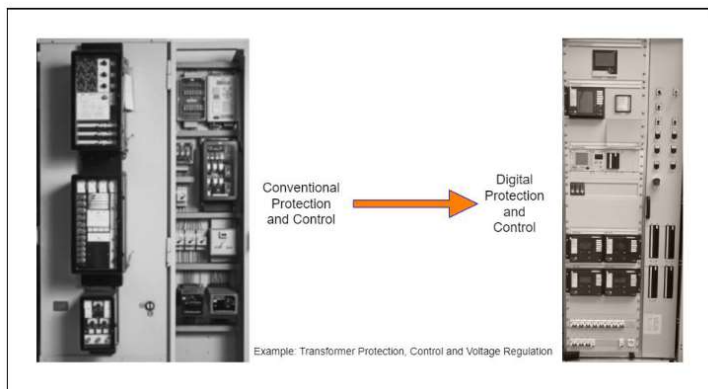
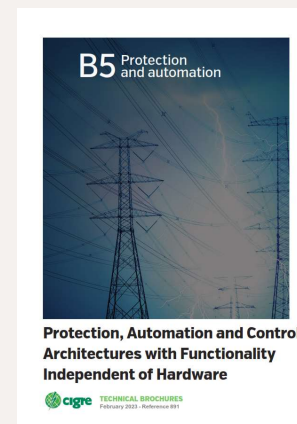


Figure 18: Substation level protection, automation, and control

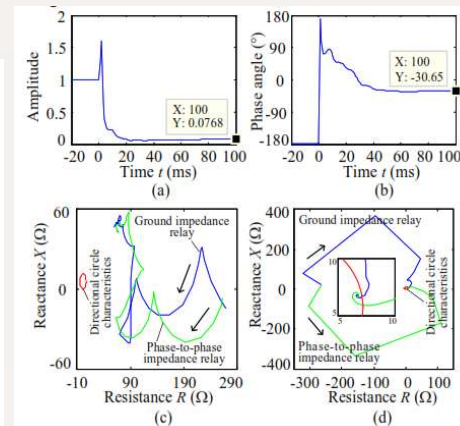
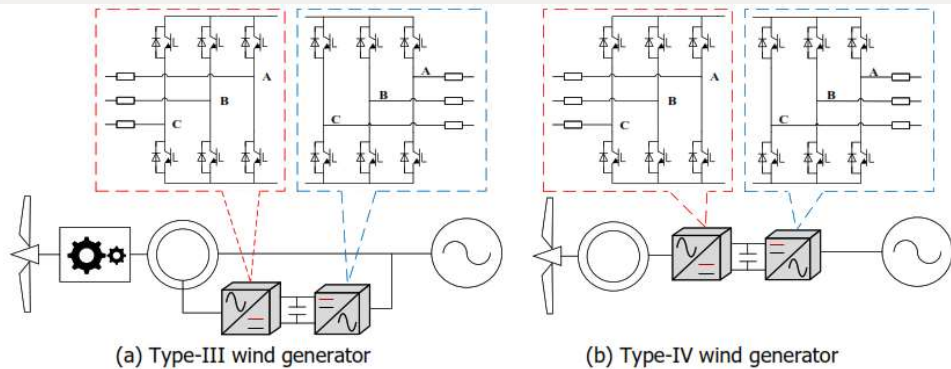




# 2023 Deliverables – Documents Published

AU/NZ  
Representatives

- WG B5.48 – TB 896 - Protection for developing network with limited fault current capability of generation

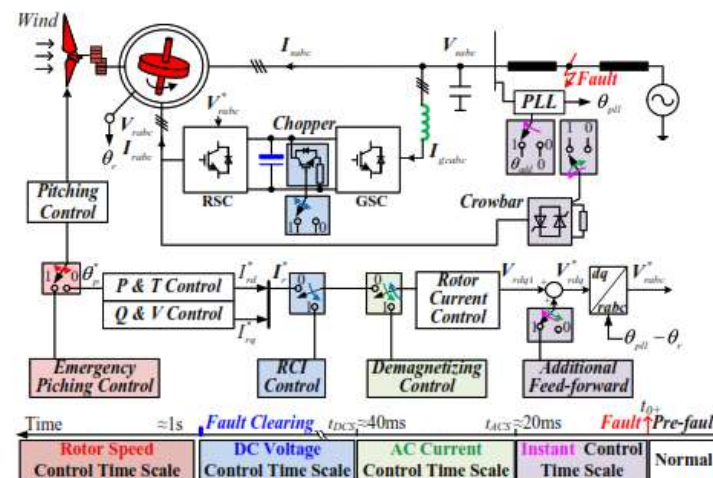


Protection for developing network with limited fault current capability of generation

cigre TECHNICAL BROCHURES April 2023 - Reference 100

- Rajnish Sood

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# Complete B5 Active Working Group List

Working Group.	Formed	Title	AU Rep
B5.51	2012	Methods and application of remotely accessed information for SAS maintenance and operation	Taren Hobson - Ergon
B5.55	2015	Application of Travelling Wave Technology for Protection and Automation	
B5.56	2015	Optimization of Protection Automation and Control Systems	Tuan Vu
B5.57	2016	New challenges for frequency protection	<a href="#">Christopher WEMBRIDGE</a>
B5.58	2016	Faster protection and network automation systems: implications and requirements	<a href="#">Stephen PELL</a>
B5.59	2016	Requirements for Near-Process Intelligent Electronic Devices	<a href="#">Kevin HINKLEY</a>
B5/C4.61	2017	JWG B5/C4 Impact of Low Inertia Network on Protection and Control	
B5.63	2017	Protection, Automation and Control System Asset Management	<a href="#">Mark MUNDELL</a>
B5.64	2017	Methods for Specification of Functional Requirements of Protection, Automation and Control	
B5.65	2018	Enhancing Protection System Performance by Optimising the Response of Inverter-Based Sources	<a href="#">Leonardo TORELLI</a>
B5.68	2018	Optimisation of the IEC 61850 Protection, Automation and Control Systems (PACS) engineering process and tools	
B5.69	2019	Experience feedback and Recommendation for implementation of process bus in PACS	<a href="#">Yang LU</a> (Frankie)
B5.70	2019	Reliability of Protection Automation and Control System (PACS) of power systems – Evaluation Methods and Comparison of Architectures	<a href="#">Stewart COLLINS</a>
B5.71	2020	Protection, Automation and Control Systems Communication Requirements for Inter-Substation and Wide Area Applications	<a href="#">Ritesh BHARAT</a>
B5.72	2020	Modelling, Assessment, and Mitigation of Protection Performance Issues caused by power plants during Dynamic Grid Events	<a href="#">Gurinder SALUJA Paul BLANCHFIELD</a>
B5.73	2020	Experiences and Trends related to Protection Automation and Control Systems Functional Integration	
B5.74	2020	Busbar Protection Considerations When Using IEC 61850 Process Bus	<a href="#">Gurinder SALUJA</a> <a href="#">Filip IVANOVSKI</a>
B5.75	2021	Documentation and version handling related to Protection, Automation and Control functions	
B5.76	2021	Architecture, Standards and Specification for metering system in a Digital Substation and Protection, Automation and Control (PACS) Environment	<a href="#">Satendra BHOLA</a>
B5.77	2022	Requirements for Information Technologies (IT) and Operational Technology (OT) managed of Protection, Automation and Control Systems (PACS)	<a href="#">Rob SUSANTO-LEE</a>
B5.78	2022	New requirements of network protection and control for renewable energy integration	<a href="#">Mitchell TAP</a>
B5/C4.79	2022	Protection Roadmap for Low Inertia and Low Fault Current	
B5.81	2023	Obsolescence Management for Protection, Automation and Control	<a href="#">Peter BISHOP</a>
B5.82	2023	Education, Qualification and Continuing Professional Development of Engineers in Protection, Automation and Control	<a href="#">Lara KRUK</a>
B5.83	2023	Protection for modern distribution networks	<a href="#">Diptiman YADAV</a>



# New Proposed Working Groups

- During the 2023 B5 Study Committee meeting three new working group topics were agreed:-
  1. PACS interfaced asset management and condition monitoring using innovative technologies
  2. Recommendations and constraints for development and interfacing of virtual IED implemented in PACS
  3. Protection, Control and Monitoring principles of synchronous condenser and generation with fly wheel