



**POWER SYSTEM RELAYING AND CONTROL COMMITTEE  
OF THE IEEE POWER AND ENERGY SOCIETY  
MINUTES OF THE MEETING  
September 21-24, 2020, WebEx Virtual Meeting, Rev. 1**

**I. Call to order / Introductions: Russ Patterson**

Chair Russ Patterson, called the meeting to order at 1:10 pm on Thursday, September 24, 2020. There were 100 voting members, 2 non-voting members, and 145 guests for a total attendance of 247.

Due to the meeting being virtual via WebEx, the tradition of all attendees introducing themselves was skipped. Similarly, the tradition of having all first time attendees reintroduce themselves was also skipped. A quorum check was conducted, and it was verified that quorum was met with 100 voting members in attendance out of a total membership of 134 voting members. Attendance was recorded via a WebEx report.

**II. Sponsors**

Because this meeting was conducted as a virtual meeting, there were no sponsors for coffee breaks.

**III. Approval of Minutes / Financial Report: Michael Thompson**

A motion to approve the minutes of the January meeting of the PSRC Committee in Jacksonville, FL was made by J. Niemira contingent upon revisions requested by I subcommittee are incorporated. The motion was seconded by P. Mysore. There was no further discussion. The motion was approved unanimously.

The PSRC committee financial status is fine. Attendance was good for the September virtual meeting and expenses were low.

**IV. Chairman's Report: Russ Patterson**

We had 412 participants for our September 2020 virtual (online) meeting, including 99 newcomers.

Thank you for all of your hard work helping make the PSRC as successful as we have been. We have a lot going on now with Inverter Based Resources, IEC 61850, and our bread-and-butter standards work (e.g. C37.101 and C37.102 are both actively being revised right now). I am encouraged to see us tackle the new technical challenges as well as maintaining our long standing standards with new developments and improvements.

Thanks to Mike Thompson and James Formea for deftly handling the daunting task of

organizing and pulling off a completely virtual meeting. While it was a success, I want to make it clear that the PSRC leadership is fully aware of the benefits of in person meetings and is committed to this approach. While we have used working group on-line meetings for a long time (as necessary in between our regular in-person meetings to keep time critical work ground work progressing) we do not think virtual would be good for our regular meetings. As such, we will only hold virtual PSRC meetings as absolutely necessary (e.g. September 2020). While there are benefits to virtual meetings, nothing will replace in person meetings for the level of collaboration and “in between” discussions that happen between meetings. The relationships we are able to build are invaluable to us professionally, and to the continued success of our committee.

Thank you to all PSRC attendees for making our September 2020 meeting a successful meeting. As you know, this was my last meeting as Chairman. I look forward to seeing you all for our January meeting.

Sincerely,

Russ Patterson

## **V. Reports of Interest**

### **A. Technical Paper Coordinator’s Report: Murty Yalla**

GM 2020 Montreal (Aug 2-7, 2020) – Due to COVID -19 Virtual meeting

- Total 38 papers received. 20 papers accepted.
- PSRC Committee sponsored 3 panel sessions.

T&D Meeting – expo canceled. Paper presentation going virtual

- The virtual paper presentation date is Oct 12-15, 2020
- 8 papers accepted 2 of them will be in poster session

IEEE PES ISGT NA 2021, Feb 15-18, 2021: “Technology Solutions for an Evolving Grid”

- Paper submission deadline: Sept 30, 2020 (Due to COVID-19 ☐ Virtual meeting)

2021 IEEE PES General Meeting, July 25 – 29, Washington DC,

- Theme, Managing Energy Business During a Pandemic
- Paper submission deadline November 10, 2020
- For more information, visit [www.pes-gm/2021](http://www.pes-gm/2021)

### **B. Future Meetings: Murty Yalla**

- January 2021 Meeting; Virtual; January 10-14, 2021.
- May 2021 Meeting; Nashville, TN; May 3-6, 2021.
- September 2021 Meeting; TBD; September 20–23, 2021
- January 2022 Meeting; Garden Grove, CA; January 9-12, 2022.
- May 2022 Meeting, Reno, NV; May 9-12, 2022.

Details are posted on the PSRC website.

## C. CIGRE B5 Activities Report: Rich Hunt

### General News:

The new regular Member for B5 from Canada is Mukesh Nagpal.

### New Working Groups

The two newest working groups are:

- B5.71 Protection, Automation and Control Systems Communication Requirements for Inter-Substation and Wide Area Applications
- B5.72 Modelling, Assessment, and Mitigation of Protection Performance Issues caused by power plants during Dynamic Grid Events

### New Publications

Technical Brochure 789 Improved metering systems for billing purposes in substations

Technical Brochure 790 Cybersecurity requirements for PACS and the resilience of PAC architectures

Technical Brochure 800 Network protection performance audits

Technical Brochure 810 Protection and automation issues of islanded systems during system restoration/black start

### 2020 CIGRE General Session, Paris, France, August 2020

The 2020 CIGRE General Session was cancelled in favor of the 2020 eSession, and a 2021 Centennial Session to be held in Paris in August 2021.

The eSession used a different format than the typical General Session. Each lead author gave a 10 minute recorded presentation of the paper, with some short live question and answer sessions managed by moderators.

Preferential Subjects:

- PS 1 Human Aspects In Protection, Automation And Control Systems (PACS)
- PS 2 Communications Networks In Protection, Automation And Control Systems (PACS) : Experience And Challenges

2 papers were presented by US authors.

### 2021 CIGRE Centennial Session

The Centennial Session will replace the B5 Colloquium originally planned for New Delhi. This is intended to be held with a similar format to the General Sessions, with paper presentations and tutorials. The Preferential Subjects, and papers, will be identical to the 2020 eSession, but using the traditional CIGRE Special Reporter model.

The topic for the tutorial is still under discussion.

### 2022 CIGRE General Session

The preferential subjects for the 2022 CIGRE General Session will be:

- PS1: ADDRESSING PROTECTION RELATED CHALLENGES IN NETWORKS WITH LOW-INERTIA AND LOW FAULT-CURRENT LEVELS

- Asset protection challenges and system protection challenges
- Protection schemes: Best practices, role of grid codes and impact of inverter characteristics and specifications
- New asset protection principles, advancements in inverter technologies, system monitoring and state estimation for aiding asset and system protection
- PS2: APPLICATIONS OF EMERGING TECHNOLOGY FOR PROTECTION, AUTOMATION AND CONTROL
  - Virtualization; digital twins, Protection Automation and Control functions independent of hardware, centralized protection systems
  - New protection principles and monitoring principles for AC and DC grids including use of new sensors and better use of today's sensors and process interfaces
- PS 3: Integration of Intelligence on Substations (Common PS with B3)
  - Data analytics, remote supervising & monitoring and autonomy application
  - IoT and Machine learning applications based on Protection Automation and Control data including asset management, monitoring and data analysis
  - Expectations and benefits from digital substation and IEC 61850 principles and applications to substations

**2021 CIGRE Grid of the Future Conference, Providence, RI.**

The 2020 CIGRE Grid of the Future Conference, scheduled to be held in October, is postponed until October 17-20, 2021, and will be held in Providence, RI. The GOTF presents papers over 5 CIGRE Study Committees, and includes a NGN (next generation engineer) paper contest.

For complete details on the CIGRE Grid of the Future, visit the website at <https://cigre-usnc.org/grid-of-the-future/>.

For more information on CIGRE B5 activities, please contact me directly. CIGRE membership is by country, so if you live outside the U.S., I can put you in touch with the Regular Member for your country.

rich.hunt@ieee.org / richard.hunt@ge.com

**D. IEC Report: Eric Udren**

**TC 95, Measuring Relays and Protection Systems**

IEC TC 95 creates IEC 60255 series protection system standards – electrical and physical environment type testing, design, safety, and functional behavior. Technical work is

carried out by Maintenance Teams (MTs) and by Working Groups led by Convenors. Dr. Murty Yalla of PSRC is Chair of TC 95 internationally.

The Technical Advisory Group (TAG) to the US National Committee (USNC) of IEC for TC 95 meets as a part of PSRC WG I4, *International Standards Development*, creating US comments and votes on TC 95 standards drafts and process documents at each stage of international development. Eric Udren is the Technical Advisor (TA) to the USNC for TC 95. Deputy Technical Advisor (DTA) is Normann Fischer. The TC 95 TAG Administrator is Pacific Northwest National Laboratory (PNNL), under the US Department of Energy. The TAG Secretary is Jeff Dagle of PNNL. Eric has reported on the trend of growing collaboration between PSRC and IEC TC 95 – visible in coordinating working groups and joint developments.

The US Technical Advisory Group is currently working with the following standards topics and projects:

- The three most important TC 95 measuring relay/protection system product design standards have all been subjected to a complete rewriting effort, and drafts were circulated from the TC 95 for review and comment by the national committees. These are particularly impactful for manufacturers of relays whose products are to be certified for compliance to the final version of the standard.
- 60255-1 Edition 2 - Common Requirements – role like that of IEEE C37.90. The last round of commenting and resolution has been circulated – a new CD is to be issued shortly.
- 60255-27 Edition 3 - Safety requirements – no IEEE equivalent specific to relays – review of comments and a new CD are pending.
- 60255-26 Edition 4 - EMC requirements – covers roles of IEEE C37.90.1, 90.2, 90.3, plus several other immunity requirements not in IEEE standards. Comments with resolution, plus a new CD, have been circulated. New comments if any are due on October 9.
- TC 95 has been working on an update of its strategic business plan (SBP). The January I4 minutes listed technical topics the WG had listed which should be considered for inclusion in future standardization project plans. Several US-suggested topics and scope wording revision are now integrated in the plan. The final revision will be discussed at the upcoming November TC 95 Plenary Meeting.
- TC 95 WG2 has issued a new CD for a technical report (draft requirements for a future standard) 60255-216-1, *Guidelines for requirements and tests for protection functions with digital inputs and outputs*. This is aimed mainly at protection data streams from merging unit data exchange. We are coordinating that work with the activities of PSRC WG H47 on the same topic.
- Per prior reports, TC 95 is initiating standardization under a JWG for travelling wave-based protection and fault locators.
- Per prior reports, TC 95 is initiating standardization under a JWG for HVDC protection.
- 60255-187-1: *Functional requirements for restrained and unrestrained differential protection of motors, generators and transformers* – going to final draft international standard (FDIS) for international vote of acceptance.

- IEC 60255-187-2: *Functional requirements for busbar differential protection* - Still in draft review, with recent changes in CT sections inherited from 187-1.
- IEC 60255-187-3: *Functional requirements for biased (percentage) differential relays for transmission lines* –being drafted with help of Normann Fischer from USNC and PSRC. CD expected in second quarter of 2020.

TC 95 will hold its virtual plenary meeting on November 5-6. An agenda is circulated to the US TAG and PSRC I4 members. Contact Eric Udren for a copy or with any information related to the topics to be covered. Key discussions are about documents and efforts listed above.

**E. Standards Coordinators Report: Don Lukach**

The May, 2020 meeting was cancelled due to COVID. A virtual meeting was not held in September. Rather, all PARs that needed extensions or submissions were individually addressed before and during the PSRC meeting week. Three extension requests remain outstanding. All motions for these extensions were passed in Subcommittee H and await submittal to NesCom. The motion to change the output from a Recommended Practice to a Guide for C37.90.1 passed the Main Committee and awaits submittal to NesCom.

**Main Committee PAR Submissions:**

Please refer to the Main Committee minutes for specific Subcommittee PAR motions.

**Published PAR projects since January 2020:**

PC37.250 Guide for the Protection of Shunt Reactors, was submitted to IEEE-SA for final editing and publication.

**Projects currently in Balloting**

PAR Number	Title	Status
PC37.91	Guide for Protecting Power Transformers	SA Ballot: Comment Resolution
PC37.108	Guide for the Protection of Secondary Network Systems	SA Ballot: Comment Resolution
PC37.235	Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes	SA Ballot: Comment Resolution
PC37.110	Guide for the Application of Current Transformers Used for Protective Relaying Purposes	SA Ballot: Comment Resolution
PC37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	SA Ballot: Comment Resolution
PC37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control	SA Ballot: Recirculation Review

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**PAR Submittal Deadlines & Standards Board (SASB) Meeting Schedule:**

<https://standards.ieee.org/about/sasb/meetings.html>

Submittal dates for the remainder of 2020.

13 OCT 2020

**PAR Expiration dates and their Status:**

PAR	Title	Expiration	Status
PC37.249	Guide for Categorizing Security Needs for Protection and Automation Related Data Files	31 Dec 2020	Awaiting NesCom submittal. Passed SC Vote to extend.
PC37.251	Standard for Common Protection and Control Settings or Configuration Data Format (COMSET)	31 Dec 2020	Awaiting NesCom submittal. Passed SC Vote to extend.
PC37.1.2	<b>Recommended Practice</b> for Databases Used in Utility Automation Systems	31 Dec 2020	Awaiting NesCom submittal. Passed SC Vote to extend. Passed MC vote to change to a Guide.
PC37.233	Guide for Power System Protection Testing	31 Dec 2021	Draft Development
PC37.234	Guide for Protective Relay Applications to Power System Buses	31 Dec 2021	Draft Development
PC37.102	Guide for AC Generator Protection	31 Dec 2021	Draft Development
P1646	Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation	31 Dec 2021	Draft Development
PC37.120	Protection System Redundancy for Power System Reliability	31 Dec 2021	Draft Development
PC37.101	Guide for Generator Ground Protection	31 Dec 2021	Draft Development
PC37.90.2	Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers	31 Dec 2021	Draft Development
PC37.2	Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations	31 Dec 2022	Draft Development
P1613	Standard for Environmental and Testing Requirements for Intelligent Electronic Devices (IEDs) Installed in Transmission and Distribution Facilities	31 Dec 2022	Draft Development
PC37.300	Guide for Centralized Protection and Control (CPC) Systems within a Substation	31 Dec 2022	Draft Development

P2030.100.1	Monitoring and Diagnostics of IEC 61850 Generic Object Oriented Status Event (GOOSE) and Sampled Values Based Systems	31 Dec 2022	Draft Development
PC37.104	Guide for Automatic Reclosing on AC Distribution and Transmission Lines	31 Dec 2022	Draft Development
PC37.106	Guide for Abnormal Frequency Protection for Power Generating Plants	31 Dec 2022	Draft Development
P2030.12	Guide for the Design of Microgrid Protection Systems	31 Dec 2022	Draft Development
PC37.90	Standard for Relays and Relay Systems Associated with Electric Power Apparatus	31 Dec 2022	Draft Development
PC37.252	Guide for Testing Automatic Voltage Control Systems in Regional Power Grids	31 Dec 2023	Draft Development
PC37.1.3	Recommended Practice for Human Machine Interfaces (HMIs) used with Electric Utility Automation Systems	31 Dec 2023	Draft Development
PC37.109	Guide for the Protection of Shunt Reactors	31 Dec 2023	Draft Development
PC37.99	Guide for the Protection of Shunt Capacitor Banks	31 Dec 2023	Draft Development
PC37.90.3	Standard Electrostatic Discharge Tests for Protective Relays	31 Dec 2024	Draft Development
PC37.114	Guide for Determining Fault Location on AC Transmission and Distribution Lines	31 Dec 2024	Draft Development
PC37.90.1	Standard for Relays, Relay Systems, and Control Devices used for Protection and Control of Electric Power Apparatus-Surge Withstand Capability (SWC) and Electrical Fast Transient (EFT) Requirements and Tests	31 Dec 2024	Draft Development
PC37.113	Guide for Protective Relay Applications to Transmission Lines	31 Dec 2024	Draft Development
PC37.95	Guide for Protective Relaying of Utility-Consumer Interconnections	NA	NesCom Agenda (02 Dec 2020)

**All PSRC Par-Related Projects:**

PAR Number	Title	Status
C37.108	Guide for the Protection of Network Transformers	Completed
C37.106	Guide for Abnormal Frequency Protection for Power Generating Plants	Completed
C37.90.2	Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers	Completed
C37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	Completed
C37.109	Guide for the Protection of Shunt Reactors	Completed
C37.101	Guide for Generator Ground Protection	Completed
C37.102	Guide for AC Generator Protection	Completed



C37.90	Standard for Relays and Relay Systems Associated with Electric Power Apparatus	Completed
C37.231	Recommended Practice for Microprocessor-based Protection Equipment Firmware Control	Completed
C37.110	Guide for the Application of Current Transformers used for Protective Relaying Purpose	Completed
1646	Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation	Completed
C37.230	Guide for Protective Relay Applications to Distribution Lines	Completed
C37.91	Guide for Protecting Power Transformers	Completed
C37.233	Guide For Power System Protection Testing	Completed
C37.234	Guide for Protective Relay Applications to Power System Buses	Completed
C37.235	Guide for the Application of Rogowski Coils used for Protective Relaying Purposes	Completed
C37.2	Standard Electrical Power System Device Function Numbers, Acronyms and Contact Designations	Completed
C37.101-2006/Cor 1	Guide for Generator Ground Protection - Corrigendum 1: Annex A.2 Phasor Analysis (Informative)	Completed
C37.99	Guide for the Protection of Shunt Capacitor Banks	Completed
C37.96	Guide for AC Motor Protection	Completed
C37.90.1	Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus	Completed
C37.110-2007/Cor 1	IEEE Guide for the Application of Current Transformers Used for Protective Relaying Purposes - Corrigendum 1: Corrections to Equation 18 and Equation 19	Completed
1613	Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Electric Power Substations	Completed
C37.239	Standard for Common Format for Event Data Exchange (COMFEDE) for Power Systems	Completed
C37.104	Guide for Automatic Reclosing of Circuit Breakers for AC Distribution and Transmission Lines	Completed
1613a	IEEE Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Electric Power Substations Amendment: Adding of one definition, DC power supply requirements (5.1), and Annex E- History	Completed
C37.111	Standard for Common Format for Transient Data Exchange (COMTRADE) for Power Systems	Completed
C37.95	Guide for Protective Relaying of Utility-Consumer Interconnections	Completed
C37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMU) for Power System Protection and Control	Completed
C37.114	Guide for Determining Fault Location on AC Transmission and Distribution Lines	Completed
C57.13.3	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases	Completed
C37.232	Standard for Common Format for Naming Time Sequence Data Files (COMNAME)	Completed
C37.113	Guide for Protective Relay Applications to Transmission Lines	Completed
C37.243	Guide for Application of Digital Line Current Differential Relays Using Digital Communication	Completed
1613.1	Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Transmission and Distribution Facilities	Completed
C37.103	Guide for Differential and Polarizing Relay Circuit Testing	Completed
C37.119	Guide for Breaker Failure Protection of Power Circuit Breakers	Completed

C37.241	Guide for Application of Optical Instrument Transformers for Protective Relaying	Completed
2030.100	Recommended Practice for Implementing an IEC 61850 Based Substation Communications, Protection, Monitoring and Control System	Completed
C37.246	Guide for Protection Systems of Transmission to Generation Interconnections	Completed
C57.13.1	Guide for Field Testing of Relaying Current Transformers	Completed
C37.248	Guide for Common Format for Naming Intelligent Electronic Devices (COMDEV)	Completed
C37.245	Guide for the Application of Protective Relaying for Phase Shifting Transformers	Completed
C37.237	Standard Requirements for Time Tags Created by Intelligent Electronic Devices - COMTAG(TM)	Completed
2030.101	Guide for Designing a Time Synchronization System for Power Substations	Completed
60255-118-1	Measuring Relays and Protection Equipment - Part 118-1: Synchrophasor for Power System - Measurements	Completed
C37.247	Standard for Phasor Data Concentrators for Power Systems	Completed
C37.116	Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks	Completed
C37.250	Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes	Completed
C37.112	Standard Inverse-Time Characteristic Equations for Overcurrent Relays	Completed
PC37.249	Guide for Categorizing Security Needs for Protection and Automation Related Data Files	Draft Development
PC37.251	Standard for Common Protection and Control Settings or Configuration Data Format (COMSET)	Draft Development
PC37.1.2	Recommended Practice for Databases Used in Utility Automation Systems	Draft Development
PC37.233	Guide for Power System Protection Testing	Draft Development
PC37.234	Guide for Protective Relay Applications to Power System Buses	Draft Development
PC37.102	Guide for AC Generator Protection	Draft Development
P1646	Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation	Draft Development
PC37.120	Protection System Redundancy for Power System Reliability	Draft Development
PC37.101	Guide for Generator Ground Protection	Draft Development
PC37.90.2	Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers	Draft Development
PC37.2	Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations	Draft Development
P1613	Standard for Environmental and Testing Requirements for Intelligent Electronic Devices (IEDs) Installed in Transmission and Distribution Facilities	Draft Development
PC37.300	Guide for Centralized Protection and Control (CPC) Systems within a Substation	Draft Development
P2030.100.1	Monitoring and Diagnostics of IEC 61850 Generic Object Oriented Status Event (GOOSE) and Sampled Values Based Systems	Draft Development

PC37.104	Guide for Automatic Reclosing on AC Distribution and Transmission Lines	Draft Development
PC37.106	Guide for Abnormal Frequency Protection for Power Generating Plants	Draft Development
P2030.12	Guide for the Design of Microgrid Protection Systems	Draft Development
PC37.90	Standard for Relays and Relay Systems Associated with Electric Power Apparatus	Draft Development
PC37.252	Guide for Testing Automatic Voltage Control Systems in Regional Power Grids	Draft Development
PC37.1.3	Recommended Practice for Human Machine Interfaces (HMIs) used with Electric Utility Automation Systems	Draft Development
PC37.109	Guide for the Protection of Shunt Reactors	Draft Development
PC37.99	Guide for the Protection of Shunt Capacitor Banks	Draft Development
PC37.90.3	Standard Electrostatic Discharge Tests for Protective Relays	Draft Development
PC37.114	Guide for Determining Fault Location on AC Transmission and Distribution Lines	Draft Development
PC37.90.1	Standard for Relays, Relay Systems, and Control Devices used for Protection and Control of Electric Power Apparatus-Surge Withstand Capability (SWC) and Electrical Fast Transient (EFT) Requirements and Tests	Draft Development
PC37.113	Guide for Protective Relay Applications to Transmission Lines	Draft Development
PC37.95	Guide for Protective Relaying of Utility-Consumer Interconnections	NesCom Agenda (02 Dec 2020)
PC37.230	Guide for Protective Relay Applications to Distribution Lines	RevCom Agenda(02 Dec 2020)
PC37.91	Guide for Protecting Power Transformers	SA Ballot: Comment Resolution
PC37.108	Guide for the Protection of Secondary Network Systems	SA Ballot: Comment Resolution
PC37.235	Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes	SA Ballot: Comment Resolution
PC37.110	Guide for the Application of Current Transformers Used for Protective Relaying Purposes	SA Ballot: Comment Resolution
PC37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	SA Ballot: Comment Resolution

PC37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control	SA Ballot: Recirculation Review
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**F. PSCC Committee Report: James Formea**

September virtual event – 26 sub-groups, 3 subcommittees. Great participation with many new faces...or voices...in our meetings!

C0's WG for C93.5, Standard for PLC Transmitters/Receivers, has passed a draft through initial balloting and is working on comment resolution.

WG S3 for P2030.102.1, Standard for Interoperability of Internet Protocol Security (IPsec) Utilized within Utility Control Systems, has completed IEEE-SA balloting and standard is approved

Subcommittee S0 approved a PAR request from SG S15 to develop the IEEE Guide for Securing Generic Object Oriented System Events (GOOSE) and Sampled Values (SV) Protocols of IEC 61850 using IEC 62351-6 and IEC 62351-9. WG is expected to hold first meeting in January

Work continues in the working groups for 2 joint projects with SCC-21:

1547.3, Cybersecurity of Distributed Energy Resources (DER) interconnection with Electric Power Systems (EPS)

P2030, Guide for Smart Grid Interoperability of Energy Technology and Information Technology Operation with the Electric Power System (EPS), End-Use Applications, and Loads.

**G. P2800 Report: Manish Patel**

IEEE P2800- Standard for Interconnection and Interoperability of Inverter-Based Resources Interconnecting with Associated Transmission Electric Power Systems

Please visit the public website at <https://sagroups.ieee.org/2800/> for the latest on future meetings, timeline and milestones.

The WG met during the week of July 13th via a series of 2 hour conference calls. The third draft of the standard was made available after this meeting. The next meeting is scheduled for the week of October 19th.

The revised “scope” and “purpose” statements were presented. The WG will vote on revision during the October, 2020 meeting.

The goal of the WG is to ask sponsor committees to approve WG draft for IEEE-SA initial ballot in January 2021 at IEEE JTCM.

The following are excerpts from the presentation made at the main committee meeting.

What to expect from IEEE P2800?

- Value
  - widely-accepted, unified technical minimum requirements for IBR

- simplification and expedition of technical interconnection negotiations
- Specifications for
  - performance and functional capabilities
  - functional default settings and ranges of allowable settings
  - measurement data for performance monitoring and model validation
  - required type and commissioning tests, and other verifications means
  - but not their detailed procedures (IEEE P2800.1)
- Applicable to BPS-connected, large-scale wind, solar, energy storage and HVDC-VSC

Timeline With Stretch Goals

<b>Milestone:</b> Draft 4.0 (WG Draft)	September 21, 2020 (SG Input)	October 5, 2020* (Posted on iMeet)
•Redlines + resolved comments	•SG Redlines + resolved comments	•Redline + Clean + resolved comments
<b>Milestone:</b> WG Vote on Draft 4.0	Oct 19, 2020 (iMeet polls close during the first meeting session)	
WG Meeting w/ Voting on Drafts 4.x	Oct 19-23, 2020*, Virtual	
<b>Milestone:</b> Draft 4.x (WG Draft)	TBD, 2020* (SG Input)	TBD, 2020* (Posted on iMeet)
Sponsor Coms Approve WG Draft 4.x	January 2021* at IEEE JTCM	
Initial Ballot	Q1/2021*	
Recirculation	Q2/2021*	
<b>Milestone:</b> Submission to NesCom	Q3/2021*	
<b>Milestone:</b> Publication	Q4/2021*	

Draft - Revised PAR

Scope:

This standard establishes the **recommended-required** interconnection capability and performance criteria for inverter-based resources interconnected with transmission and **networked** sub-transmission systems. Included in this standard are **recommendations-on performance requirements** for reliable integration of inverter-based resources into the bulk power system, including, but not limited to, voltage and frequency ride-through, active power control, reactive power control, dynamic active power support under abnormal frequency conditions, dynamic voltage support under abnormal voltage conditions, power quality, negative sequence current injection, and system protection. The standard may also be applied to isolated inverter-based resources that are interconnected via dedicated HVDC-VSC transmission facilities.

Purpose:

This document provides a uniform standard **requirements** for the interconnection, **requirements-capability**, and **lifetime** performance of inverter-based resources interconnecting with transmission and sub-transmission systems.

## H. NERC Report: Rich Bauer

Two new NERC Reliability Guidelines, since January 2020, have been published.

- BPS Reliability Perspectives on the Adoption of IEEE 1547-2018
- DER Data Collection for Modeling in Transmission Planning Studies

Standard Drafting Teams (SDTs) have been formed and are working on a number of Standard Authorization Requests (SARs)

- PRC-005
  - Maintenance requirements for protection functions in AVR control systems
- MOD-032
  - Inclusion of DER data in model requirements
- Transmission Connected Dynamic Reactive Resources
  - Include synchronous condensers, SVCs and STATCOMs in the MOD-025, MOD-026, MOD-027, PRC-019 and PRC-024 Standards

The NERC System Protection and Control Subcommittee (SPCS) has submitted two SARs. The Standards Committee has not acted on those SARs yet. The SARs are;

- PRC-019
  - Specify Requirements Inverter-Based Resources
  - Determine if Steady State Stability Limit should be a part of the required coordination
- PRC-023
  - Remove OOSB Requirement R2- the language in the requirement is misleading and appears to require OOSB to be set inside the tripping element, which defeats out of step blocking. SPCS recommends removing the requirement.

There have been four whitepapers published since January 2020, of interest to the PSRC.

- NERC-WECC Report on Inverter-Based Resource Modeling
- BPS-Connected Inverter-Based Resource Modeling and Studies
- Review of NERC Reliability Standards White Paper
  - PRC-002
  - MOD-026, MOD-027, FAC-001, FAC-002, TPL-001, VAR-002
- Fast Frequency Response Concepts and BPS Reliability Needs White Paper

Of particular attention to the PSRC is the PRC-002 section of the of NERC Reliability Standards White Paper. The review recommends revisiting PRC-002 with regards to disturbance monitoring equipment (DME) requirements. The existing standard requirements for DME placement is based on short circuit capacity. In the move to higher penetrations of inverter-based resources, short circuit capacity may not be the

best method to determine DME placement.

The NERC SPCS also modified and re-published Lesson Learned 20200702 - Verification of AC Quantities during Protection System Design and Commissioning. This Lesson Learned discusses different methods to verify AC currents and voltages during commissioning to ensure the installation and design is correct.

## **VI. B: Advisory Subcommittee Reports**

**Chair:** Russ Patterson

**Vice Chair:** Murty Yalla

There have been various requests to have NON-PAR related WGs to share draft documents using and ftp site.

- imeet central is being used by PAR related WGs
- PSRC committee will be setting up a new file sharing site: <https://psrc.sharefile.com> to be used by NON-PAR related WGs
- This site is for sharing files between working group members
- Can also share files externally (via links) to anyone
- Please do not ask how to login yet – if a working group has a need, the WG chair will contact PSRC leadership requesting to have a sharefile folder setup.
- If it is only for WG use then a list of WG members names and email addresses is required.
- Files can be shared via link to people that do not have a login account on <https://psrc.sharefile.com>
- More information (and “how-to” videos) will be forthcoming to clarify

### **A. B1: Awards and Technical Paper Recognition Working Group**

**Chair:** Hugo Monterrubio

**Vice Chair:** Mal Swanson

The B1 Working Group met virtually on Monday September 21, 2020 with all the SC’s being represented. The January 2020 meeting minutes were discussed and approved.

The following items were discussed during this meeting:

1. The WG reviewed and discussed the list of nominees for all the WG and individual awards listed below. The actual voting for these awards will take place electronically from October 1st to October 9th to give enough time to the voting WG members to review the merits of each nominee and make their selection.
2. WG Awards for the year 2020
  - a. PSRC Outstanding Standard or Guide & PES Nomination for Outstanding Standard or Guide
  - b. PSRC Outstanding Technical Report & PES Nomination for Outstanding Technical Report
  - c. PSRC Prize Paper Award & PES Nomination for Prize Paper Award
3. PSRC & Awards

- a. PSRC Young Professional Award & PES Nomination for Young Professional Award
  - b. PSRC Distinguished Service Award
  - c. PES Distinguished Service Award
  - d. PSRC Career Service Award
4. The following announcements were made on Thursday September 24, 2020 during the PSRC Main Committee Meeting.
- a. We will not be issuing or announcing PSRC awards during virtual meetings including this one. We believe that award recipients deserve their peer recognition in a face to face ceremony. All new and pending PSRC awards will be issued at our next PSRC physical meeting during the previously announced new Awards Ceremony section during the Monday reception dinner.
  - b. 2020 PES Awards issued to PSRC Members or WG's  
During the last IEEE PES General Meeting the following awards were announced:

IEEE PES Society Awards 2020

**IEEE PES Award for Excellence in Power Distribution Engineering,**

Thomas R. Beckwith for developing innovative solutions for voltage control and protection of power distribution systems

**IEEE PES Charles Concordia Power Systems Engineering Award,**

Kenneth E. Martin for contributions to increasing world-wide power systems performance by developing and testing wide-area synchrophasor technologies

IEEE PES Working Group Awards 2020

**IEEE PES Working Group - Outstanding Standard or Guide,**

IEEE C37.246, Guide for Protection Systems of Transmission-to-Generation Interconnections - Alla Deronja (Chair) and Keith Houser (Vice-Chair)

**B. B3: Membership Working Group**

**Chair:** Mal Swanson

**Vice-Chair:** Cathy Dalton

Attendance during the Virtual meeting was 412.

No report.

The following persons accepted the chair's invitation to become main committee members:

Abu Bapary  
Ritwik Chowdury  
Jason Espinosa  
Nathan Gulczynski

Dean Ouellette  
Marilyn Ramirez  
Angelo Tempone  
Steven Turner



Dennis K. Holstein

Ted Warren

The following persons became honorary committee members in 2020:

Bill Dickerson

Ljubomir Kojovic

Jerry Jodice

Michael McDonald

**C. B4: O&P Manual Revision and Working Group Chair Training Working Group**

**Chair:** Phil Winston

No report.

**D. B5: Publicity Working Group**

**Chair:** Cathy Dalton

**Vice Chair:** Mal Swanson

**Assignment:**

- Promote IEEE PES PSRCC activities globally.
- Facilitate global outreach using tools such as webinars, tutorials, trade publications, and other similar methods.
- Strengthen PSRCC awareness by preparing technical articles as may be required for the promotion of technical committee working group activities about the art of relaying, and the work of the PSRCC.

No report.

**B8: Long Range Planning Working Group**

**Chair:** Pratap Mysore

No report.

**E. B9: Web Site Working Group**

**Chair:** Rick Gamble

No report.

**VII. Items of Interest from the Main Committee Meeting: Michael Thompson**

**A. Motions:**

The chair of the C subcommittee, F. Friend, made a motion, "Mr. Chair, the System Protection Subcommittee, C, requests approval for transmittal of the "Guide for Power System Protection Testing", PC37.233 to the IEEE SA for balloting." The motion was seconded by G. Henneberg. There was no discussion. The motion was voted on by the main committee members and the motion carried.

The chair of H subcommittee, G. Antonova, made a motion to extend the PAR for WG H40 revising C37.1.2 and remove the words "Recommended Practice" and replace it with the word "Guide" in the Title and the Assignment. Also, the wording of the proposed scope was altered, and a purpose was added. The motion was seconded by T. Johnson. There was no discussion. The motion was voted on by the main committee members and the motion carried.

The chair of I subcommittee, J. Niemira, made a motion that the IEEE PSRC committee jointly sponsor IEEE 1854, Guide for Smart Distribution Applications with the T&D committee. The motion was seconded by T. Johnson. There was no discussion. The motion was voted on by the main committee members and the motion carried.

**B. Presentations:**

Presentation, how to use the PSRC CT Saturation Calculator spreadsheet with Example CT and System Data. Steve Turner, Arizona Public Service

Presentation, WG K11 Report, Methods for Detecting and Analyzing an Open Phase Condition of a Power Circuit to a Nuclear Plant Station Service or Startup Transformer, Charlie Sufana, Retired.

Presentation, Protection of High-Penetration Distributed PV, Dr. Thomas McDermott, Pacific Northwest National Laboratory.

**C. Adjournment:**

At the completion of the meeting, A. Makki made a motion to adjourn. The motion was seconded by S. Conrad. The motion carried and the meeting was adjourned.

**VIII. Subcommittee Reports**

**C: System Protection Subcommittee**

**Chair:** Fred Friend

**Vice Chair:** Michael Higginson

**System Protection Subcommittee Scope**

Evaluate protection systems responses to abnormal power system states. Evaluate and report on special protection schemes, remedial actions schemes, monitoring and control systems and their performance during abnormal power system conditions. Recommend corrective strategies and develop appropriate standards, guides, or special publications. Evaluate and report on new technologies which may have a bearing on protection system performance during abnormal power system conditions.

**Meeting Minutes**

The System Protection Subcommittee of the PSRC met on September 24, 2020 via WebEx. The participants introduced themselves, a quorum was achieved (51 of 61 members and 91 guests), and the January 2020 minutes were approved (Jonathan Sykes made motion, Michael Meisinger seconded).

**Advisory Committee and other Items of Interest**

- WG agendas are required to be posted at least two weeks prior to the meeting.
- WG meeting minutes due to Mike and Fred by Friday, October 2. Please use the new template.
- A custom web page is available for each WG, if the WG Chair wishes to use it. Contact Rick Gamble, [webmaster@pes-psrc.org](mailto:webmaster@pes-psrc.org)
- WGs that complete their work are encouraged to present it to the IEEE community through WEBEX. Contact PSRC officers or Cathy

- Dalton (Publicity Chair) for further information.
- Don Lukach is developing a meeting guideline presentation.
- Registration for this meeting was about 400, including 40 first timers.
- WG Reports should follow the IEEE Style Manual for word usage (Clause 10.2).
- WG officers should request certificates for their members upon completion of their work. Hugo Monterrubio can address any open questions.
- The Awards Ceremony will take place during the Monday night reception for the May and September meetings when we can resume in-person meetings.
- A file share application for non-PAR working groups has been developed.
- All are reminded and encouraged to apply for Senior Membership in the IEEE, if you are eligible.
- New templates for the O&P and P&P have been approved and are coming soon. Additional information is expected to follow.

### **Old Business**

There was no old business.

### **New Business**

Working group C-21 has completed their work. Yi Hu motioned to disband, Gene Henneberg seconded, and the subcommittee approved without opposition.

Working group C-24 has completed their work. Sukumar Brahma motioned to disband, Manish Patel seconded, and the subcommittee approved without opposition.

Working group C-32 has completed their work. Michael Higginson motioned to disband, Manish Patel seconded, and the subcommittee approved without opposition.

Working group C-26 has a draft standard ready for ballot. The subcommittee will conduct a vote on sending this draft standard to ballot via email.

Task force CTF-42 requested to be elevated to a working group, with the assignment to “Develop a summary paper from the new C37.250 Guide for Engineering, Implementation and Management of System Integrity Protection Schemes.” The Subcommittee chair granted this request. The working group will be led by Gene Henneberg as Chair and Yi Hu as Vice Chair.

Task force CTF-43 requested to be elevated to a working group, with the assignment to “Prepare a report summarizing existing and new practical applications and challenges to use Artificial Intelligence and Machine Learning technologies for power system protection and control.” The Subcommittee chair granted this request. The working group will be led by Yi Hu as Chair.

Sukumar Brahma motioned to form a new Task Force with the assignment to “Investigate the possibility of preparing one journal paper and one conference paper exclusively based on the material published in the WG C24 report”, and the motion was seconded by Jay Anderson. The Subcommittee chair granted this request and formed new task force CTF-44. The chair will be Sukumar Brahma and the Vice Chair will be Evangelos Farantatos.

Manish Patel motioned to form a new Task Force with the assignment to “Investigate additional need for protection practices for interconnecting solar or other inverter based generation to utility transmission systems (continuation of WG C32)”, and the motion was seconded by Gene Henneberg. The Subcommittee chair granted this request and formed new task force CTF-45. The chair will be Ali Hooshyar.

## Working Group Reports

### **C-23: Coordination of Synchrophasor Related Activities**

**Chair:** Allen Goldstein

**Vice Chair:** TBD

**Output:** Ongoing Liaison

**Draft:** N/A

**Completion:** Ongoing Liaison

The chair called the meeting to order.

Convened with 9 members and 17 guests. A quorum was in attendance.

Introductions

Patent Slides are not required since this WG has no PAR

Previous meetings minutes were reviewed and approved via email.

- Allen provided an overview of the scope of the C23 work group
- Allen reviewed the agenda
- Allen provided a summary of NASPI, and the five task teams (see PowerPoint)
  - Distribution Task Team: we could use greater coordination with IEEE PSRC C41?
- Jeff provided a preview of the upcoming NASPI work group meetings
- Allen – mentioned the expansion of NASPI's interest to include higher speed sampled values
- There aren't any new actions from NASPI to IEEE PES at this time
- Allen pivoted to the PSRC/PSCC PMU related activities (see modified slide 10)
  - Report updates by Vasudev Gharpure (updating C37.118.2 next year)
  - Ken Martin – wants broader representation of the community for CTF41, expecting this to become a WG
- If we have more information – people that are actually implementing PMUs in distribution systems
- Mahendra Patel asked about protocol test systems: synthetic model that can generate realistic data.
- Vasudev: submitted a tutorial for next year's general meeting
- Allen/Ken briefed P2664 (STTP)
- ICAP is the next meeting this afternoon
- PSCC P8 - Mapping between C37.118.2 and IEC 61850
- Clarification that this is the existing version of C37.118.2, not the new changes under development
- Slide 11: we haven't heard from Mark Adamiak – “point on wave” input to PMU and ideal PMU response
- Gustavo Brunello volunteered to be the vice chair
- Mahendra asked about education materials, Allen answered that a task force was formed and subsequently disbanded. ICAP is interested in pursuing something in that area.
  - There were a lot of good ideas generated, perhaps we can link to the

NASPI CRSTT who have recently developed some control room training materials?

- New Business:
  - More discussion about wide-area high-speed waveform measurements
  - Jeff Dagle discussed NASPI's ambitions in this area
  - Shane Haveron briefed a UK project, 4 samples per cycle across a wide area
  - Mahendra talked about the benefits of measurement waveforms beyond the standards requirements
  - Evangelos: EPRI has a related activity, PSCAD and EMTP models, PMU emulator
- Evangelos will present at an upcoming C23 meeting

Adjourn

(Thank you to Jeff Dagle for keeping minutes.)

The meeting adjourned at 3:22 PM CDT.

### **C-24: Modification of Commercial Fault Calculation Programs for Wind Turbine Generators**

**Chair:** Sukumar Brahma (Clemson University)

**Vice Chair:** Evangelos Farantatos (EPRI)

**Secretary:** N/A

**Output:** Report

**Established Date:** September 2014

**Expected Completion Date:** September 2020

**Draft:** Final

**Assignment:**

- 1) To survey WTG manufacturers to determine what parameters they could provide that could be used by steady state short circuit program developers in various time frames.
- 2) Use the result of this survey to prepare a report that can be used by steady state program developers to refine their models.

The webex meeting started with introductions. Participants introduced themselves alphabetically.

Then it was announced that the final report of the WG has been published at the IEEE PES Resource Center ([link](#)). Another version, only for PSRCC participants, is also available at the PSRCC website ([link](#))

The assignment of the WG has been successfully accomplished, so there was a motion by Sukumar to disband the WG. Dean Miller second the motion. The motion was approved. Sukumar will request disbandment of the WG at the C subcommittee meeting.

Then a discussion followed regarding dissemination of the work. Sukumar suggested to prepare an IEEE transactions paper that summarizes the report content. There was a question whether new developments should be included in the paper, but it was concluded that the paper should include only work documented in the C24 WG report.

In addition to the transactions paper, it was suggested to prepare one or more papers for relaying conferences.

Preparation of the paper(s) will be done under a new TF. Sukumar will request the formation of a new TF under C subcommittee with title/assignment "Investigate the possibility of preparing one journal paper and one conference paper exclusively based on the material published in the WG C24 report"

There were total 38 attendees in the meeting, 10 members and 28 guests.

### **C-25: Protection of Wind Electric Plants**

•  
**Chair:** Martin Best

**Vice Chair:** Amin Zamani

**Secretary:**

**Output:** Report

**Established Date:** January 2015

**Expected Completion Date:** January 2021

**Draft:** 6.4

**Assignment:** Write a report to provide guidance on relay protection and coordination at wind electric plants. This report will cover protection of generator step up transformers, collector system feeders, grounding transformers, collector buses, reactors, capacitors, main station transformers, tie lines and points of interconnection, and associated arc flash issues. Although the report will address coordination with wind turbine generator protective devices and static VAR sources, the protection of the wind turbine generators and static VAR sources will not be included.

Working Group C25 met virtually on September 21, 2021 at 1:10 PM CDT with 10 members and 42 guests.

### **Meeting Agenda**

- 1) Introductions
- 2) Review January 2020 meeting minutes
- 3) Review the report approval progress
- 4) Adjourn

### **Summary of Meeting Discussion**

- i) Since the attendees list was available and to save time, no formal introduction was done. Then, the January 2020 minutes were approved.
- ii) The status of the report was discussed first. The Chair announced that WG voting members have sent their comments, and the Chair is finalizing the report to address comments in draft 6.4.
- iii) George Tsai agreed to review the report for proper use of the words 'shall / should' and 'ensure'.

## **C-26: C37.233, Power System Protection Testing Guide**

**Chair:** Don Ware

**Vice Chair:** Matt Black

**Secretary:** Zach Zaitz

**Output:** Revise Guide

**Established Date:** Jan. 2016

**Expected Completion Date:** Nov. 2021

**Draft:** 4.2

**Assignment:** Complete revised Guide by end of 2021

- a) Officers presiding: Don Ware and Matt Black
- b) Officer recording minutes: Don Ware
- c) Call to order: Matt Black
- d) Chair's remarks: Reviewed IEEE Patent Policy and Word Usage Guideline Policy; i.e. should, etc.
- e) Results of call for quorum: Achieved
- f) Approval of Agenda (motion and second): incomplete
- g) Approval of Minutes of previous meetings (motion and second): incomplete
- h) Brief summary of discussions and conclusions including any motions:

Much discussion took place concerning quorum quantity, policy procedure and questioned whether our WG needed to vote as a ballot group. Tony reached out to Don Lukach and the answer is "NO", the WG does not need to do a preliminary ballot. In addition, Matt showed slides on how to reach quorum in different meeting formats.

Don asked someone to make a motion for the members present to vote on accepting draft, as is, and to move to vote on at SC meeting. Tony Seegers made the motion and Vahid Madani seconded it. A unanimous vote was counted; therefore, to move forward.

Vahid Madani shared ideas and tips of making a "Work Plan" that shows our timeline in our finishing process.

Don and Matt stated that all contributions and comment resolution has been finished during the Web meetings. Although, there was only one item that was presented about the correction of a formula. Don mentioned the need of the formula's reference; therefore, after meeting Don, Matt and Fred added the reference as [B40].

- i) Action items:
  1. Matt Black to enter latest draft into iMeet-Central.
  2. Matt will seek guidance on upcoming procedure in the moving forward process.
- j) No new business
- k) Time of final adjournment: 12:22 CDT
- l) Next meeting date and location: TBD, Web meetings to occur and Jan. main meeting to be virtual

Additional notes: None

**C-28: C37.242 Guide to the Synchronization, Calibration, Installation and Testing of PMUs for Power System Protection and Control**

**Chair:** Allen Goldstein

**Vice Chair:** Harold Kirkham

**Output:** IEEE Guide, C37.242

**Established Date:** September 2015

**Expected Completion Date:** May 2021

**Draft:** D3

**Assignment:** Revision of C37.242 Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control

The chair called the meeting to order. The chair provided an update on working group status. Draft has completed 1st sponsor ballot with 92% approval rating. All comments but one had been resolved by the beginning of the meeting and that was addressed during the meeting. By the end of the meeting, the WG had voted by email to take the ballot to recirculation.

Convened with 8 of 18 members and 25 guests. A quorum was not in attendance.

Patent Slides (no response)

Copyright Slides (no response)

The chairman presented a summary of the present situation of C28. He noted that 229 changes had now been reviewed and dealt with. Although a ballot was not strictly speaking required, one was being conducted.

One comment had been received and not completely dealt with. The text and a figure presented different values for the angle above the horizon that an antenna should have clear, ten degrees or fifteen. Harold Kirkham had been charged with resolving the matter. He gave a short presentation, summarized here.

Most of the people on the planet live at temperate latitudes, and since launching a satellite into polar orbit was more costly, the various entities that had launched navigational satellite systems had all opted not to do that. Most navigation satellites had an orbital inclination of about 50 or 55 degrees. Russian satellites had slightly higher angles. This meant that if you were located at a latitude of (say) 50 degrees, there would come a time when a satellite would pass directly overhead. If your latitude was higher than that, all satellites would always be toward the equator.

A navigation system on the surface of the planet could access any of the satellites of whatever systems it was made for, provided it had line-of sight access in the sky. However, as the angle above the horizon grew smaller, the path for the radio waves grew longer, the noise level increased, and the signal quality suffered. The longer path meant that there would be more attenuation (and therefore lower signal strength) and more dispersion (and therefore lower "readability") as well as more sources of man-made noise coming into view. Although navigation satellites were visible from the poles, they were not considered useful there. Because of signal degradation, navigation receivers are capable of deliberately ignoring low-elevation satellites, the angle being set



by a “mask angle” in the software. The goal is to maintain a high-quality position or time estimate.

The conclusion was that whether the Guide recommended a clear view down to an elevation of ten rather than fifteen degrees would not have much practical effect. The number of 15 was proposed as the solution. This could also be recommended as the mask angle setting.

After some discussion it was agreed to give the number (15) in the Guide, and a citation, but not the details.

The following are suggested as citations: Introduction to GPS: The Global Positioning System, Ahmed El-Rabbany, Artech House, Norwood, MA, 2002 and the following web location:

[https://www.nevadadot.com/home/showdocument?id=9212#:~:text=Nearly%20all%20GPS%20receivers%2C%20inexpensive,between%2010%20and%2015%20degrees.\\_](https://www.nevadadot.com/home/showdocument?id=9212#:~:text=Nearly%20all%20GPS%20receivers%2C%20inexpensive,between%2010%20and%2015%20degrees._)

- **C-29: Power System Testing Methods for Power Swing Blocking and Out of Step Tripping**

**Chair:** Kevin W. Jones

**Vice Chair:** Mike Kockott

**Secretary:** N/A

**Output:** Tutorial

**Established Date:** January, 2016

**Expected Completion Date:** May, 2022

**Draft:** 1.04

**Assignment:** Create a report on test instructions/parameters to accompany the PSRC documents Application of Out-Of-Step Protection Schemes for Generators, and Tutorial for Setting Impedance-Based Power Swing Relaying on Transmission Lines, to aid the users in quality testing of their settings and systems when following the working group outputs which recommend testing of complex relay settings and systems.

Working Group C29 met via WebEx in a single session with 11 members and 28 guests (39 total). Kevin Jones, Chair presided over the meeting. Mike Kockott, Vice Chair, recorded the meeting minutes. The meeting was called to order by Kevin Jones on Tuesday, September 22, 2020 at 0800 CDT. Kevin led the review of the minutes from the January meeting in Jacksonville, FL, then asked for a motion to approve. Gene Henneberg supported this motion, with second from Jonathan Sykes. As no objections were raised, the minutes from January were approved.

The draft report has now been completely transferred to the new technical report format. The latest version number is 1.04. The target completion date is revised to May, 2022. Kevin led a review of the outline and existing content of version 1.04.

#### Review of Writing Assignments

Gene re-committed to writing section 1.4 and send to Kevin before the January 2021 meeting.

Thanks to Mike Benitez for his summary write-ups for sections 2 and 3. These two sections will now be worked on by the already assigned teams for this. Kevin will reach out to Mike Benitez to check he is still willing to lead these writing teams. Benton Vandiver re-affirmed his willingness to participate. Kevin will check with the other writing team members on their willingness to still participate. The target completion date for sections 2 and 3 is such that they can be included in the draft report in time for this to be sent out to all before the January 2021 meeting.

Kevin invited any volunteers wishing to contribute to contact him. Jonathan Sykes and Deepak Maragal offered to review the present draft and provide feedback.

Ritwik Chowdhury asked if 'hardware in the loop' testing had a place in the envisioned scope of the report. Kevin affirmed that it did.

#### COMTRADE Power Swing calculator

Kevin presented the details of this tool that he has been developing as an Excel spreadsheet. He discussed its scope and purpose. He then went over the input parameters and showed a demonstration on the calculation.

Kevin invited all to suggest to him other relays to be included in the calculator.

He also invited all who would like to use this calculator to contact him. He did however point out the disclaimer, emphasizing that use of this tool is 'use at own risk'.

Kevin also mentioned future enhancements to come.

Ritwik Chowdhury informed the Working Group of a tool he has developed and is currently using. He mentioned the strengths and flexibility of the tool, and asked if there was a place in the report in which it could be described. Kevin answered to the affirmative. Ritwik accepted to write a contribution, but indicated that he would not be able to do this by the January meeting.

Heather Malson raised a point of warning. All tools and testing methods are welcome in this report, but the purpose and intent of each should be made clear, and no tool should be put forward as requisite, especially if high cost and levels of skill are required.

As time was up, Kevin adjourned the meeting at 0900 CDT.

- **C-31: Guide for Protection System Redundancy for Power System Reliability**

**Chair: Solveig Ward**

**Vice Chair: Alla Deronja**

**Secretary: Alla Deronja**

**Output: Guide**

**Established Date: September 2017**

**Expected Completion December 2021**

**Draft: 9.1**

**Assignment: Development of a guide for protection system redundancy**

WG C31 met on Wednesday, September 23, 2020, in a single session chaired by vice-chair/secretary with 19 voting members, 10 non-voting members, and 27 guests attending. The WG was taking the meeting notes.

The meeting chair displayed the IEEE patent and IEEE-SA Copyright policy slides as required for the working group with PAR related activities. There were no patent claims from the meeting participants.

The quorum was met (19 voting members out of 22 were in presence).

The meeting agenda was approved. There were no objections.

The WG voted to approve JTCM January 14, 2020, February 17, 2020 webex #17, March 23, 2020 webex #18, April 6, 2020 webex #19, May 4, 2020 webex #20, and June 29, 2020 webex #21. (Motion: Don Ware, 2<sup>nd</sup>: Joerg Blumschein).

An internal circulation for approval of the completed guide draft within the WG was conducted in the summer of 2020. The 75% approval rate was achieved with 18 approve/approve with comments votes, 1 negative vote, and 3 no-votes.

The WG's next task is to address the comments received during the internal circulation of the document before we can start the IEEE-SA ballot. The WG will conduct bi-weekly webex meetings to address these comments. A series of meeting will be set up accordingly. If needed, some meetings will be cancelled.

A question was whether we need to resolve WG comments before moving to subcommittee ballot? It was agreed to address comments first and, then, request the subcommittee permission by email.

The WG then proceeded to address the comments received during the internal circulation for approval.

Document review:

- a) Definitions – use IEEE dictionary definitions
  - i. Redundancy: Use 1475 definition. Add our 2<sup>nd</sup> sentence in the body of the document (4.1)
  - ii. Dependability: use C37.113
  - iii. Security: use IEEE 100
  - iv. Reliability: use C37.113
  - v. Protection system: Use Matt's suggestion (= new definition)
  - vi. Backup protection: no change

b) Acronyms

Generator step-up transformer. Keep as is. Do not add transformer to GSU in the body.

c) General considerations (4); Protection systems are designed to be reliable and ...

Action items:

1. Alla Deronja will set up 6 webex meetings to address the comments from the WG internal circulation of the guide.
2. Matt Black will work with I2 to approve the revised definitions.

**C33: Support for WG-P2004 “Recommended Practice for Hardware-in-the-Loop (HIL) Simulation Based Testing of Electric Power Apparatus and Controls”**

**Chair:** Dean Ouellette

**Vice Chair:** Sakis Meliopoulos

**Secretary:** Aaron Findley

**Output:** Recommended Practice

**Established Date:** September 2018

**Expected Completion Date:** 12/31/2021

**Draft:** D2

**Assignment:** Support the development of this IEEE recommended practice in cooperation with PELS, IAS, and IES efforts

**Webex Meeting 23 September 2020, 08:00 – 09:00 CDT [13:00 – 14:00 GMT].** All working group officers were present. The chair presided over the meeting and the secretary recorded minutes.

A call to order of the meeting was made with 9 members and 17 guests in attendance.

A quorum was achieved with approval of the agenda and approval of the minutes from previous meetings.

Patent slides were shown and all participants asked to speak up about any patent claims at this time. The patent slides are always available on the IEEE P2004 collaboration website for review.

Dean Ouellette presided over the meeting, and presented a draft of P2004 as well as a review of the Generator protection application C33 is developing as an appendix to the P2004 document

C33 working documents have been placed on the IEEE SA Collaboration site for P2004 under the folder for C33 Task Force documents.

**Action Items:**

Working group member or guests that require access to the P2004 Imeet central will need to send a request to Dean and he will forward the request to the P2004 admin.

P2004 leads requested support in developing the following write-ups

5.4.2.6 Wind Turbine Protection – Assigned to Jim van de Ligt

5.4.2.7 Solar Generation Protection – Assigned to Yuan Liao

5.4.2.8 Battery Energy Storage – Assigned to Deepak Maragal, Amin Zamani

5.4.4 Cyber-Physical system testing – Assigned to Deepak Maragal

Panos Kotsampopoulos (National Technical University of Athens) from P2004 requested support in Section 6 when using a digital interface

Dean requested members review and revise the Generator protection application in addition to the above writing assignments.

Meeting was adjourned at the scheduled time.

- **CTF34 – Inverter-Based Short Circuit Current Impacts**

**Chair:** Kevin W. Jones

**Vice Chair:** Gary Kobet

**Secretary:** N/A

**Output:** N/A

**Established Date:** September, 2017

**Expected Completion Date:** January, 2022

**Draft:** N/A

**Assignment:** Coordinate/communicate the efforts of the PES/NERC Low Short Circuit Current Impacts Task Force and PSRC working groups addressing the issues of inverter-based resources.

Working Group CTF34 met via WebEx in a single session with 15 members and 65 guests (80 total). Chair Kevin Jones presided over the meeting. Vice Chair Gary Kobet recorded the minutes. The meeting was called to order by Kevin Jones on Wednesday, September 23, 2020 at 0910 CDT. The minutes from the January 14, 2020 meeting in Jacksonville, FL were reviewed and approved.

The Chair reviewed action items for other PSRC working groups as noted in the document (NOTE: The Vice-Chair plans to send bullets from the NERC/PES TR68 document to each PSRC WG below to remind them of the recommendations of the NERC/PES task force.)

- C24 Modification of Commercial Fault Calculation Programs with Wind Turbine Generators - Evangelos Farantatos: Report published June 2020, available in IEEE PES Resource Center. WG disbanded. New task force to write paper for presentation at regional relay conferences.
- C25 Protection of Wind Electric Plants - Dean Miller: Report out for C subcommittee ballot, ballots due end of September.
- C32 Impact of Inverter Based Resources on Utility Transmission System Protection - Mike Jensen: Report balloted and approved, paper in process of being published. WG disbanded.
- C38 Guide for the Design of Microgrid Protection Systems - Mike Higginson: Guide under development now. Goal to finish end of next year.
- D29 Tutorial on Setting Impedance-Based Power Swing Blocking and Out-of-Step Tripping Functions on Transmission Lines - Kevin Jones: Up to 40% IBR penetration results in slightly more unstable system but could not prove slip rate increased. More help needed from EPRI to fine tune the model. Also plan to model in PSCAD as well as positive sequence PSSE model. Hopefully progress by end of this year.
- D38 Impact of High SIR on Distance Relaying - Christopher Walker: Writing assignments still being worked on, including a section on IBR.
- D41 Coordination of Activities Related to Line Protection Inverter-Based Sources - Evangelos Farantatos: WG did not meet this week and will disband. This is because this activity has been stalled due to confidentiality concerns.

- J18 Investigate the effect sub-synchronous oscillations due to inverter based resources (IBR) on rotating machinery protection and control- Jared Mraz:  
Outline developed, writing assignments made.
- NERC - Rich Bauer:
  - Another solar disturbance occurred recently, NERC report forthcoming in October.
  - P2800/P2800.1
    - Some discussion about synchronous condensers being part of the solution. Rich discussed some work with a national lab involving synchronous condensers and IBR. It was discovered that when the fault is applied, there is a timeframe of 1-2 cycles where IBR “hunt” with unpredictable response. Synchronous condensers not required in P2800 but still may be an option.
    - Manish Patel
      - New draft available in couple weeks, WG vote forthcoming, January 2021 initial ballot coming. This is a standard, not a guide. Target publish end of 2021.
      - A requirement to inject negative sequence current that is 90 to 100 degrees leading negative sequence voltage, with the required ratio of negative sequence to positive sequence current being specified by the interconnecting utility.
      - Question from P2800 to PSRC regarding type III wind turbine generators (doubly-fed induction generators):
        - Simple controls - I2 leads V2 by 130-150 degrees
        - Advanced controls - After initial transient of 20-30 ms, I2 leads V2 by 100-110 degrees
        - Discussion:
          - 90 degrees I2 leading V2 is maximum torque, but characteristic is usually +/- 90 degrees around that
          - 20-30 degrees off MTA acceptable but can have problems if greater than that
          - Can have wrong phase selection
          - Possible problems with negative sequence values may be off-nominal frequency
          - Mohammad Zadeh will study by end of tomorrow
          - Consensus seems to be that simple controls will be a problem
      - Manish requested review of P2800 draft by PSRC, wants as much PSRC feedback before balloting. Chair recommended send to C-SC chair for distribution to working groups monitored by CTF34.

Chair Kevin Jones adjourned the meeting at 1010 CDT.

**C-36 IEEE Transaction Paper Development from C2 Report: Role of Protection Relaying in the Smart Grid**

**Chair:** R. Benjamin Kazimier  
**Vice Chair:** Steve Klecker  
**Secretary:** Steve Klecker  
**Output:** Paper  
**Established Date:** Jan 2018  
**Expected Completion Date:** Jan 2022  
**Draft:** 5.1

**Assignment:** To develop an IEEE transactions paper based on the C2 report "Role of Protective Relays in the Smart Grid"

C36 met Wed by web meeting from 1:10PM to 2:10PM. There were 10 voting members, 2 non-voting members, and 28 non-members present. Benjamin Kazimier chaired and presided over the meeting. Steve Klecker recorded the minutes.

The working group reviewed the latest 5.1 draft. No changes were suggested or made. A vote was taken and draft 5.1 passed unanimously with all 10 voting members present. The working group will add the final member list to the paper. It will then be sent to Fred for submission to Mal for terminology review prior to submission to the C subcommittee. This will happen within the next two weeks to speed up the approval process.

Additional notes:

The working group agrees to keep the group open and active for the purpose of writing abstracts and creating presentations for submitting C2 or the C36 transaction paper, as appropriate, to various conferences. The date of expected completion is updated to reflect this plan. The list of conferences with possible volunteers was also updated. Assignments are given in the section below.

**Conferences for Possible Submission of C2 / C36 work with Volunteers:**

Edison Electric Institute – Rob F.  
Cigre – Grid of the future – organized by US National committee – Alex A.  
IA/NE – Ben M.  
Mipsycon – Steve K.  
GA Tech – Taylor F. – backup Alex A.  
Texas A&M – 2020 – Volunteer Needed  
WPRC – Steve K.  
Pac World – Taylor R.  
APAP - Asia 2021– Alex A.  
DPSP European developments in power system protection 2022– Alex A.  
IEEE general meeting – Have to submit transaction paper  
IEEE T&D - Have to submit transaction paper  
PSRC Main Committee Meeting – Volunteer Needed

**Other Volunteer Efforts:**

Jayaprakash can support presentations  
Yuan can assist Alex in preparing abstracts  
Dr. Gers can support presentations

**Writing / Work Assignments:**

Alex Apostolov: Create 2 versions of conference presentations, for 15 and 30 minutes long.

Alex Apostolov: Create 150 word abstract for conference submissions.  
Taylor Raffield: Develop matrix of conferences listed above with conference dates, abstract submission dates, abstract requirements, and other notes of interest.

**Link to C2 paper:**

<http://www.pes-psrc.org/kb/published/reports/PSRC%20WG%20C2%20-%20Role%20of%20Protective%20Relaying%20in%20the%20Smart%20Grid.pdf>

**C38: P2030.12 Guide for the Design of Microgrid Protection Systems**

**Chair:** S. S. (Mani) Venkata

**Vice Chair:** Michael Higginson

**Secretary:** Geza Joos

**Output:** IEEE Guide, P2030.12

**Draft:** 0.7

**Expected Completion Date:** February 2022

**PAR Expiration Date:** December 2022

**Scope**

This guide provides for the design and selection of protective devices and coordination between them for various modes of operation of the microgrid. These include grid connected and islanded modes as transitions between modes.

**Purpose**

To facilitate the deployment of protection systems, given the challenge of protecting equipment and assets in the different modes of operation of the microgrid, including grid connected or islanded modes and during transitions between modes. The guide proposes different approaches, centralized and decentralized, passive and active, to detect and take proper actions to dependably and securely protect the microgrid and its equipment.

- **September 22, 2020 Meeting Minutes**

**Online Meeting**

**Officer Presiding:** Michael Higginson

**Minutes Prepared By:** Michael Higginson / Geza Joos

This meeting was an online meeting (WebEx). It was chaired by Vice-Chair Michael Higginson, standing in for Chair S. S. (Mani) Venkata.

The meeting commenced at 3:30 PM central time. There were 73 attendees, with 22 voting members, 13 non-voting members, and 38 non-members. Quorum was met.

The working group began with introductory remarks by the acting Chair. Roll was called. The patent slides were reviewed, and no concerns or comments were raised.

Minutes for the last meeting May 2020 were reviewed. Ben Kazimier moves to approve the unapproved meeting minutes. Fred Friend seconded this motion, and the minutes were approved by the working group without opposition.



The working group reviewed the agenda for this meeting. Fred Friend motioned to approve the agenda, with a second by Sukumar Kamaladasan and no opposition from the working group.

The meeting started with a presentation on the topic of Fault performance of a grid forming inverter given by Lalitha Devarakonda of Eversource. The working group members asked many questions on fault performance, mostly related to measured fault currents and the controls and operating conditions during the tests.

Michael Higginson started the discussions on the guide by discussing the status of the guide and stating the following: (a) the guide is nearly completed and most of the sections have been completed and reviewed; (b) the timeline for completion of the work is 2022; (c) it is expected that all outstanding writing assignments will be completed within the next 2 months; (d) this will be followed by a full review of all sections by all the working group members, with an internal ballot and comment resolution, a process that should be completed by end of 2021; (e) the IEEE SA balloting process would begin in early 2022.

The following questions were raised, and comments made: (a) consider the review by smaller groups: this will be revisited; (b) the timeline appears reasonable.

The working group reviewed progress on the draft guide. Updates and discussion, and commitments and action items were as follows:

- Section 4:
  - **Action Item:** Ward Bower to review some definitions, including the mention of ac and dc microgrids, as needed, and finalize section with feedback from Geza Joos within next two weeks; this review will be coordinated with the text of section 5.2 describing microgrids in general terms.
- Section 5:
  - The added material (section 5.3) on general considerations on microgrid operation related to protection issues are accepted.
- Section 6:
  - **Action Item:** Sebastien Billaut to expand description around Figure 4 in section 6.3 to clarify that it applies to grid-forming resources.
  - **Action Item:** Sukumar Brahma to review new third paragraph in section 6.2.
- Section 7:
  - **Action Item:** Mani Venkata and Michael Higginson to write section 7.1.3 on Black Start.
  - **Action Item:** Sukumar Brahma to expand section 7.6 on Fault Location in microgrids.
  - **Action Item:** Mohammad Zadeh, Ali Bidram, and Joe Xavier volunteered to review section 7.
- Section 8:
  - **Action Item:** Sakis Meliopoulos to review and provide feedback on Ratan Das's edits, for integration by Higginson, within 2 weeks.

- Section 9:
  - **Action Item:** Geza Joos and Ward Bower volunteered to review section, considering expansion, elimination, and/or relocation of sections 9.4-9.7 within 2 weeks.
  
- Section 10:
  - **Action Item:** Sukumar Brahma received feedback from Michael Ropp on Sections 10.1 and 10.2 and will revise per the comments and today's discussion within next 3 weeks.
  - **Action Item:** Section 10.3 to be reviewed by Sukumar Brahma and Jim Van de Ligt.
  - **Action Item:** Aleksandar Vukojevic to review section 10 to identify location of proposed addition, and draft proposed addition.

The next meeting is planned for January 2021 (PSRCC meeting). There may be a meeting schedule between now and January 2021 as needed.

Finally, the meeting was adjourned at 5:40 PM central time.

### **C-39: IEEE PC 37.252 Guide for Testing Auto Voltage Control Systems in Regional Power Grids**

**Chair:** Xiaopeng Li

**Vice Chair:** None

**Secretary:** Zhenyuan Zhang

**Output:** Guide

**Established Date:** 08-Feb-2019

**Expected Completion Date:** 31-Dec-2022

**Draft:** First edition draft.

**Assignment:** SGCC, SWJTU and THU are to sort out the necessary testing items of the AVC system. UESTC, XJTU, and CQU are to refine the testing procedures of the AVC system. SCU is to establish a Benchmark model for testing the AVC system.

#### **1. Call to Order**

- The meeting was called to order at 8:00 a.m.
- All attendees introduced themselves and declared their affiliations.
- Main WG meeting attendance was recorded.

#### **2. Roll call of participants**

- 11 representatives from 7 entities and 13 Individuals attended the meeting by Webex. The total number of the attendees present counts 24. The participants make a quorum.
- WG membership consists of State Grid Corporation of China (SGCC), University of Electronic Science and Technology of China (UESTC), Southwest Jiaotong University (SWJTU), Xi'an Jiaotong University (XJTU), Chongqing University (CQU), Sichuan University (SCU) and Tsinghua University (THU). The DRs of the above entities are Xiaopeng Li (SGCC), Zhenyuan Zhang (UESTC), Kai Liao (SWJTU), Lixiong Xu (SCU), Zaibin Jiao (XJTU), Qinglai Guo (THU) and Yongjie Luo(CQU).

#### **3. Approval of agenda**

- Chair Xiaopeng Li presented the agenda.

- *Motion #1*  
*Approve the agenda for the second WG meeting of PC37.252.*  
*Motion passed by voice vote without opposition.*
  - 4. Approval of minutes of previous meeting**
    - The minutes of the first WG meeting was sent to DRs in advance.
    - *Motion #2*  
*Approve the minutes of the first WG meeting of PC37.252.*  
*Motion passed by voice vote without opposition.*
  - 5. Current progress**
    - Chair Xiaopeng Li introduced the current progress on the draft development.
    - 1 preparatory meeting and 1 WG meeting have been held.
    - First-edition draft has been prepared.
    - Vote for new chair of WG PC 37.252 is finished. And Dr Xiaopeng Li is the new chair.
  - 6. Draft Discussion**
    - Dr. Peng Zhang from SGCC introduced the first-edition draft.
    - The content of the draft was discussed, and members agreed to make corresponding adjustments.
    - The scope should cover both the transmission system and sub-transmission system.
    - The maintenance testing of AVC systems should be added.
    - There should be consideration about dispatching priority in the draft.
  - 7. Date and place of next WG Meeting.**
    - A consensus was reached that if permitted the next WG meeting is expected to be scheduled in Nanjing in April, 2021.
  - 8. Unfinished business**
    - No unfinished business was brought before the WG.
  - 9. New Business**
    - No new business was brought before the WG.
- The WG adjourned at 9:05 a.m.

**C-40 Paper, Summary of C37.247 Standard for Phasor Data Concentrators for Power Systems**

**Chair: Vasudev Gharpure**

**Vice Chair: Mital Kanabar**

**Secretary: Mital Kanabar**

**Output: Tutorial planned (Paper, Presentation in future)**

**Established Date: 01/15/2020**

**Expected Completion Date: 12/31/2022**

**Draft: 1.01**

**Assignment:** Develop a publication (transaction and/or conference), a tutorial and a presentation based on C37.247-2019: the standard for Phasor Data Concentrators for power systems.

The following information should be included in your minutes as appropriate. The working group is free to use whatever form they choose to cover the items from the below list that apply to the meeting.

- a) Officer presiding: Vasudev Gharpure
- b) Officer recording minutes: Mital Kanabar
- c) The chair opened the meeting
  - a. Patent / IP slides were shown.
  - b. The WG assignment was shown
  - c. The purpose of the publication was shown. It will not be just a short version of the standard, although a short summary will be included.
  - d. The publication will include the reasoning for what was included, and for what was left out of the standard. It will also include recommendations for how the standard should be used.
  - e. Proposed tutorial outline was shared with the group.
- d) We had quorum, though no decisions were needed / made.
- e) We welcome a remote member from Abu Dhabi
- f) Previous minutes had been approved electronically.
- g) Vasudev Gharpure, Mital Kanabar and Galina Antonova will form the tutorial presenters.
- h) Tutorial material to proceed. The PEC deadline is 03-May-2021.
- i) Next meeting during the January 2021, JTCM. This is expected to be remote as well.

### **CTF-41 Investigate performance requirements for Distribution PMUs**

**Chair: K. Martin**

**Vice Chair: N. Perera**

**Secretary: D. Gurusinghe**

**Output: TBD**

**Established: 2019**

**Expected Completion Date: TBD**

**Chair:** K. Martin

**Vice Chair:** N. Perera

**Secretary:** D. Gurusinghe

**Output:** Report

**Established Date:** September 2019

**Expected Completion Date:** January 2021

**Draft:** 0

**Assignment:** Task Force CTF41 will examine the measurement performance requirements for PMUs that are intended for use in distribution systems and make a recommendation to either use the present standard 60255-118-1, update the present standard 60255-118-1 with special requirements, or initiate creation of a completely new standard. CTF41 will also review frequency and sample value measurement requirements and recommend updates to the 60255-118-1 if they seem warranted.

Task force CTF41 met on Tuesday, September 22, 2020 at 9:10am (CDT) with 41 participants via WebEx. Ken Martin (Chair) welcomed participants, reviewed patent slides, and explained the objective of the task force. There was no quorum, so no approvals of documents. Ken briefly discussed reviewed the last TF meeting, particularly issues brought by Harold and the alternative approach presented by Mario's paper.

Harold clarified the difference between operational and representative measurement definitions. With an operational approach, a specific measurement algorithm or equipment is specified as the reference and all other measurement systems or devices are compared against it. A representative approach uses a theoretical reference such as a mathematical formula and compares all implementations against that. The current standard uses a representative definition and gives test signals that are used to qualify the PMU against the reference. There are some operational aspects to the standard in the performance accuracy limits, as they take into account some of the known problems of implementation. Harold promoted using an operational definition approach in order to prevent ambiguities. This requires defining a particular implementation as the reference. Allan pointed out this would restrict innovation and competition. He suggested setting limits for specific applications rather than specifying a particular implementation. Harold disagreed as he does not believe we can get a lot of different PMUs giving compatible measurements without a specific PMU reference. Ken explained that we still have the comparability problem with the operational approach in determining they give the same measurement. Harold stated that with an operational definition we have a more precise definition of filters and other shaping structures so the comparison can be made more precisely. Ken pointed out without a mathematical model we still do not have a precise representation. Further do we have any evidence that present PMUs will not work in those environments.

Veselin asked why we want to modify the exiting standard? Ken stated that is why we have this TF and we need to investigate distribution requirements, testing and implantations.

Allan suggested this TF should refer reports/materials produced by the NASPI task force for distribution PMUs. Ken shared interesting figures of Romano's PhD dissertation which relate measurement precision to typical distribution system parameters. These indicate that to get a good level of precision between distribution substations, we need PMU accuracies around 0.01%, much higher than the current standard. This needs further investigation as to why this accuracy is needed and for what purpose.

Ken also explained summary of documents/material available in iMeet Central. He requested participant to refer these documents. Furthermore, Ken asked a volunteer(s) to provide typical characteristic values for transmission systems similar to data provided in Table 2.1 of Romano's PhD dissertation for distribution systems. Gustavo offered to provide some.

Gustavo pointed angle difference in distribution systems are small and therefore, needs more accuracy, but many PMU algorithms do not fulfill that requirement. He suggested this TF prepare a technical report on distribution PMU requirements. Harold stated distribution voltages are well controlled and no one-use distribution voltage angles for power flow calculations. Herb disagreed with that idea and stated microgrids need phase angle for their controlling.

Ken stated this TF should provide a recommendation to C subcommittee and highlighted possible outcomes. There was discussion as to whether a report is required or just a statement. C subcommittee chair, Fred stated only a statement is required, but this TF membership should decide whether elevate to WG or dismantle. Harold proposed a motion to terminate this TF at this meeting. Tony seconded the motion. In discussion, Fred pointed that TF should come to a decision by the next meeting. Several members including Dinesh, Nuwan, Deepak and Gopal showed their disagreement with the Harold's motion in the chat box. Krish disagreed with the motion, pointed that we need this TF, and proposed to continue its work to address growing demands of distribution network. Deepak agreed with Krish and stated distribution protection applications need this TF. Since a true voice vote was impractical and a roll call impossible, the chat box was used for voting and the motion failed with 17 against, 6 abstain, 1 for.

The TF will meet by webex to try to draft a recommendation and disband at the January meeting after presenting a statement to the C subcommittee.

In general, the TF decided it could use more evidence of what the measurement environment looks like, how transmission and distribution systems differ, and the actual requirements of applications that will use these measurements.

In chat box, Jean-Sebastien asked use cases and Gustavo replied that some use cases are already proposed. Gopal stated he could share one of use case of for need of distribution system PMU in real system in Mumbai. Michael Quinlan questioned for the proposed use cases, has it been shown the current standard is insufficient?

There are 48 attendees listed in the spreadsheet.

**CTF-42:** Summary of C37.250 Guide for Engineering, Implementation and Management of System Integrity Protection Schemes

**Chair:** Gene Henneberg

**Vice Chair:** Yi Hu

**Proposed Assignment:**

*Write a conference paper summarizing the new C37.250 Guide for Engineering, Implementation and Management of System Integrity Protection Schemes.*

**Established:** September 2020

**Completion:** December 2022

Task Force CTF-42 met in web session on September 22, 2020 with 20 attendees. Gene Henneberg presided. We did not introduce participants since the complete list, including affiliations, was subsequently provided to the chair.

The TF explored whether there is an interest to develop a summary paper based on C37.250 "Guide for Engineering, Implementation and Management of System Integrity Protection Schemes" for presentation at conferences or publication as a transaction paper. Also, it was discussed if it is more practical to develop a tutorial version of the standard due to high volume of material in the standard document. However, there were some concerns regarding the tutorial idea (attendees must pay to attend) and transaction paper idea (only subscribers of transactions will be able to read it). Therefore a tutorial or transactions paper may be less effective in achieving the goal of letting more people know of the contents of the C37.250 guide.

The CTF-42 decided to ask the C Subcommittee to be established as a Working Group. The proposed assignment for this WG is noted above. The proposed paper developed from the C37.250 guide can be presented at WPRC, Georgia Tech or any other relevant conferences.

Requirements for next meeting: room for 20, single session and projector.

Meeting minutes by Mehrdad Majidi, Yi Hu, and Gene Henneberg 09/22/2020.

**CTF-43: Investigate interest in the use of Artificial Intelligence and Machine Learning for Protection and Control Applications**

**Chair:** Yi Hu

**Vice Chair:** N/A

**Secretary:** N/A

**Output:** Make a recommendation to C subcommittee regarding whether a new working group should be established, and the proposed assignment for the new working group

**Established Date:** January 2020

**Expected Completion Date:** September 2020

**Draft:** N/A

**Assignment:** To investigate whether there is interest in the use of AI/ML for protection and control, and if there is interest, and to make a recommendation to C subcommittee regarding the proposed assignment of a new working group.

Task Force CTF-43 met in one WebEx session on September 23, 2020 with 53 attendees. No round-the-table introduction of attendees was taken due to time constraints. Complete information of all attendees, including affiliations, was recorded by the WebEx, and subsequently provided to the task force chair.

- a) **Officer presiding:** Yi Hu (Chair)
- b) **Officer recording minutes:** Yi Hu (Chair)
- c) **Call to order:** Yi Hu (Chair)
- d) **Chair's remarks:** Yi Hu informed meeting attendees of the objective and the assignment of the task force CTF-43: The objective is to investigate if sufficient interest exists to establish a new working group to report on the "the use of Artificial Intelligence and Machine Learning for Protection and Control Applications". The assignment is to make a recommendation to C subcommittee

whether a new working group should be established, and the proposed assignment of the new working group.

- e) **Results of call for quorum:** N/A
- f) **Approval of Agenda (motion and second):** No formal agenda for this CTF-43 session
- g) **Approval of Minutes of previous meetings (motion and second):** N/A
- h) **Summary of discussions and conclusions:** The meeting attendees engaged in an open discussion to explore whether there is interest in the use of artificial intelligence and machine learning for power system protection and control applications. Many attendees shared their current implementation and R&D activities in this area. The challenges and the need to have some directions for activities in this field were also discussed. The consensus of the meeting attendees is that a strong interest exists for establishing a working group in the use of the artificial intelligence and machine learning technology for power system protection and control. The task force CTF-43 decided to make a recommendation to the C Subcommittee to establish a new working group with the following proposed assignment:
  - a. **Prepare a report summarizing existing and new practical applications and challenges to use Artificial Intelligence and Machine Learning technologies for power system protection and control.**
- i) **Action items:** Task force Chair to make a recommendation to C subcommittee to establish a new working group with the proposed assignment.
  - a. CTF-43 recommendation was made at the C subcommittee meeting and the recommendation was approved. The new working group will be C43.
  - b. Yi Hu has been appointed to be the C43 Chair and will appoint vice chair and secretary before next meeting.
- j) **Items reported out of executive session (if such sessions have occurred):** N/A
- k) **Recesses and time of final adjournment (if different from our published face-to-face meeting agenda):** N/A
- l) **Next meeting date and location (if different from our published face-to-face meeting schedule):** N/A

#### **D: Line Protection Subcommittee**

**Chair:** Bruce Mackie

**Vice Chair:** Meyer Kao

##### **Line Protection Subcommittee Scope**

Investigate and report on the relaying techniques and systems used for transmission and distribution (T&D) line protection. Develop statistics and recommend protection practices for improving line relaying performance. Develop and maintain standards for line protection.

- The Subcommittee meeting met virtually via WebEx on Thursday, September 24, 2020 from 10:20 to 11:20.
- Officer presiding – Bruce Mackie



- Officer recording minutes – Meyer Kao
- The Subcommittee meeting was called to order by the Chair
- The virtual meeting was attended by 29 members and 41 guests. Quorum was met.
- Minutes from the January 2020 meeting in Jacksonville were approved - motion made by Jonathan Sykes and seconded by Russ Patterson.

The Chair reviewed items of interest from the Advisory Committee.

- WG Chairs: please send up to date minutes to Chair and VC
- Reminders:
  - Presentations for future meetings/webinars
  - Please send out agendas one month prior to the meeting
  - Template for Technical Reports (including Tutorials)
- Going forward what should be included in the Meeting Minutes on WGs
- Reminded subcommittee members on Standards WG Awards
  - IEEE SA Working Group Awards has new Procedure to request certificates of appreciation for completed (Approved Standard) work.
  - Must be requested by WG Chair or VC directly from the IEEE SA.
  - <http://standards.ieee.org/develop/awards/wgchair/wgawards.html> [standards.ieee.org]
  - Visit the IEEE SA Awards webpage after the Standard has been approved and published. You will need the IEEE Standard Number and year of publication: ve.g XXXX(Standard number)- XXXX (Year)
  - <http://standards.ieee.org/develop/awards/wgchair/wgawards.html>
  - The process is very simple and will require to list the names of the WG officers and members
  - The awards can be shipped to the person who is filling out the form OR can all be sent to an event. If you want these awards to be handed at our next PSRC Awards Ceremony then choose to have them be sent to an event and enter your name or the name of the awards Chair (Hugo Monterrubio) for collection. Important to verify and add the address of the Hotel of our next PSRC Meeting to arrive Monday or earlier.
  - Please email Hugo Monterrubio (HugoM@ieee.org) for any questions and also to notify when the awards have been requested for your Standard or Guide WG so we can follow up with IEEE SA
  - New PSRC Welcome Reception and Awards Ceremony: For all future in-person PSRC May and September meetings our Monday night Welcome Reception will feature an Awards Ceremony. Please take this into consideration when making travel plans for future PSRC meetings. Don't miss this opportunity to help recognize or be recognized for the work that our Committee and fellow PSRC members do throughout the year.
- Rick Gamble is contact for D SC (Webmaster)
- SA Documents are reviewed for terminology – Important for Subcommittee to review technical reports
- Recognized the need for a file share application for non-PAR WG's
- Reminder to apply for Senior Membership in IEEE
- New Templates Approved for O&P and P&P
- Attendance 400 with 40 first timers
- Don Lukach developing Meeting Guideline Presentation
- Future Meetings
  - January 2021 – New Orleans, LA or Virtual

- May 2021 – Nashville, TN
- September 2021 - TBD
- January 2022 – Garden Grove, CA
- May 2022 – Reno, NV

**Reports from the WG Chairs:**

**D28: (PC37.230): Guide for Protective Relay Applications to Distribution Lines**

**Chairman:** Brian Boysen

**Vice Chair:** Claire Patti

**Established:** 2013

**Output:** C37.230 – Guide for Protective Relay Applications to Distribution Lines

**Draft:** 2.6

**Expected Completion Date:** 2020

**Assignment:** To review and revise C37.230-2007, “Guide for Protective Relay Applications to Distribution Lines” to correct errors and address additional distribution line protection related topics.

Did not meet

Claire Patti motioned to create a task force on forming a WG on writing a summary paper on C37.230, seconded by Alla Deronja. Member of D-Subcommittee approved to create DTF46.

**D29: Tutorial for Setting Impedance-Based Power Swing Relaying on Transmission Lines**

**Chair:** Kevin W. Jones

**Vice chair:** Normann Fischer

**Assignment:** Create a tutorial on setting impedance-based power swing blocking and out-of-step tripping functions related to transmission line applications. Specific relay settings examples will be provided. Other methods of detecting out-of-step conditions that exist will be summarized and referenced, but will not be discussed in detail.

Working Group D29 met via WebEx in a single session with 9 voting members, 8 non-voting members and 30 guests (47 total). Kevin Jones, Chair, presided over the meeting. Normann Fischer, Vice Chair, recorded the meeting minutes. The meeting was called to order by Kevin Jones on Monday, September 21, 2020 at 1420 CDT. Kevin led the review of the minutes from the January meeting in Jacksonville, FL, then asked for a motion to approve. Gene Henneberg motioned to approve, with second from Jörg Blumschein. As no objections were raised, the minutes from January were approved.

- 1) The chair reviewed the latest document (Draft 1\_03) and update the attendees with respect to the changes made to the document.
- 2) New writing assignments were assigned with respect to:
  - a) Sections 4.1.1 “Concentric Characteristic Schemes”, to be written by Gene Henneberg and Normann Fischer.
  - b) Section 4.2.1 “Concentric Characteristic Schemes” will also be revised by Gene Henneberg and Normann Fischer.

- c) Section 4.2.2.1 “Single Blinder” schemes will be reviewed, and a brief explanation will be given why single blinder schemes are not applicable to transmission line applications (Gene Henneberg).
  - d) Section 4.2.2.2 “Double Blinder” schemes and Section 7 “Conventional Impedance Relay Power Swing Settings Philosophy” will be reviewed and rewritten by Kevin Jones.
- 3) The new target date for balloting is revised to January, 2022.

Kevin Jones adjourned the meeting at 1520 CDT.

### **D30: Tutorial on Application and Setting of Ground Distance Elements on Transmission Lines**

**Chair:** Karl Zimmerman, Schweitzer Engineering Labs

**Vice Chair:** Ted Warren, Southern Companies

**Output:** Tutorial

**Established:** January 2014

**Expected Completion Date:** Jan 2020

**Draft:** 4.0

**Working Group Assignment:** Write a tutorial on factors affecting the application and setting of ground mho and quadrilateral distance elements on transmission lines

Working Group D30 met with 39 attendees, via the virtual online Webex at 2:20 PM on September 23, 2020.

Chair, Karl Zimmerman presided over the meeting. He brought the meeting to order, and showed the agenda and guidelines for IEEE working group meetings. Vice-Chair Ted Warren recorded minutes, and D SC Chair Bruce Mackie moderated the Chat window.

Working Group D30 met with 39 attendees, including 12 out of 22 Voting Members present, so a quorum was established.

The Chair reviewed previous activities, including the Working Group title, output, and assignment. The Chair also reported that Draft 6.0 has been submitted to be available on the web site.

The Chair then showed a list key revisions that were made to the most recent draft.

These items included:

- Guide in IEEE PES template.
- Moved “Basic Setting Considerations” to Settings and Applications section
- Placeholder for 3.4 Polarizing Quantities for Quad
- Example added to 5.1
- New Figure in 5.2,
- New Writing Assignment in 5.3
- Expanded Section 6.0 including placeholder for summary table

After review, several edits and writing assignments were made:

- Clause 3.4 Choice of Polarizing Quantities will be added and reviewed (J. Candeleria, R. McDaniel, J. Blumshein, D. Maragal)
- Clause 5.1 Add a row to Table to show apparent impedance of line with parallel line out of service, but grounded at both ends. (Chris Walker)
- Clause 5.2 Figure was updated, D. Maragal comment to edit figure to show transformer connection (A. Deronja)
- Clause 5.3 Comment to improve figures legibility- from” Distorted Waveforms” Report (K. Zimmerman)
- Clause 5.3 Mike Kockett made comment to add application and setting guidance to CT saturation section (S. Billaut, D. Lebeau)
- Review of 6.0 Settings and Applications Section (K. Zimmerman, T. Warren)

Meeting was adjourned.

**D34: Coordinate with IEC 60255-187-3 Functional Specification for Line Current Differential**

**Chair:** Normann Fischer, Schweitzer Engineering Labs

**Working Group Assignment:** Coordinate with IEC 60255-187-3 (functional specification on line current differential requirements) and provide feedback

The working group did not meet.

**D35: Evaluation of Transmission Line Pilot Protection Schemes**

**Chair:** Rick Gamble

**Vice Chair:** Brandon Lewey

**Output:** Technical report to the Line Protection Subcommittee

**Established:** January 2017

**Expected Completion date:** 9/2020

**Draft:** 9

**Assignment:** Prepare a technical report to the line protection subcommittee to evaluate advantages and disadvantages of common transmission line pilot protection schemes, including POTT, DCB, DCUB, and line current differential. The schemes will be evaluated in terms of speed, sensitivity, dependability and security based on the design and configuration of transmission lines and system topology. A limited number of example systems will be evaluated.

The working group did not meet.

**D37: Impact of series compensation on transmission lines**

**Chair:** Mike Kockott

**Vice Chair:** Luis Polanco

**Secretary:** Nuwan Perera

**Working Group Assignment:** Create a report the impact of fixed series compensation on transmission line protection.

D37 met as scheduled on Monday, 21 September 2020, 1.10-2:10 PM with 37 attendees (10 Members and 27 Guests).

Previous meeting minutes have been reviewed and approved.

Several writing and review assignments were received. WG reviewed the list of writing / review assignment.

### **New/ revised Assignments**

#### Writing Assignments

##### Section 5.2.1

- Provide input for section 5.2.1 based on field reported events/failures - Luis Polanco

##### Section 5.4: In-service period, from perspective of line protection

- Provide a draft: Nuwan Perera

##### Section 5.3: Requirement/benefit of performing staged fault testing

- Provide a draft: Mike Kockott to work with Aaron Martin

##### Section 3.4:

- Provide a draft: Mukesh Nagpal

#### Reviews Assignments

##### Section-3

- Normann Fischer

##### Section-4

- Mike Kockott / Normann Fischer

##### Section-5

- Nuwan Perera

### **Action items**

- Secretary to send the updated draft (1.04): Oct 15
- Volunteers to provide their feedback to Secretary: Dec 15

With no further business, the meeting was adjourned.

### **D38: Impact of High SIR on Line Relaying**

**Chair:** Chris Walker (Walker Consulting Services)

**Vice Chair:** Greg Ryan (Ameren Illinois)

**Working Group Assignment:** Prepare a technical report to the line protection subcommittee to evaluate the impact of high SIR on line protection.

We met virtually today with 91 attendees; 16 voting members, 8 non-voting members, and 67 guests.

We met quorum.

Chris opened the meeting with some meeting logistics discussion. We did not go through the room with Introductions to conserve meeting time. Attendance is tracked through the Webex meeting platform and attendee's names are displayed in Webex for everyone to view.

Chris requested the approval of the minutes from Jacksonville and noted that the agenda had an error of the wrong city listed. Abu Bapary was first motion and Sebastien Billaut seconded. The minutes were approved without objection and the agenda included above is corrected to list Jacksonville. Quorum will be checked via the Webex attendance list.

Throughout the meeting several members and guests volunteered for more writing and review assignments. Those will be summarized at the end of the minutes.

Chris presented the current draft that is revision 0.2 and went over assignments.

Mohammad Zadeh discussed about expanding the section of Impedance relaying and mentioned a paper he wrote. He volunteered to work on this section.

Gustavo Brunello brought up to the working group line differential relaying and wondered if it should be discussed. Jack Wilson mentioned that overcurrent elements certainly need to consider high SIR but doesn't believe line differential is affected. Juan Piñeros mentioned line differential issues with polarization. A section on line differential will be included even if that section states that SIR is not an issue.

Pratap Mysore brought up to the working group that he has received additional information on CVTs that he will add to the instrument transformer section. He mentioned adding IEC CVTs that are faster versions and will update the CVT section with a discussion on sub cycle relays needing to be delayed.

The working group discussed effects of high penetration of IBR on SIR and also the section of SIR in the transmission line guide. Ali Hooshyar, Mohammad Zadeh, and Lalitha Devarakonda volunteered to work with Sebastien Billaut on the IBR section.

Ted Warren overviewed the system topology section and discussed a network system with two parallel lines.

Chris will put together draft 0.3 and organize the writing assignments and get the latest draft to the working group so the volunteers can work on their section.

#### **Volunteers – Section**

Abu Zahid – Quad section

Ali Hooshyar – IBR on SIR

Art Buanno – Review sections

Charles Sufana – 3.1

Daniel Lebeau – 3.2 or 3.3

Don Lukach – What is SIR

Frederico Lopez – Practical Solutions / any assignment

Gene Henneberg – any assignment

Jack Wilson – Practical Solutions / any assignment

Jayaprakash Ponraj – Section 3

Juan F. Piñeros – Practical Solutions

Koustubh Banerjee – 3.2 – 3.4 / any additional assignment

Lalitha Devarakonda – IBR Section

Mohammed Zadeh – Impedance Relaying / IBR on SIR

Pratap Mysore – Update CVT section that he has been working on / What is SIR

Ryan McDaniel – Section 4.2 high speed elements

Steve Klecker – What is SIR

**D39: Revise C37.104 IEEE Guide for Automatic Reclosing on AC Distribution and Transmission Lines**

**Chair:** Manish Patel

**Vice Chair:** Brandon Armstrong

**Established:** May 2018

**Output:** C37.104 – IEEE Guide for Automatic Reclosing on AC Distribution and Transmission Lines

**Draft:** ???

**Expected Completion Date:** December 31, 2022

**Working Group Assignment:** Revise C37.104 IEEE Guide for Automatic Reclosing of Circuit Breakers for AC Distribution and Transmission Lines

The working group met via a conference call on September 22nd, 2020 at 9:10 am CT with 22 members and 37 guests. Quorum was met (based on attendee list provided by webex meeting log). The meeting minutes for January 2020 and various conference calls since then were approved.

Presiding Officer – Manish Patel

Meetings recorded by – Manish Patel

The working group members spent most time reviewing edits to following in draft 1-0:

- 1) Definitions:
  - a) Autoreclosing – replace circuit breaker with an interrupting device.
  - b) Breaker autoreclosing time – Manish to check if this definition can be removed. It is not used in the main body at all.
  - c) Dead time – The definition included following note - The dead time is also widely referred as open interval or reclose interval. The note is removed and this statement is added to the definition itself
  - d) Manish Patel will reach out to WG I2 via a liason to check if edited definitions are acceptable.
- 2) Clause 4 – Fundamentals and Applications: Manish asked if use of “should” is ok in a question. Don Lukach suggested that it is OK to use “should” in a question.
- 3) Manish Patel noted that term “breaker pumping” could benefit from a foot note explaining it. Joshua Lamb volunteered to provide a couple of statements.
- 4) Manish Patel noted that the guide has three instances of term “safety”. Is this OK? WG agreed to remove “safety” and focus on adverse conditions instead.
- 5) Manish Patel noted that Autoreclose blocking is discussed in detail in clause 4 and then again briefly in clauses 5 & 6. A small team to review and determine if content in clause 5 and 6 can be removed.
- 6) While reviewing, it was noted that the phrase “needs to be” is used ~20 times in the current draft. Manish to review and replace with appropriate language. Possible alternatives are “several factors to consider”, “are often considered” etc.

Manish Patel to review the draft guide again and determine if a conference call is needed to resolve any comments or issues before requesting a WG vote.

**D41: Coordination of Activities that Impact Line Protection Due to Increasing Penetration of Inverter-Based Sources**

**Chair:** Iliia Voloh (GE)

**Vice Chair:** Evangelos Farantatos (EPRI)

**Assignment:** To monitor and collect line protection events, coordinate with other industry activities, and provide guidance to line protection subcommittee to improve line protection response when connected to inverter-based sources

The WG D41 did not meet during this virtual September 2020 PSRC committee meeting.

Due to difficulties in making progress towards the assignment of the WG, and in particular related to collection of field data from IBR events, the officers of the WG discussed with the officers of the PSRC committee prior to the PSRC committee meeting, and decided to disband the WG.

Iliia Voloh motioned to disband D41 WG, seconded by Steve Conrad. Members of D-Subcommittee approved to disband D41 Working Group.

**D42: Revise C37.113, Guide for Protective Relay Applications to Transmission Lines**

**Chair:** Jeff Barsch

**Vice Chair:** Don Lukach

**Secretary:** Josh Lamb

**Assignment:** Revise C37.113-2015, IEEE Guide for Protective Relay Applications to Transmission Lines.

- 1) Officer presiding – Jeffrey Barsch and Josh Lamb
- 2) Officer recording minutes – Josh Lamb
- 3) Call to order – Jeff Barsch
- 4) Chair’s remarks – Covered the IEEE Code of ethics, SA Copyright policy, Patent slides
- 5) Results of call for quorum – Quorum Achieved
- 6) Approval of Agenda (motion and second) – Chris Walker Motioned to approve Charlie Sufana second. Agenda approved.
- 7) Approval of Minutes of previous meetings (motion and second) – Josh Lamb Motioned to approve, Karl Zimmerman Second. Minutes approved.
- 8) Brief summary of discussions and conclusions including any motions.
  - a) Review of prior WG’s and history.
    - i) Guide was approved in 2015, in 2018 the D40 WG was formed with an open discussion to add to the guide.
    - ii) PAR has been submitted to revise the guide.
  - b) Discussed status of PAR: scope and purpose have been discussed and submitted for comments, responded to comments, submitted PAR for approval, waiting on approval of PAR.
  - c) Reviewed Scope at meeting – No Comments
  - d) Reviewed Purpose at meeting – No Comments
  - e) Reviewed topics to be added to guide – Charlie Sufana asked to add Loadability of 3 terminal lines.
  - f) Writing assignments



- i) Long Radial Tap Section: Taylor Raffield, Chris Walker
- ii) Load Encroachment and Loadability: Rafael Garcia, Alexis Mezco, Abu Bapary, Steve Klecker
- iii) Dual element spot Network: Abu Zahid
- iv) Multi-Terminal line protection: Qun Qiu, Pratap Mysore, Sebastien Billaut. Jim van de Ligt, Vamsi V., Kamal Garg
- v) Loss of Potential overcurrent scheme: Daniel Lebeau
- vi) Ground Directional Polarization: Jorg Blumschein, Karl Zimmerman, Madhap Paudel
- vii) Enhanced section on zone 2 protection (coordination of time intervals, margins for reach, bkr failure timer coordination, multi-terminal and tapped transformer applications): Federico Lopez, Nathan Gulczynski, Abu Zahid
- viii) Torque Control for POC Relays:
- ix) Setting Resistive reach for ground quad distance elements (D30): Daniel Lebeau, Sebastien Billaut
- x) Parallel lines feeding a load: Silviu Boanta, Abu Zahid, Arun Shrestha
- xi) SIR and Voltage discrimination: D38 Working group report.
- xii) Figures: Charlie Sufana, Steve Conrad, Walter McCannon
- xiii) Any outstanding comments from users?
- xiv) Add Travelling Wave protection?
- g) Reviewed Working group material – No Comments
- 9) Action items - NA
- 10) Items reported out of executive session (if such sessions have occurred) – N/A
- 11) Recesses and time of final adjournment (if different from our published face-to-face meeting agenda) Final adjournment 2:10 pm Central DST – Steve Conrad Motioned to close, Charlie Sufana seconded.

**DTF43: Investigate the need to update PSRC Report, Effect of Distribution Automation on Protective Relaying**

**Chair:** Bruce Mackie

**Established:** January 2020

**Assignment:** Determine if there is a need to update the PSRC report, Effect of Distribution Automation on Protective Relaying

Task Force DTF43 met virtually on Wednesday, September 23, 2020 at 8:00am CDT in a single session with 32 attendees.

The purpose of the task force was discussed in which PES approached PSRC about taking some chosen papers and converting them to the new PES format. This paper was chosen, and the task force will determine if the paper should be put in the new format. If the paper is put in the new format, then should the paper be updated as well? The previous task force meeting determined the paper would be put in the new format as a minimum.

The Chair showed the attendees how to obtain the existing report. The next portion of the meeting was dedicated to possible updates to the paper. Some of the ideas discussed were increased discussion on DER integration, volt/var control, additional information on reconfiguration and the current complications of adaptation, the addition of line sensors that send information at relay speed and peer to peer protocols.

Based on the possible updates, a motion was made by Jackie Wilson to create a working group to update the existing report. The motion was seconded by Mital Kanabar. The motion passed. The assignment of the working group will be **Update the PSRC report, Effect of Distribution Automation on Protective Relaying.**

Greg Ryan volunteered to be the chair of the new working group.

Motioned by Don Lukach to create a Working Group and seconded by Chris Walker. Members of D-Subcommittee approved to form a D43 Working Group. Gregory Ryan will be the D43 WG Chair.

**D44: Revise C37.114, IEEE Guide for Determining Fault Location on AC Transmission and Distribution Lines**

**Chair:** S. Billaut

**Vice Chair:** Karl Zimmerman

**Assignment:** Revise C37.114, IEEE Guide for Determining Fault Location on AC Transmission and Distribution Lines

Working Group D44 met Wednesday at 10:20CT with 43 attendees, via the virtual online Webex.

Chair, Sebastien Billaut presided over the meeting. He brought the meeting to order, and showed the agenda, IEEE copyright guidelines, and guidelines for IEEE working group meetings. Vice-Chair Karl Zimmerman recorded minutes, and he and D SC Chair Bruce Mackie moderated the Chat window.

Working Group D44 met with 43 attendees, including 26 out of 35 Voting Members present, so a quorum was established.

11 new voting members were added to the group (in addition to the 24 existing voting members).

The Chair reviewed previous activities, including the Working Group title, output, assignment, scope and purpose. The Chair also reported that the PAR was submitted to the IEEE SA NESCOM committee who issued an approval recommendation to the board and is under review this week, awaiting approval.

The Chair then showed a list of items to be added or expanded in the existing guide. These items were the result of the DTF44 Task Force meeting in January.

Working group tasks were assigned:

- Putting the guide in IEEE SA template (Arun Shrestha, Hardesh Khatri, Dean Sorensen)
- Redraw figures in MS Visio (Looja Tuladhar, Dean Sorensen, Hardesh Khatri)
- Micro grid considerations, including traveling wave on distribution systems (Mike Bloder, Yuan Liao, Steve Klecker)
- Fault location with inverter-based sources (differentiate the type of IBR) (Mohammed Zadh, Sebastien Billaut)

- Expanded TW fault location approaches and experience ([Robert James](#))
- Use of fault indicators as a strategy to work with relays ([Sebastien Billaut](#), Amir Makki )
- Possible creation of excel spreadsheet to calculate single and two-ended FL as part of guide ([Karl Zimmerman](#), Swagata Das, Daniel Sabin)

The Chair then showed an outline of the existing guide.

Working group tasks were assigned to review sections:

- Overview
- 2. Normative references
- 3. Definitions, acronyms and abbreviations ([Yu Liu](#))
- 4. One-ended impedance-based measurement techniques (Mohammad Zadeh, [Abu Bapary](#))
- 5. Two-terminal data methods (review comment: why not multi terminal) ([Yuan Liao](#), Hardesh Khatri, Yu Liu)
- 6. Other fault location applications ([Bruce Mackie](#), Nathan Gulczynski, Daniel Sabin)
- 7. Traveling wave techniques (Robert James, [Normann Fisher](#))
- 8. Other techniques ([Yu Liu](#), comment: there are many other ways; Scott Hayes: Wildfire technologies such smart meters, DFA, EFD )
- Annex A (informative) Bibliography
- Annex B (informative) Additional information on series-compensated lines (Normann Fisher)

Daniel Sabin reported that Hydro Ottawa utilizes an automatic impedance-based distribution fault location system. They have integrated FCIs into their system to identify branches where the fault was detected. The application is described in a CIRE paper. He provided a case study, "Example application of networked underground distribution fault location system" related to clause 5.5.3 of existing guide.

Normann Fischer motioned to adjourn, seconded by Amir Makki.

#### **DTF45: Investigate the need to create report on reduction of forest fire hazard**

Chair: Bruce Mackie

Assignment: Determine if there is a need create report on reduction of forest fire hazard.

Task Force DTF45 met virtually on Tuesday, September 22, 2020 at 2:20pm CDT in a single session with 69 attendees.

The reason for the task force was discussed as it is very relevant. The task force will have two meetings. At the meeting in January, the task force will determine if a working group should be formed to create a report. This meeting was dedicated to learning what a couple of utilities are doing in this area.

Scott Hayes, Principle Protection Engineer at Pacific Gas and Electric Company gave an excellent presentation entitled, "Wildfire Risk Reduction for Electric Utilities. His presentation had the following sections: Is Wildfire Risk Reduction Important, Electric Ignition of Fires – Causes, Is this a distribution issue, a transmission issue or both, Technologies and Methods to include in the report, Technologies and Methods to exclude from the report, and next steps.

John Belzins, System Protection Engineer at Xcel Energy discussed their protection controls and coordination sacrifices in Colorado. He discussed reclosing, fault clearing times and sacrificing coordination and their look at high-impedance fault elements.

## **Coordination Reports**

### **T&D Committee / Distribution Subcommittee**

T&D Committee / Distribution Subcommittee

The Summer T&D Committee / Distribution Subcommittee meeting was held virtually, The next planned meeting will occur during the IEEE JTCM in New Orleans, 11-14 January 2021.

The Distribution Subcommittee is comprised of working groups focused on Distribution Reliability, Switching and Overcurrent Protection, Smart Distribution, Distributed Resource Integration, and Voltages at Publicly and Privately Accessible Locations. Additional information can be found at the new link: <http://grouper.ieee.org/groups/td/dist/>

The following are items of interest to the Line Protection Subcommittee:

Working Group on Smart Distribution      <https://cmte.ieee.org/sdwg/>  
Sal Martino, Chair      Fred Friend, Vice-Chair      Kate Cummings, Secretary

P1854: Smart Distribution Application Guide has been published.

Scope: This guide categorizes important smart distribution applications, develops descriptions of the critical functions involved, defines important components of these systems, and provides examples of the systems that can be considered as part of distribution management systems or other smart distribution systems. The Guide was published on August 31, 2019. As a result of comments received during the balloting, a new PAR will be submitted to begin revision of the guide with PSCC joint sponsorship.

Volt-VAR Control Working Group  
Mike Simms, Chair      Suresh Gautam, Vice-Chair      John Sell, Secretary

P1885 'Guide for Assessing, Measuring and Verifying Volt-Var Control Optimization (VVO) on Distribution Systems' was balloted and the working group is addressing comments.

Scope: This guide provides practical methods for assessing, evaluating and verifying the benefits and impact of electric power demand, energy consumption and loss reduction of volt-var control optimization on electric power distribution systems.

Purpose: The purpose of this guide is to provide practical methods to estimate and verify the potential energy savings, demand reduction and loss reduction that can be achieved with distribution system VVO methods. This guide establishes uniform methods for distribution system modeling/measurements, load modeling/measurements, and performing assessment studies and pilots to forecast and verify the benefits.

Working Group on Switching & Overcurrent Protection  
<http://grouper.ieee.org/groups/td/dist/sop/>  
Fred Friend, Chair Clay Stocklin, Vice Chair Joe Viglietta, Secretary

P1806 “Guide for Reliability Based Placement of Overhead and Underground Switching and Overcurrent Protection Equipment” was balloted and the working group is addressing comments.

Scope: This guide provides analytical techniques to assist in the placement of switching and overcurrent protection devices on medium voltage distribution circuits for reliability purposes.

Purpose: This guide provides means and methodologies for proper placement of switches and protective devices to achieve the desired performance characteristics and reliability for medium voltage distribution circuits, including feeder and branch line equipment, with operating voltages up to and including 38 kV. Drivers for device placement, such as reliability and operational considerations are identified. Various types of switching and overcurrent equipment are covered such as: manual switches, automated switches, reclosers, sectionalizers, and fuses. Impacts on reliability and device placement are addressed for factors such as fault rate, interruption duration, exposure miles, customers affected and distribution automation.

There is a Task Force in the Distributed Resources Integration Working Group working on Microgrid Design Considerations in collaboration with PSRC C38 working group.

### **Old Business**

None

### **New Business**

D28 – Create Task Force to investigate need to create summary paper for C37.230

- D28 WG has completed the WG Assignment.
- Motioned by Claire Patti, seconded by Alla Deronja to create Task Force DTF46.
- Task Force to discuss writing a summary Paper on C37.230. Brian Boysen will chair the DTF46.

C37.243, IEEE Guide for Application of Digital Line Current Differential Relays Using Digital Communications (2025)

- Guide is set to expire in 2025.
- Motioned by Pratap Mysore, seconded by Jonathan Sykes to create Task Force DTF47
- Task Force to investigate if the guide needs to be revised and updated. Alla Deronja will chair the DTF47.

### **Entity PAR Proposal**

- IEEE SA inquired the PSRC on interest in participation of the PAR proposal for “Guide for application of direct current (DC) network topology protection in DC distribution grids”. Chair of PSRC stated this should fall in the D-Subcommittee. Chair of D-Subcommittee discussed this subject in the subcommittee meeting.

## **General Discussion**

Russ Patterson discussed a D WG report back in 2005 on EMTP models of transmission lines. The working group report showed printouts of the ATP files but the actual files were lost. Those print out of ATP files are now converted to text and a couple of ATP users debugged and made them useable. The WG report and the ATP files are now stored on PSRC website under the knowledge base section.

## **Line Protection operations of interest**

Karl Zimmerman made a presentation regarding a 230kV A-phase to 115kV A-phase transmission lines fault causing wind. Relays on both lines' terminals correctly tripped to clear this fault

## **Adjournment**

Motioned by Russ Patterson, seconded by Ted Warren

## **H: Relaying Communications and Control Subcommittee**

**Chair:** Galina Antonova

**Vice Chair:** Aaron Martin

### **Relaying Communications and Control Subcommittee Scope**

Evaluate and report on the characteristics and performance of protective relaying communications and control systems. Recommend communication requirements, operating and test procedures which assure reliable performance of the overall protection and control system. Report on new relaying equipment designs tailored to specific communication requirements.

Included are matters necessary to the function of such systems employed in the generation, transmission, distribution, and utilization of electrical energy, and their effects on system operation. Control systems include data acquisition and processing from devices such as transducers, Intelligent Electronic Devices (IEDs), and Human Machine Interfaces (HMIs) including the low-level interfaces to these systems.

Power System control issues associated with Power System Dynamics are excluded from this scope.

SC H met on September 24, 2020 via WebEx with 32 members and 59 guests present comprising a quorum. January 2020 meeting minutes were approved electronically.

SC H Membership changes were announced.

Departing SC H Members: Miriam Sanders, Jeffrey Pond, Bruce Pickett, Bill Dickerson.

New SC H Members: Jay Anderson, T.W. Cease, and Theo Laughner.

### **Announcements:**

- a. New items from September 2020 AdCom Meeting
  - i. PES GM2021 panel presentation, proposed by NERC (H22)
  - ii. PES Tutorial template and process, next deadline is 08/21
  - iii. A reminder to apply for Senior IEEE Membership

- b. New items from Awards and Recognition Meeting
  - i. Bruce Pickett and Bill Dickerson announced their departure from PSRC activities
- c. New from Standards Coordination Meeting: SC H Votes carried to
  - i. Pass H22 Draft to Sponsor Ballot
  - ii. Extend H22 PAR (to allow time for approvals)
  - iii. Extend H27 PAR (new leadership)
  - iv. Extend H40 PAR (new leadership)
  - v. Change H40 PAR (to a Guide) => a Main Committee motion
- d. New items from SC and reminders carried from prior meetings:
  - i. WG officers to attend Stds Coordination meeting
  - ii. SC Members are required to Vote on Reports
  - iii. iMeet space available for Non-PAR WGs. PSRC Officers have organized documents depository for non-PAR WGs
  - iv. PSRC directory updates to be provided by WG/TF Officers
  - v. WG presentations to be reviewed by SC Officers
  - vi. Upon work completion, prepare a presentation to the MC
  - vii. SA Sponsor Ballot pool formation for C37.238 Amendment closes on September 30, 2020 – please join if of interest
  - viii. Joint with IEC TC57 WG10 work on IEC/IEEE 61850-9-3 revision is discussed in PSCC P0 – SC H is invited to join

WG business:

The below 4 motions were carried electronically prior to the meeting

**Motion:** Working Group H22 motions to extend the PAR for IEEE Guide PC37.249, Guide for Categorizing Security Needs for Protection Related Data Files, for 1 year.

Reason: This group requires an additional year to complete IEEE-SA balloting process. Formation of IEEE-SA Sponsor Ballot pool is initiated upon an approval to proceed granted in September 2020.

Motion made by WG H22 Chair Amir Makki, seconded by SC H Chair Galina Antonova. Voted on electronically with 22 (of 42 SC H Members) in Favor, 0 Opposed, 0 Abstained

**Motion:** Working Group H27 motions to extend the PAR for IEEE Standard PC37.251, Standard for Common Protection and Control Settings or Configuration Data Format (COMSET), for 2 years.

Reason: This group has a new leadership and requires additional 2 years to complete this project. Working group has been conducting e-meetings regularly in addition to the scheduled meetings at PSRC.

Motion made by WG H27 Chair Mario Capuozzo, seconded by SC H Chair Galina Antonova. Voted on electrically with 22 (of 42 SC H Members) in Favor, 0 Opposed, 0 Abstained

**Motion:** Working Group H40 motions to extend the PAR for IEEE Recommended Practice PC37.1.2, Recommended Practice for Databases Used in Utility Automation Systems, for 2 years.

Reason: This group has a new leadership and is going through a major re-structuring of the existing draft to best align it with the power industry needs. This re-structuring also led to submitting a PAR change request with changed output and clarified wording. Additional 2 years are required to complete the on-going re-structuring and document updates.

Motion made by WG H40 Chair Theo Laughner, seconded by SC H Chair Galina Antonova. Voted on electronically with 22 (of 42 SC H Members) in Favor, 0 Opposed, 0 Abstained

**Motion:** Working Group H40 motions to Revise PAR for IEEE Recommended Practice for Databases Used in Utility Automation Systems, with the following Assignment, Scope, and Purpose.

Proposed Title:

~~Recommended Practice Guide for Databases Used in Utility Automation Systems~~

Output: ~~IEEE Recommended Practice Guide~~, **Project Number:** PC37.1.2

WG Assignment: Develop IEEE Std C37.1.2, ~~IEEE Recommended Practice Guide for Databases Used in Utility Automation Systems~~

Chair: Theo Laughner

~~Proposed Scope: This recommended practice presents general requirements, design, and lifecycle costs versus performance for databases associated with substation automation systems. Also included are specifications for database elements that should be standardized to ensure interoperability. Example designs are included for reference purposes, which are not intended to prescribe a definitive database design. Applications utilizing databases can be very different and may have vastly different requirements.~~

This guide presents database characteristics to be considered by protection and automation engineers in discussions with the information technology specialists on desired database requirements to meet the needs of the power system applications.

~~Proposed Purpose: This document will not include a purpose clause.~~

The purpose of this guide is to enhance the understanding between protection and automation engineers and information technology specialist in the area of database applications. This will be facilitated by application examples

During HTF51 report Mark Adamiak made a motion to form a WG to revise IEEE C37.239 COMFEDE standard. Benton Vandiver seconded the motion. All SC H members present voted to approve formation of WG H51.

Voting on the below 2 actions to be done electronically after this meeting: disbandment of WG H3 as it completed its assignment and disbandment of HTF48 as it had 6 meeting opportunities and did not produce any output.

## **Reports from the WG Chairs**

### **H3: Time Tagging for Intelligent Electronic Devices (IEDs) – COMTAG**

**Chair: W. Dickerson**

**Vice Chair: J. Hackett**

**Output: IEEE Standard, PC37.237**

**Completion Date: December 31, 2018**

**Current Revision: D1.01**

**Assignment:** Develop an IEEE Standard for time tagging for power system IEDs. This will include common requirements for time tags and show how to apply them to various classes of time sequence data. Requirements and methods for stating the resulting time accuracy will be included.

H3 did not meet and it completed its assignment.



**H6: IEC 61850 Application Testing**

**Chair: C. Sufana**

**Vice Chair: B. Vandiver**

**Output: Report**

**Established: 1999**

**Expected completion date: September 2020**

**Draft: 14.1**

**Assignment:** Write a report to the H Subcommittee on application testing of IEC-61850 based protection and control systems. Emphasis will be on the GOOSE functions.

The working group met virtually on September 23, 2020 with 9 voting members, 3 non-voting members, and 26 guests.

After introductions the IEEE Patent slides and IEEE Copyright slides were presented. There were no concerns raised.

The minutes of the previous in-person and Web-Ex meetings were approved.

Charlie then went over the latest H sub-committee ballot results. The latest draft is now 14.1 and he explained what changes had been made. The working group decided that draft 14.1 should be presented to the PSRC officers. Once the draft is approved by the officers, it will be forwarded to the IEEE HQ folks for final submission. It is also anticipated that a PowerPoint presentation will be developed for presentation at a Main Committee meeting. There is also a possibility that a summary paper will be developed.

Charlie also presented a few fun facts about the H6 Working Group since it has been in place for about 20 years.

Fun Facts:

First H6 meeting May 11, 1999 with John Burger Chair and Charlie Sufana Vice Chair  
Benton Vandiver became Vice Chair in first half of 2011 and Charlie Sufana became Chair  
Number of PSRC meetings to date: 61

**H22/C19 – Guide for Categorizing Security Needs for Protection Related Data Files**

**Chair: T.W. Cease**

**Vice Chair: Cesar Calix**

**Secretary: Hugo Monterrubio**

**Ballot Administrator: Rick Cornelison**

**Output: Guide - PC37.249**

**Established: January 2014**

**Expected Completion Date: December 2020**

**Draft: 12**

**Assignment:** Identify and categorize protection and automation related data files based on content, use, and risk of disclosure or compromise (confidentiality, integrity, and availability). Protection and automation related data files include, but are not limited to, files used for configuration, management, and analysis of protective relaying systems.

No meeting, no report. H22 requested to start an IEEE-SA Sponsor Ballot pool formation.

**H27: PC37.251 Standard for Common Protection and Control Settings or Configuration Data Format (COMSET)**

**Chair: Mario Capuozzo**  
**Vice Chair: Benton Vandiver**  
**Secretary: Zach Makki**  
**Output: Standard**  
**Established: 2013**  
**Estimated Completion Date: December 2023**  
**Draft: 4.0**

**Assignment:** Develop a standard file format for exchange of protection and control configuration data between engineering tools and asset management tools.

The working group met with 15 members and 6 guests in attendance.

Agenda:  
Introductions  
Review Patent Policy  
Review Copyright Policy  
Presentation / Discussion  
Adjourn  
Proceedings:

Quorum achieved

Chair business – minutes for approval (past 3 meetings) – motion (Benton Vandiver) and 2<sup>nd</sup> (Shane).

Shane noted in the last paragraph of last meeting minutes should be moved to action item. Chair did this and it was then approved.

Chair requested volunteer for H27 Secretary position. Daniel Sabin volunteered and was accepted as new secretary for the group.

Discussions:

PAR extension was previously voted approved by WG, request goes to H SC now for approval.

Reviewed the COMSET XML example for last content edits, work to date, and status of the draft std.

Issue of enumeration, how to address, data types supported.

Example shown with Herb/Ralph making recommendations.

Checked harmonization of data types with IEC 61850.

Address definitions and acronyms in draft, decide on method and verify with I2 liaison Yuan Liao.

Noted everyone should review section 5 as the XSD doesn't validate all structures and reader should understand that.

Boolean setting data type: Was forgotten in the example XML file. Discussion was held with a potential solution created in the file and then posted to iMeet.

Draft standard is available on iMeet, please review and comment.

Meeting adjourned.

Action Items:

Schedule next meeting for late October. – Mario Capuozzo

Revise the draft standard. – Mario Capuozzo

Review boolean type, ensure correctness. – Mario Capuozzo/Herb Falk/et.al.

Provide feedback on draft standard. - Members

### **H30: IEC 61850 User Feedback**

**Chair: D. Maragal**

**Vice Chair: A. Martin**

**Secretary: D. Tessier**

**Output: User Feedback**

**Established: September 2014**

**Estimated Completion Date: Ongoing**

**Assignment:** Collect user feedback from utilities and consultants for designing and implementing IEC 61850 based substation automation system. Prepare a report outlining the experienced issues and suggest enhancements to IEC 61850 standard and manufacturer implementations.

Introductions – 49 attendees

Approved Agenda

Reviewed and reminded attendees of scope

Summarized future topics for meetings with tentative schedule

System & Configuration Management

Top-Down Engineering Process

Testing

Training

Discussion of the Importance & Reliability of Time Synchronization System in IEC 61850 based applications & IEEE ICAP efforts included:

Cascading failures and the impacts of different time synchronization failures

How does this impact reliability?

Time synchronization is currently deemed as a “ancillary system”, and therefore is not critical and doesn’t require redundancy.

Analogy was made to station battery system

Time synchronization was designed on a “per substation” basis, which indicated whether the substation’s time source was synchronized, primarily used for SOE timestamps. Protection system cannot be dependent on this common mode of failure so redundancy needs to be considered on a component level (antenna, GM, BC, TC, etc.).

Time synchronization needs to be designed closely in hand with your networking architecture. These are becoming one of the same, which need to meet similar MTBFs.

Mixing of time synchronization protocols (PTP and its different profiles, PPS, etc.) should be added.

Need to consider time synchronization as a complete chain, and each component (antenna, RF splitter, links/cables, clocks, switches, etc.)

Yuchen Lu of EPRI asked which protection elements are more vulnerable to loss of synchronized timing.

Mital Kanabar asked members and guests to please consider attending H47 tomorrow (sept. 22nd) on "Impact of IEC 61850 sampled values, GOOSE and PTP time synchronization on protection and control applications using process bus" in regard to the PTP time synchronization.

Two-way Collaboration of PSRC with IEC WG10

Discussed liaison between IEC ←IEEE. Focus on establishing formal liaisons, and then other logistics (representation, physical attendance of WG10 meetings versus remote connection)

Roadmap of Future H30 Meetings à Discussion Topics & Tentative schedules

CIGRE B5.69 is working on Technical Brochure for feedback on SV projects. Contact Alex Apostolov for more information.

Alex is the Convener of CIGRE SC B5 WG B5.69 Experience gained and Recommendations for Implementation of Process Bus in Protection, Automation and Control"

Update from CIGRE B5.69 scheduled for future meeting. Alex also proposed sending a survey to H30 working group members by the November meeting.

PSRC's H30 site

Other topics:

Collaboration with Open source IEC 61850 tool development vendors?

Discussed opportunity to engage open-source software development

Mittal: I have information about LF Energy COMPAS, if you want me to update WG H30, let me know in Nov. 2020 meeting. LF Energy CoMPAS: The mission of the CoMPAS project is to develop open source software components related to IEC 61850 model implementation (profile management) and configuration of a power industry Protection Automation and Control System (PACS). More information: <https://github.com/com-pas/contributing>

Presentation on system configuration tool, and COMPAS/RTE.

Tentatively scheduled for November meeting

Repository of all IEC 61850 Engineering/Configuration/Test/ tool page

Deepak Action Item:

Clarify how members are to formerly submit issues so they can be tracked/stored in a repository of some sort. This should mirror the official punch list, but maybe use a more modern technique to capture feedback. (H30 site, etc.)

### **H31: Common Protection & Control parameters for COMSET**

**Chair: D. Maragal**

**Vice Chair: A. Apostolov**

**Output: Report**

**Established: September 2015**

**Estimated Completion Date: September 2022**

**Draft: 6**

**Assignment:** Develop generic models and parameters of protection functions.

This meeting highlighted and discussed the two major concerns of existing logical node model:

Duplication of Attributes Inconsistent representation and overloading of attributes

Duplication of Attributes

In continuation to the previous presentation nearby Alex Apostolov on nesting of logical nodes, the author presented the model of existing PDIS logical node, where in the PIOC element for SOTF function could be separated from the existing model. Following items were discussed in detail with regard to the PDIS logical model:

Phase Distance parameters are same as Ground Distance except the ClcSrc : Duplication of parameters

There is nowhere wherein Phase and Ground Distance elements are instantiated in the same LN

External Sync has nothing to do with PDIS

An alternate model was proposed and discussed wherein the timer elements and the PIOC-SOTF were nested, restraint element were nested from harmonic elements

Inconsistent representation and overloading of attributes

The differential element PDIF attributes were analyzed and compared against its usage for Transformer differential, Bus differential, Line differential, Capacitor bank Voltage differential applications. The following attributes were analyzed in detail:

87V characteristics is different from Rest

87L Characteristics is different from Rest

87T always has 2nd harmonic Restraint/block

87G can have 5th Harmonic Restraint/Block

The need for splitting these elements attributes separately from general comprehensive PDIF logic node was highlighted.

Chair (Deepak) would compile these attributes and indicated conducting the WebEx sessions and discussing these attributes in a comprehensive manner for consensus with H31 Working Group.

### **H32: Performance considerations for Ethernet circuits applied to teleprotection**

**Chair: K. Fodero**

**Vice Chair: W. McCannon**

**Output: Report**

**Established: September 2014**

**Estimated Completion Date: December 2020**

**Draft: 10**

**Assignment:** Develop a report on the use of Ethernet transport for teleprotection services and line current differential protection. This report will define the channel performance requirements for Ethernet transport systems / circuits that carry pilot protection communications.

No meeting, no report. The H32 report was approved and published on PSRC and PES sites.

### **H40: Databases used in SAS**

**Chair: T. Laughner**

**Vice Chair: M. Capuozzo**

**Output: Guide**

**Established: 2017**

**Expected completion date: December 2022**

**Draft: 1.7**

**Assignment:** Develop IEEE Std C37.1.2, IEEE Recommended Practice Guide for Databases Used in Utility Automation Systems

Working group met with 3 Members and 17 Guests in attendance. Theo Laughner ran the meeting. After introductions, IP Policy call was made, no issues were raised.

Membership was reviewed. It was noted that a membership refresh is needed. Quorum was not achieved based on current membership (3 of 8 members were present).

Previous minutes and action items were reviewed, but no vote was taken since there was no quorum.

Two PAR changes were recommended at the previous meeting and subsequently approved by the PSRC H subcommittee to approve. The first change was to extend the PAR by two years (reflected in the expected completion date above). The second change was to modify the output from a Recommended Practice to a Guide.

A new outline for Draft 1.8 was provided. Tony Johnson agreed to reflow the existing content into the proposed outline.

Two guests were volunteered to contribute content for sections. Dan Sabin offered to provide content on Database Requirements. Dennis Holstein offered to provide content on regulations. They also requested to be added as corresponding members to the working group.

**H41: Revision of IEEE 1646 Communication Delivery Time Performance Requirements**

**Chair: D. Holstein**  
**Vice Chair: T.W. Cease**  
**Output: Standard**  
**Established: 2017**  
**Completion Date: 2021**  
**Draft: D4**

**Assignment:** Revision to IEEE Standard 1646-2004

The WG met on Tuesday, with 4 members and 10 guests in attendance. A quorum was present. This was the 12<sup>th</sup> meeting. Attendees introduced themselves and affiliation.

The call for patents was presented – no response.

The copyright slides were presented.

The agenda was reviewed and approved without change.

Past minutes were approved via email.

Those attending focused on the following topics:

Reviewed and updated the status of existing action items.

Dennis Holstein reviewed the chronology of the request for IEC standards. To date, no permission has been granted. Aaron Martin provided H44 successful request letter.

WG will continue to work on the remaining section of the document while awaiting resolution of the request to review the IEC 61850-90-12 tables.

Members attended voted to retain clauses 6 and 7. Clause 7 header is changed to “System requirements.” Clauses 6 and 7 content is subject to further review.

Attendees discussed at length the need for more than one latency model (one for inside substation and one for substation external communications) and supporting examples. The chair requested that all suggestions be in written form and sent to the chair. The suggestions will be posted on iMeet for discussion. Remove reference to current differential relay.

Dennis will put out a Doodle poll to determine the preferred date and time for the next meeting.

**H44: Monitoring and Diagnostics of IEC 61850 GOOSE and Sampled Values Based Systems (PC2030.100.1)**

**Chair: A. Martin**

**Vice Chair: R. Mackiewicz**

**Output: Guide**

**Established: May 2018**

**Expected completion date: January 2022**

**Draft: 1.3**

**Assignment:** Create a guide that provides information about what factors to consider when applying IEC 61850 GOOSE and Sampled Values to monitor and diagnose communication of automation systems.

Introduction – 13 members, 19 guests WG had Quorum  
Chair presented IEEE standard patent slides and Copy right slides

Meeting called to order by Chair at 3:30PM CDT

Roll Call: 13 of 22 (4 new) [or 16 of 25 (6 new)] members present. Quorum Achieved.

Patent and Copyright slides presented by Chair

Motion to Approve Minutes of August 2020 Meeting made by Scott Mix, Seconded by Jose Castillo.

Vote: Minutes approved unanimously

Chair reviewed the guide outline and thanked those that have already contributed and asked for more contributions from those previously committed who have not yet delivered.

Chair will move some of the network monitoring content to other sections to improve the organization of the guide.

The group had a discussion on the goals of monitoring. A new section will be added to Chapter 7 (title TBD) to describe communication relationship engineering using SCL. This section will describe those elements of SCL that should be defined in order to facilitate or enable monitoring. Assigned to Alex Apostolov and Ralph Mackiewicz.

Discussion on how monitoring is important both before and after commissioning. Some questioned if it is monitoring during commissioning or is it testing as opposed to monitoring during maintenance (or operations). Lots of discussion. Monitoring capabilities of the system must be recognized so that the design accommodates the goal of monitoring GOOSE/SV system in the long run. For instance, Bruce says making sure that start and stop of protection actions and diagnostic information via GOOSE/SV/Reporting is recorded

and monitored in addition to the communications. Need to identify sufficient diagnostic information for communications and use appropriate mechanism (polling, reporting and GOOSE). Bruce will review outline and determine a good place to address this in a chapter. This is also relevant to the section planned for communication relationship engineering using SCL.

Yuchen Lu will contribute to the Condition based maintenance section of the guide.

Alex will review existing contributions regarding testing/simulation issues to make sure the same concepts are not repeated in the guide.

The Chair reiterated, that screenshots are acceptable but need to include multiple examples and not be focused on a single vendor's application.

The Vice Chair suggested that we still need to get SA to confirm our understanding of copyright related to screenshots and other graphics provided by participants. Do we need to explicitly document copyright grants or are any such contributions already covered by the copyright policy all participants have agreed to?

Mital Kanabar and Dave Dolezilek will undertake Monitoring by and/or of endpoints (Sections 7.1 and 7.2 in the draft displayed during the meeting)

Data monitoring (7.1.1) means monitoring the data in the GOOSE/SV messages, not just the message traffic. Xiangyu Ding will contribute to this.

Bharat Nalla will contribute to network monitoring of IEC 61850. Chair asked Bharat to look at existing contributions and to organize and enhance as appropriate with Chair's assistance.

Dustin Tessier suggested we should assign some content for PTP and its impact on GOOSE/SV monitoring per Dustin. Alex Apostolov thinks it is out of scope, but we should include content on how critical time synch is to SV especially. The Chair suggests there should be a description of this issue, but the monitoring of time synchronization should be a separate topic for another guide and not a focus of this guide. Deepak will provide some content for this guide.

A Motion to adjourn was made by Galina Antonova. Seconded by Scott Mix. The Chair adjourned the meeting at 4:35PM CDT.

**H45: C37.300 Guide for Centralized Protection and Control (CPC) Systems within a Substation**

**Chair: R. Das**

**Vice Chair: P. Myrda**

**Secretary: M. Kanabar.**

**Expected Output: Guide**

**Established: May 2018**

**Expected completion date: January 2022**

**Draft: 2.0**

**Assignment:** Develop a guide for Centralized Protection and Control (CPC) Systems within a Substation.



The WG met on September 23, 2020 with 17 members and 48 guests. Chair started the meeting by discussing the IEEE patent policy and other guidelines for WG meetings. No additional comments were received for the August 2020 minutes of meeting approved earlier via email.

Chair went through the project plan – it appears that we are going to meet our PAR deadline of publishing the guide by end of 2022.

Due to the presence of large number of guests, and many first-time attendees to WG H45 meeting and to PSRC meeting, the outline is reviewed. Some discussions were held on the outline – however, no additional suggestions were received on the outline which vindicate year-long effort by WG to develop a good outline. Chair then went through the Draft 2.0 which was posted in iMeet Central on September 16 – comments are due from members by October 30, 2020.

All coordinators will follow-up for pending assignments. All pending assignments are due by November 6, 2020.

We will meet virtually during the PSRC meeting in January 2021. We will prefer the present slot (second on Wednesday morning).

**H46: Recommended Practice for Human-Machine Interfaces (HMI) used in Substation Automation Systems (PC37.1.3)**

**Chair: M. Black**

**Vice Chair: C. Preuss**

**Secretary: S. Haveron**

**Output:** Recommended Practice

**Draft:**

**Established:** September 2018

**Expected Completion Date:** January 2023

**Assignment:** Produce a Recommended Practice for Human-Machine Interfaces (HMI) used in Substation Automation Systems

The chair called the virtual meeting to order on Wednesday 9/23/20 at 13:10 CDT. There were 30 attendees: 12 out of 19 voting members and 18 guests, achieving a quorum. Minutes from the previous meeting in May will be sent out by email for approval. Minutes from the meeting in January were approved with Jay Anderson making the motion to approve and Tony Johnson seconding the motion.

Galina Antonova provided a paper written by her and Asoke De regarding the subject matter that has been received by the chair and added to the iMeetCentral site for at least reference and perusal by the working group members.

Two attendees have volunteered for writing assignments and will be moved into WG membership after satisfying the 2 of the last 4 meeting requirements.

Jay Anderson made a motion to adjourn and was seconded by Tony Johnson. The motion was approved, and the meeting adjourned at approximately 14:10 CDT.

**H47: Impacts of IEC 61850 sampled values, GOOSE and PTP time synchronization on protection and control applications using process bus**

**Chair: M. Kanabar**

**Vice Chair: A. Riccardo**  
**Secretary: D. Ouellette**  
**Output: Report**  
**Completion Date:**  
**Draft: 0.1**

**Assignment:** In a digital substation Protection and Control (P&C) devices rely on Sampled Values (SV), GOOSE and time synchronization (PTP) together over process bus to communicate with Merging Units (MUs). This Working Group will generate a report evaluating the discrepancies in the communication of SV, GOOSE or PTP messages and their impact on protection and control applications such as performance and behavior.

H47 met on Tuesday with 46 attendees, 12 members, 2 Corresponding Members  
Reviewed outline and assignment with members

More volunteers for assignments

WG will meet monthly virtual to receive and review the assignments

Our Liaison to IEC TC95 – Eric Udren shared the document, liaison for CIGRE B5.69 is Alex Apostolov

Members suggest documenting specific impact line protection, substation protection, and rotating machines

2.  
3.

#### **HTF48: Education/Outreach for Synchronized Measurements**

**Chair: W. Dickerson**  
**Vice Chair: R. Midence**  
**Output: Recommendation for a WG**  
**Completion: 2019**

**Assignment:** Investigate the needs and opportunities for outreach and education regarding synchronized measurements, especially Phasor Measurement Units (PMU).

No meeting, no report.

#### **H49: Application Considerations on the Use of Packet-Switched Communication Channels for Pilot Protection and Teleprotection Schemes**

**Chair: G. Stoedter**  
**Vice Chair:**  
**Secretary: L. Erichsen**  
**Output: Report**  
**Completion:**  
**Current Revision:**

**Assignment:** Develop a report/tutorial on switched networks from a pilot protection application point of view for the benefit of relay engineers.

The WG met on Tuesday 9/22/2020 via virtual meeting, with 37 attendees. This was the first official meeting. A membership call was made. Attendees were prompted to indicate desired membership by indicating in the virtual meeting chat. 16 attendees requested to be members (14 in attendance and 2 previously expressed desired membership but were not in attendance). 23 guests were in attendance.

Attendee introductions were skipped. Attendance list will be made from 123 signup information from the meeting.

Guidelines for IEEE SA meetings and IEEE SA Copyright Policy were reviewed  
The work group title and assignment were discussed.  
First assignment for members is to read the Working Group H32 Report – Channel Performance Considerations for Ethernet Circuits Applied to Teleprotection.  
Second assignment is for members to come to the January meeting prepared to construct an outline for work group report.

Discussion included:

The assignment was discussed regarding the final product being a report or tutorial. The course of action is to develop a report. It will be decided later if a tutorial will be developed. If it is decided to pursue a tutorial the target should be for summer 2022. A proposal for the tutorial must be submitted in summer of 2021 to the appropriate governing body.

The subject matter of the report was discussed, specifically out of concern of overlap between H49's assignment and H32's report issued this summer. The application of pilot protection and teleprotection via switched networks, including real world experience from deployment of such schemes are areas H49 report can expand on. Additional points of focus will be defined while outlining the report.

#### **H50: Requirements for Time Sources in Protection and Control Systems**

**Chair: D. Ouellette**

**Vice Chair: J. Anderson**

**Output: Report**

**Completion Date: 2019**

**Current Revision: 1.3**

**Assignment:** To produce a Report on Requirements for Time Sources in Protection and Control Systems

Webex Meeting 23 September 2020, 11:30 – 12:30 CDT [16:30 – 17:30 GMT]. All working group officers were present. The chair presided over the meeting and the vice chair recorded minutes. A call to order of the meeting was made with 12 members, 1 non-voting member, and 31 guests in attendance. Attendance has been recorded in 123Signup.

Patent slides and Copyright policies were shown, and all participants asked to speak up about any patent claims at this time.

A quorum was achieved with 12 out of 21 members present.

Minutes from the January and May meetings were approved following a motion by Rich Hunt, seconded by Jim Bougie. Minutes from the July meeting were approved following a motion by Robin Byun, seconded by Nicholas Kraemer. The minutes will be moved to Approved in iMeet Central. Work was continued editing Draft 1.3.

A couple of discussion items:

Under the definition of "WAMS", we had a discussion concerning the reference time. UTC was selected (as in the draft) over other models such as TAI since UTC is required for by regulations for Synchrophasors, etc. We decided to consider "frequency" as a potential input into a substation clock rather than an output (although it might be from an internal system). The "doodle" that Rich Hunt had provided at our January 2020 meeting continues as a focus of discussion.

The following writing assignments are in progress.

Security: Tony Johnson

Inputs to clocks: Jay Anderson

Outputs: A section was received from Nicholas Kraemer. The group decided to expand the Output section. Jay Anderson to add bullet items for additional discussion.

Ya-Shian Li-Baboud to contribute to sections 3 and 5

Jack Wilson to contribute to Applications

Yuchen Lu also offered to contribute as needed

Can clocks communicate their own accuracy: Nick Kraemer

Event Logging: Aaron Martin

The Draft will be rev'd to 1.4.

Meeting was adjourned at the scheduled time.

A WebEx meeting is planned for November prior to the January 2021 PSRC meeting (also virtual). A doodle poll will be used to schedule the November meeting.

Note: files for the H50 Working Group are stored in iMeet Central at: <https://ieeesa.imeetcentral.com/psrcc-h50/folder/WzlwLDEyNTQ5NTk4XQ>

**HTF51: Revision of C37.239-2010 Standard on a Common Format for Event Data Exchange (COMFEDE)**

**Chair: M. Admiak**

**Vice Chair: N/A**

**Output: Recommendation to form a WG**

**Completion Date: September 23, 2020**

**Assignment:** Review the existing standard and determine whether a revision of the COMFEDE standard (C37.239-2010) is needed

The task force meeting was held on Wednesday, September 23 with 11 participants. The task of revising IEEE C37.239-2010 was presented. All in attendance voted to revise/re-affirm the standard. It is requested that a Working Group be formed to take on the task of revising such. It is also requested the HTF51 subsequently be disbanded.

IEC TC 57 IEC 61850 update

No update.

New business:

Craig Preuss presented a new IEEE 1854 PAR on Smart Distribution applications This Trial Guide was approved and published in 2019 with T&D as a Sponsor. The new PAR proposal is to create a Full Use Guide on the same topic. The question is if SC H is interested in reviewing and commenting on it. Voting on SC H interest to be performed electronically.

Jay Anderson motioned to adjourn, and Hugo Monterrubio seconded the motion. The motion carried unanimously.

## I: Relaying Practices Subcommittee

**Chair:** Jim Niemera

**Vice Chair:** Robert Frye

### Relaying Practices Subcommittee Scope

Develop, recommend and establish standards on protective relaying practices which are compatible with the electrical environment, including but not limited to; relay withstand capabilities to electromagnetic interference, characteristics and performance of instrument transformers, testing procedures, applications performance criteria, and definitions of relay and relay systems. Evaluate and report on pertinent aspects of protective relaying not addressed by other PSRCC Subcommittees. Maintain applicable protective relaying standards.

1. Welcome and Webex guidelines for meeting
2. Thank guests for attending
3. Many thanks to former members of the I-SC:
  - a. Ljubomir Kojovic (Sept 2019)
  - b. Farnoosh Rahmatian (Oct 2019)
  - c. Suresh Channarasappa (Oct 2019)
  - d. Jerry Jodice (Jan 2020)
  - e. Mark Carpenter (Sept 2020)
  - f. Roy Moxley (Sept 2020)
  - g. Oscar Bolado (Sept 2020)
  - h. Jeffrey Burnworth (Sept 2020)
  - i. Mario Ranieri (Sept 2020)
  - j. Bruce Pickett (Sept 2020)
4. Welcome to new members of the I-SC:
  - a. John ("Scott") Cooper (Sept 2019)
  - b. Normann Fischer (May 2020)
  - c. Ritwik Chowdhury (May 2020)
  - d. Todd Martin (May 2020)
  - e. Chase Lockhart (Sept 2020)
  - f. Michael Higginson (Sept 2020)
  - g. Adrian Zvarych (Sept 2020)
5. Determine a Quorum (**35 members** total in I SC)
  - a. Attendance: 26 members, 35 guests. Only 18 members required for quorum therefore we had quorum.
6. Approval of Minutes of the May 28, 2020 meeting APPROVED
  - a. Motion entered by: Mike Meisinger
  - b. Motion seconded by: Jeff Pond
7. The Chairman thanked Ritwik Chowdhury and Robert Frye for their dedication in hosting all the I-working group meetings
8. Coordination & Advisory Committee Meetings Items of Interest
  - a. Subcommittee Members' status and incoming Officers for May 2020
  - b. Attendees information
    - i. Approximately 400 PSRCC attendees from all over the world
  - c. *Future Meetings: (Check PSRCC website for latest information)*

- i. January 10 – 14, 2021 – JTCM – New Orleans LA (stay tuned to JTCM website and PSRC website for developments)
    - ii. May 2021 – trying for Nashville, TN
    - iii. Sept 2021 – TBD
    - iv. Jan 2022 – JTCM – Garden Grove, CA
    - v. May 2022 – trying for Reno, NV
  - d. Policies and Procedures for: Power System Relaying and Control Committee Working Group – see PSRC Knowledge Base
    - i. Three officers: Chair, Vice-Chair, Secretary
    - ii. **All WG Officers must be members of SA!!!**
  - e. **Working Group sign-in sheets – use 123SignUp procedure!!!**
    - i. See instructions on PSRC website for how to create your Working Group roster and attendance list for handout at your meeting. Email addresses are no longer permitted to be placed on your sign-in sheet. Attendees must add their email address in 123signup when they register for our meetings.
    - ii. <https://www.123signup.com/> also there is a navigation link on the PSRC website
    - iii. The Chairman reminded working group Chairs and Vice Chairs to keep attendee’s contact information private.
  - f. For PAR related work, please present the new patent slides and *record in your minutes* whether essential patent claims exist. If there are none, please write this into the minutes. **Do this at every working group meeting.** New 2018 slides available and are at <http://standards.ieee.org/about/sasb/patcom/materials.html>.
  - g. Looking for Webinars to publicize our PSRC work products as part of Global Outreach
    - i. Availability of WebEx for presentations by IEEE. Every WG that has completed their work is encouraged to present it to the IEEE community through WebEx which will project our work. Please contact Cathy Dalton, Chair of Publicity group or Russ Patterson, Murty Yalla, or Michael Thompson.
  - h. Looking for presentations for future Main Committee meetings – please contact Jim Niemira.
- 9. Administrative Items
  - a. From IEEE-SA: WG/TF Agendas and Minutes: **“The 14-calendar-day rule” – the Standards Association requirement in O&P**
  - b. Procedure for PARs:
    - i. All PAR related activities must be approved by the PSRC Main Committee members, although certain activities are now delegated to the Subcommittee
    - ii. See examples provided of how to request at the Main Committee – a Working Group Chair makes a motion at the Subcommittee meeting for the SC Chair to create a slide and then send it to the Main Committee Officers for inclusion on the slide set at the Main Committee meeting. The SC Chair reads the motion (s)



PAR Committee  
motion\_2020-6-18.p

- iii.
- iv. Create new PAR for new standard – Main Committee (MC)
- v. Create new PAR for existing standard without major changes to scope – SC; with changes to scope – MC
- vi. Approval to proceed to IEEE-SA for creation of a balloting body or to proceed to sponsor ballot – SC
- vii. Minor changes to statements of PAR title, scope and/or purpose without change of scope – SC; Changes to PAR scope - MC
- viii. Working group submits to the Subcommittee the new or revised PAR, scope, purpose, minutes of their meeting, attendees, their affiliations, any disagreements are noted in the minutes.
- ix. Actions at SC level (i.e. motions approved or disapproved) are reported to MC; motions requiring action of the full MC are brought to the MC floor by the SC Chair.
- x. The Subcommittee reviews it, and then the SC Chair **submits the PAR/name/ID number and reason for approval to the Main Committee Secretary to put in the slide deck. The slide is displayed while the SC Chair reads the request to the Main Committee members. A vote is then taken.**
- xi. Motion to approve the new or modified PAR is done at the Main Committee meeting (or if done at the SC, will be reported to the MC by the SC Chair).
- xii. PSRC Committee is the Sponsor
- xiii. myProject™ Volunteer User Guide – good stuff  
[https://mentor.ieee.org/etools\\_documentation/dcn/11/etools\\_documentation-11-0014-MYPR-myproject-user-guide.pdf](https://mentor.ieee.org/etools_documentation/dcn/11/etools_documentation-11-0014-MYPR-myproject-user-guide.pdf)
- c. Review Draft 1 of the PSRC meeting agenda as soon as the meeting notice arrives in your inbox – to avoid meeting conflicts and multiple agenda revisions. Contact Robert Frye and Jim Niemira for your requested changes – we will consolidate them and forward to Michael Thompson.
- d. **Make sure that on the Meeting Room Request (MRR) form for the *January 2021* meeting that you include “do not conflict with I50, D87, ...”**
- e. As Chair or Vice-Chair of WG or TF, please contact Jim Niemira and Robert Frye ***if you cannot attend your session.***
- f. Non-PAR related document drafts can be shared with anyone who is interested. Please add a note that this is a draft version subject to change. Once this document is complete and approved it will be posted on PSRC website which is open to all.
- g. All PAR related document (IEEE related) drafts cannot be forwarded by the WG member to anyone else – there is a public review period for all IEEE documents where anyone can submit their comments.
- h. When submitting “comments resolution” CSV file back to IEEE-SA in myProject, make sure that your draft is updated to reflect all the changes made – must match up to the CSV file!
- i. Email WG or TF Minutes to Robert Frye at: [rmfrye@tva.gov](mailto:rmfrye@tva.gov)

- j. ***iMeet Central*** (formerly Central Desktop) is to be used for IEEE Guide/Recommended Practice/Standard documents with a PAR.
- k. For Non-PAR related documents, the PSRCC has established a file sharing facility so working groups can share files and have them available to all. Contact Jim Niemira for information on how to get an account setup for your working group.
- l. Standards WG Awards - The IEEE Standards Association Working Group Awards has a new Procedure to request certificates of appreciation for completed (Approved Standard) work.
  - i. WG Chair or WG VC must request certificates directly from the IEEE SA. Awards can be shipped to our next PSRC meeting hotel for announcement and distribution or can be shipped to the requestor. The request for the SA certificates must be made at:  
<http://standards.ieee.org/develop/awards/wgchair/wgawards.html>  
 You will need list of WG Officers and Members; and shipping address. If shipping to the hotel for the next meeting, send to attn of Awards Chair Hugo Monterrubio, verify the address, and be sure they arrive prior to the Monday of the meeting.
  - ii. Awards Ceremony will be at Monday night reception dinner for all future PSRC Meetings in May and September. Please consider this when making travel arrangements. Don't miss the opportunity to recognize your colleagues or to be recognized yourself.
- m. Reports/Paper Final Output – To be considered for PES level award the output of all Working Groups with a Technical Output including Technical Reports, Transactions/Journal and conference papers must be completed in PES Format and submitted and posted in the PES Resource Center.
- n. Links to PES:
  - i. PES Technical Resource Center: <http://resourcecenter.ieee-pes.org/>
  - ii. PES - Technical Report Template: [https://www.ieee-pes.org/images/files/doc/tech-council/PES-Technical-Report-Template\\_Jan\\_2016.docx](https://www.ieee-pes.org/images/files/doc/tech-council/PES-Technical-Report-Template_Jan_2016.docx)
  - iii. PES - Technical Paper Template: <https://www.ieee-pes.org/templates-and-sample-of-pes-technical-papers>
  - iv. PES Resource Center Submission Checklist with instructions on how to get your report or Paper submitted please use this link: [http://ieee-pes.org/images/files/doc/tech-council/Submission\\_Checklist\\_PES\\_Resource\\_Center.docx](http://ieee-pes.org/images/files/doc/tech-council/Submission_Checklist_PES_Resource_Center.docx)



## 10. Working Group Reports

<b>WG/TF #</b>	<b>Name</b>	<b>Report Given By:</b>
I2	Terminology Review	Mal Swanson
I4	International Standards Development	Eric Udren
I26	Review and Expand Transaction Paper on Mathematical Models of Current, Voltage, and Coupling Capacitive Voltage Transformers	Mike Meisinger
I29	Revision of C37.110 Guide for the Application of Current Transformers for Protective Relaying Purposes	Michael Higginson
I30	Revision of C37.235 Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes	Robert Frye
I31	P1613 – Standard for Environmental and Testing Requirements for Devices with Communications Functions in Electric Transmission and Distribution Facilities	Brian Mugalian
I32	A Survey of Protective System Test Practices	Andre Uribe
I33	Review of Relay Testing Terms	Hugo Monterrubio
I35	PC37.2 – Standard for Electrical Power System Device Function Numbers, Acronyms, and Contact Designations	Mike Dood
I36	Revision of C37.90.2 – Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers	Chase Lockhart
I37	Revision of C37.90 – Standard for Relays and Relay Systems Associated with Electric Power Apparatus	Marilyn Ramirez
I38	Revision of C37.92 – Standard for Analog Inputs to Protective Relays from Electronic Voltage and Current Transducers	Ritwik Chowdhury
ITF40	Revision of IEEE C37.90.1 – Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus	Roger Whittaker
I41	Revision of IEEE C37.90.3 – IEEE Standard Electrostatic Discharge Tests for Protective Relays	Steve Turner
I43	Investigate response to USA executive order regarding EMP protection	Angelo Tempone
ITF44	Investigate and write a report on skill sets required by relay test technicians for setting, commissioning, and testing relay systems, given new technologies such as IEC 61850	Andre Uribe
ITF45	Investigation of Grounding and Bonding Issues Associated with Substation Wiring Practices and Instrumentation.	Don Ware

## **I-2: Terminology Review**

**Chair:** Mal Swanson

**Vice Chair/Secretary:** Fred Friend

**Output:** Terminology recommendations to working groups

**Established Date:** circa 1995

**Expected Completion Date:** on-going

**Draft:** N/A

**Assignment:** Review drafts of PSRC publications for proper terminology, abbreviations and symbols; and to recommend additions and changes to the PSRC Terminology database as appropriate

The virtual WebEx meeting was called to order by Mal Swanson, Chair at 4:40 pm (Central Time) on September 23, 2020 with Fred Friend, Vice-Chair recording minutes. The chair welcomed everyone and requested a deviation from the normal agenda to allow more time for terminology discussion. Quorum was achieved with 9 of 14 members present. The minutes from January 2020 were reviewed with no corrections provided, Matt Black motioned for approval and was seconded by Tony Seeger, and unanimous approval was given.

Discussion on the following terms ensued: percentage-restrained differential, percentage-restrained differential, breaker-and-a-half, CT column ground fault protection, double-bus single-breaker, communications functions, and communication port. The assigned liaisons will report to the working groups with the terminology recommendations.

Updates on the status of each of the assignments will be provided via email.

The working group chair is to send the approved working group draft to Erin Spiewak [e.spiewak@ieee.org](mailto:e.spiewak@ieee.org), IEEE SA, to begin the editorial review process in order to expedite the review process.

All working groups are reminded the database is available to them for use during their document development. All IEEE members have access to The IEEE Standards Dictionary Online using their IEEE account credentials at <http://ieeexplore.ieee.org/xpls/dictionary.jsp>.

Any standards work with a PAR (and IEEE Transaction Papers) must be submitted for review and approval of terms from I2. The output from a working group in the form of a report does not need the mandatory review; however, these will be accepted for review and comment upon request to the chair.

Words from approved Standards and Guides with a Section 3 (Definitions) have been incorporated into the IEEE database. An alphabetical listing of the words not in the database, but useful to the PSRC is posted on the web site under "TERMS" link under the "Knowledge Base" tab.

The meeting was adjourned at 5:40 pm (central time)

## **I-4: International Standards Development Working Group**

**Chair:** Eric A. Udren

**Vice Chair: Normann Fischer**

**Output: IEC TC 95 USNC standards votes and PSRC status reports**

**Established: 1990**

**Expected completion date: Meetings are continuing**

**Assignment:** Develop comments and votes for USNC of IEC on TC 95 (Measuring Relays and Protection Systems) standards projects and drafts. Report to PSRC on IEC Standards development.

The WG held a PSRC-sponsored WebEx meeting on September 21, 2020 with 7 members and 10 guests. There have been significant TC 95 developments and WG document reviews being circulated for upcoming comments and votes.

The three most important TC 95 measuring relay/protection system product design standards have all been subjected to a complete rewriting effort, and drafts were circulated from the TC 95 for review and comment by the national committees. These are particularly impactful for manufacturers of relays whose products are to be certified for compliance to the final version of the standard. The three drafts are:

- 60255-1 Edition 2 - Common Requirements – role like that of IEEE C37.90.
- 60255-27 Edition 3 - Safety requirements – no IEEE equivalent specific to relays.
- 60255-26 Edition 4 - EMC requirements – covers roles of IEEE C37.90.1, 90.2, 90.3, plus several other immunity requirements not in IEEE standards.

The US TAG had submitted extensive comments for all three. Compilations of international comments with handling have been received for Parts 1 and 26. A revised draft for Part 26 is recirculated for a new round of comments, due by October 9 – we see little likelihood of issues at this time.

TC 95 has been working on an update of its strategic business plan (SBP). The January I4 minutes listed technical topics the WG had listed which should be considered for inclusion in future standardization project plans. Several US-suggested topics and scope wording revision are now integrated in the plan. TC 95 has circulated international comments on the revised SBP – the USNC had supported it and the final revision will be discussed at the upcoming November TC 95 Plenary Meeting.

TC 95 WG2 has a CD of a technical report (draft requirements for a future standard) 60255-216-1, Guidelines for requirements and tests for protection

functions with digital inputs and outputs. This is aimed mainly at protection data streams from merging unit data exchange. We are sharing this document to coordinate with PSRC H47 now getting underway on the same topic. TC 95 has opened the door to a liaison relationship with PSRC.

In line with the new SBP and prior presentations in these reports, TC 95 is initiating standardization under JWGs in two new areas that had been topics of recent scope conflicts:

- Travelling wave-based protection and fault locator.
- HVDC protection.

The USNC TAG intends to support these proposals for new joint work by September 25, pending any further comment on these previously reviewed issues.

MT4 continues with work and progress on 60255-187-3, Functional requirements for biased (percentage) differential relays for transmission lines. CD has been delayed but will be published for review and comments shortly.

TC 95 will hold a virtual plenary meeting on November 5-6. An agenda is circulated to the TAG and PSRC I4 members. Contact Eric Udren for a copy or with any information related to the topics to be covered. Key discussions are about documents and efforts listed above.

### **I-26: Mathematical Models of Current, Voltage, and Coupling Capacitive Voltage Transformers**

**Chair:** Mike Meisinger

**Vice Chair:** Steve Turner

**Secretary:** Amir Makki

**Output:** Report

**Established Date:** 2012

**Expected Completion Date:** 2021

**Draft:** 2

**Assignment:** Recommendation to update and expand mathematical models of instrument transformers and transducers, including interface electronics such as merging units, for use in both off-line and real time transient simulation. There are now new transducer types such as optical, Hall Effect and Rogowski coils in addition to improved models for conventional CTs, VTs and CVTs.

- a) Officer presiding – Mike Meisinger
- b) Officer recording minutes – Steve Turner
- c) Call to order – Mike Meisinger
- d) Chair’s remarks – Begin the report.
- e) Results of call for quorum – Not applicable
- f) Approval of Agenda (motion and seconded)
- g) Approval of Minutes of previous meeting (motion and seconded)
- h) Investigation is done. Begin drafting the report.
- i) Action Items:

Amir will post the documents for the group with help from Jim Niemira.

Some writing assignments have been tasked:

- JA CT Modeling Results – Jim Van De Ligt
- Recent Work - Federico Lopez
- Remanence Modeling & Mathematical Models – Steve Turner
- JA Model Parameter Estimation- Athula Dayanart Rajapaske
- Test Report – Amir Makki

Still to be assigned:

- Annexes
- Instrumentation Error
- Test Parameters
- Mathematical Models of CTs Final Comments

**I-29: IEEE PC37.110 - IEEE Draft Guide for the Application of Current Transformers Used for Protective Relaying Purposes**

**Chair:** Joseph Valenzuela

**Vice Chair:** Michael Higginson

**Output:** IEEE Guide

**Established Date:** January 2015

**Expected Completion Date:** July 2021

**Draft:** 20200702

**Assignment:** Revise IEEE C37.110-2007 - IEEE Guide for the Application of Current Transformers Used for Protective Relaying Purposes

Michael Higginson presided over this meeting and recorded the minutes. The meeting was called to order at 2:20 PM. The meeting had 20 attendees, including 4 members and 16 guests.

Michael provided an update to the working group on the status of our work and planned next steps. Since the January 2020 meeting, we have had several meetings with the ballot comment resolution team. The team has worked through all the technical ballot comments. Thank you to the comment resolution team for your support with the technical comment resolution: Alla Deronja, Andy Kunze, John Lane, Jim Niemira, Don Ware.

The working group's PAR is valid through December 2021, but we plan to complete our work before then. Joseph is working on merging the technical comment resolutions, and afterwards Michael will merge the editorial comment resolutions. We expect to have all of the ballot comment resolutions integrated by mid- to late-October 2020. The working group will then ballot on all of the resolutions in batch, and review the revised guide.

After this update, the working group adjourned at approximately 2:35 PM.

**I-30: IEEE PC37.235 - IEEE Draft Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes**

**Chair: Robert Frye**

**Vice Chair: Chase Lockhart**

**Secretary: Chase Lockhart**

**Output: Guide**

**Established Date: 2014**

**Expected Completion Date: 2021**

**Draft: 10\_Incorp Bal Comments Final**

**Assignment:** Review and revise IEEE C37.235-2007 - IEEE Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes

The meeting was called to order at 3:03 PM, Central Time and the Chair called the roll of attendees. The meeting had in attendance the following individuals:

<b>Name</b>	<b>Affiliation</b>	<b>Voting Status</b>
Robert Frye	TVA	Chair
Chase Lockhart	Leidos	Vice Chair
Andre Desrochers	Vizimax	Guest
Ron Pate	ABB	Guest
Dragon Tabakovic	Hubbell	Guest
Laurel Brandt	TVA	Guest
Femi Oyebanjo	Black and Veach	Guest
Wayne Johnson	EPRI	Guest
Masi Mohammed	Amped	Guest
Mariyn Ramirez	Qualus	Guest
Louis Garavaglia	G&W Electric	Guest
Joshua Hughes	Patterson Power	Guest
Jim Niemira	S&C Electric Company	Guest and Host

The meeting had in attendance two members and 11 guests. Quorum was not achieved, and no official business could be conducted.

The Chair presented the Copyright and Patent slides and asked if there were any issues or objections and no responses were made.

The Chair discussed the membership of the Working Group and two of the members have resigned from the PSRC and are no longer attending meetings. These members will be placed in Non-Voting Member status to honor their contributions.

The minutes from the May Webex meeting were not able to be approved due to not having a quorum.

The Chair discussed that all balloting comments have been incorporated into the document and the recently provided Abstract and Introduction have also been incorporated. The Ballot Comment Spreadsheet is fully updated and ready to return to the IEEE SA staff.

Minor revisions were brought forth and proposed to Table 1 in the document. These were reviewed in the Working Group and no objections were made. These will be incorporated into the document and sent to the members for review and approval. The members will also be asked to vote on the document to close editing and send for recirculation.

The Chair moved Ron Pate to Member status for his tireless work and contributions to the document through the years.

The Chair mentioned the Working Group's PAR extension expires in December of 2021 and the working group must stay focused on completion of the document and this may require individual Webex meetings.

The Chair and members discussed final paperwork necessary to obtain permission to utilize photographs used in the document.

No new business was offered.

Adjournment at 17:05

Next meeting: January 2021, format, location, and time TBD

**I-31: IEEE P1613 Standard for Environmental and Testing Requirements for Devices with Communications Functions used with Electric Power Apparatus**

**Chair:** Brian Mugalian

**Vice Chair:** Jerry Ramie

**Secretary:** Craig Preuss

**Output:** Standard

**Established Date:** 05-Feb-2016 (PAR approval date)

**Expected Completion Date:** 31-Dec-2020 (PAR extension approved October 2020)

**Draft:** 1.14

**Assignment:** Revise IEEE 1613-2009 - IEEE Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Electric Power Substations

- a) Officer presiding: Brian Mugalian
- b) Officer recording minutes: Craig Preuss
- c) Call to order, approximately 8 am central time
- d) Chair's remarks, general welcome
- e) Results of call for quorum: 9 of 17 members in attendance
- f) Approval of Agenda: N/A
- g) Approval of Minutes of previous meetings: None to approve
- h) Oscar Bolado has resigned. Patent slides were shown, no claims were made. Copyright slides were shown.
- i) Draft 1.13 was reviewed and updated to draft 1.14.

- j) Two subcommittee items to be voted on: PAR extension for two years and changing of title, scope and purpose per the draft.
- k) Action item – secretary to post updated draft to iMeet and schedule future conference calls.
- l) No Items reported out of executive session
- m) Recesses and time of final adjournment, approximately 9 am central time.
- n) Next meeting date and location, tentative conference calls on Oct 13 and Nov 10 at 3 pm central.

**Meeting Participants:**

<u>Name</u>	<u>Affiliation</u>	<u>Voting Status</u> (voting member, non-voting member, guest)
Brian Mugalian	S&C Electric	Voting Member
Craig Palmer	PowerComm Solutions	Guest
Tony Bell	AMETEK Power Instruments - Pulsar	Guest
Murty Yalla	Beckwith Electric	NEW GUEST
Peiman Dadkhah	NuGrid Power	NEW GUEST
Jay Herman	EPRI	Guest
Dave McGuire	Hubbell Power Systems	Guest
Jeffrey Pond	National Grid	Guest
Jim O'Brien	Duke Energy	NEW GUEST
Claire Patti	Portland General Electric	Voting Member
Louis Garavaglia	G&W Electric Co.	Guest
Thomas Rudolph	Schneider Electric GmbH	NEW GUEST
David Dolezilek	SEL	NEW GUEST
Jay Anderson	ComEd - Exelon Corp.	Voting Member
Hani Al-Yousef	Eaton	NEW GUEST
Michael Dood	Schweitzer Engineering Labs	Voting Member
Michael Meisinger	S&C Electric	Voting Member
Colin Gordon (SEL)	Schweitzer Engineering Laboratories, Inc.	NEW GUEST
Mariyn Ramirez	Power Grid Engineering	Guest
Malcolm Swanson	Iniven	Voting Member
Roger Whittaker	home	Guest
Chris Huntley	SEL	Guest
Zitao Wang	S&C Electric Co.	NEW GUEST
James Bougie	Global Power Technologies	Voting Member
Tim Farrar	TRC	Guest
Craig Preuss	Black & Veatch	Voting Member
Jerry Ramie	ARC Technical Resources, Inc.	Voting Member
Lalitha Devarakonda	Eversource	NEW GUEST



**I-32 A Survey of Protective System Test Practices**

**Chair:** Andre Uribe

**Vice Chair:** Don Ware

**Output:** Report

**Established Date:** May 12, 2015

**Expected Completion Date:** May 2019

**Draft:** 3.2

**Assignment:** To review report prepared by working group I11 in 2001 called “Survey of Relaying Test Practices” and update the survey accordingly to today’s industry environment.

I-32 did not have a meeting. However the group needs help to get a distribution list for the Survey.

**I-33 Review of Relay Testing Terms**

**Chair:** Scott Cooper

**Vice Chair:** Hugo Monterrubio

**Output:** Report

**Established Date:** January 2017

**Expected Completion Date:** December 2019

**Draft:** 1.9

**Assignment:** Review the various definitions of relay testing terms and develop a Report with formal definitions in order to help eliminate any confusion. The Report will also be used by I2 for inclusion in the IEEE dictionary.

WG I-33 did not meet. The WG Chair experienced technical difficulties and the meeting was cancelled.

**I-35: PC37.2 - Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations**

**Chair:** Mike Dood

**Vice Chair:** Marc LaCroix

**Output:** Standard

**Established Date:** January 2016

**Expected Completion Date:** September 2021

**Draft:** 0.5a

**Assignment:** To revise and update IEEE C37.2-2008 - IEEE Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations

Name	Affiliation	Status (M/CM/G)
Mike Dood	SEL	M

<b>Marc LaCroix</b>	eMcREY	M
<b>James Niemira</b>	S&C Electric Company	G
<b>Tony Seegers</b>	Ameren	G
<b>Laurel Brandt</b>	TVA	G
<b>David Dolezilek</b>	SEL	G
<b>MATTHEW BLACK</b>	Sargent & Lundy	G
<b>Kevin Donahoe</b>	GE Grid Solutions	G
<b>Madhab Paudel</b>	Eaton	G
<b>Masi Mohammed</b>	AMPED I	G
<b>Michael Thompson</b>	SEL	G
<b>Andrew Brignac</b>	Entergy	G
<b>Robert Messel</b>	Siemens	G

The working group I35 met virtually on September 23<sup>rd</sup>, 2020.

- a) Mike Dood presided
- b) Marc LaCroix recording minutes
- c) Call to order – Everyone introduced themselves and gave their affiliation.
- d) Chair’s remarks
- e) We had 2 members and 12 guests and thus we did not have a quorum.
- f) Approval of Agenda – We did not have a quorum
- g) Approval of Minutes of previous meetings – We did not have a quorum
- h) Brief notes on discussion items:
  - a. Waiting for PAR approval extension
  - b. The latest draft is available on imeet central
  - c. This revision includes small addition and deletion.
  - d. Spent much of the meeting discussing Device 11.
  - e. We will plan on having virtual meetings approximately 2 weeks apparent with the attempt to have the working approve the draft to go to ballot by the January meeting.
  - f. The thought is 3 or 4 meetings might be enough to complete the document.
  - g. Balloting is planned after next January meeting. Approval from the main committee is required for balloting.
  - h. The participants will be contacted to see their interest to attend the meetings.
- i) Action items
  - a. We will investigate the comments on Device 11
  - b. We will organize biweekly meetings
- j) Adjourned the meeting

**I-36: PC37.90.2 Standard for Relays, Relay Systems, and Control Devices used for Protection and Control of Electric Power Apparatus – Radiated Electromagnetic Interference Withstand Capability Requirements and Tests**

**Chair:** Chase Lockhart

**Vice Chair:** Mat Garver

**Output:** Standard

**Established:** September 2017

**Expected completion date:** September 2021

**Draft:** D2

**Assignment:** Revise IEEE C37.90.2-2004 - IEEE Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers

**Date and Location of Meeting:** September 23, 2020, WebEx, The World Wide Web

**Meeting Participants:**

<u>Name</u>	<u>Affiliation</u>	<u>Voting Status</u> (voting member, non-voting member, guest)
Chase Lockhart	Leidos	Chair
Mat Garver	Beckwith Electric	Vice-Chair
Jeffrey Pond	National Grid	Voting Member
Gerald (Jerry) Ramie	ARC Technical Resources Inc.	Voting Member
Craig Palmer	PowerComm Solutions	Voting Member
Hani Al-Yousef	Eaton	Guest
Suresh Channarasappa	Westinghouse	Guest
Tapan Manna	Burns and McDonald	Guest
Mariyn Ramirez	Qualus	Guest
Henry Miller	Utility Automation Solutions	Guest
Andre Desrochers	Vizimax	Guest
Todd Martin	Basier Electric	Guest
David McGuire	Hubbel Power Systems	Guest
Brian Mugalian	S&C Electric Company	Guest
James Niemira	S&C Electric Company	Guest
Louis Garavaglia	G&W Electric Co.	Guest
Robert Frye	TVA	Guest
Roger Whittaker	None	Guest

**Time called to Order and Chair's remarks:** The meeting was called to order at 12:30 PM Eastern Time and introductions were made.

**IEEE Policy Reminders (patents and copyrights):** Copyright and Patent slides were reviewed.

**Confirm that call for Patent issues was made and record any responses:** The chair asked for any objections and no responses were made.

**With 5 members in attendance, quorum was achieved.**

**Approve minutes of previous meeting:** May 2020 minutes

**Motion by Jerry Ramie Second by: Mat Garver.** Approved by all, motion carried

**Approve the meeting Agenda:**

**Motion by Jeff Pond Second by: Mat Garver.** Approved by all, motion carried

**Topics discussed:**

- Voted to Modify Chair and Vice Chair to reflect Chase and Mat assuming the rolls respectively.

- Reviewed Jerry Ramie Photos and put them into the document.
- Hani Al-Yousef asked to be added as a Working Group Voting Member
- No Closing Remarks

**Action items:**

- Chase to look at PPT and photos
- Chase to get with Jeff to get photos
- Chase to send new document to Jim N. with Title, Scope, and Purpose to be resubmitted for update.
- Robert Frye to send Chase documentation on how to handle subjects dealing with PARs.

**Time of final adjournment:** Motion to adjourn at 13:29 first by Jerry Ramie, 2nd by Jeff Pondl.

Approved by all, meeting adjourned.

**Date, time, and location of next meeting:** Jan, 2021 New Orleans

**I-37: PC37.90 Standard for Relays, and Relay Systems, and Control Devices used for Protection and Control of Electric Power Apparatus – General Requirements and Tests**

**Chair:** Marilyn Ramirez

**Vice Chair:** TBD

**Output:** Standard

**Established Date:** 2018

**Expected Completion Date:** 2021

**Draft:** 2.0

**Assignment:** Revision of IEEE C37.90-2005 - IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus. Due for withdrawn in 2021. PAR Expiration 31-Dec-2022

**Meeting Participants:**

<u>Name</u>	<u>Affiliation</u>	<u>Voting Status</u>
Marilyn Ramirez	Qualus Power Services	Chair
Laurel Brandt	TVA	Guest
Jeff Pond	National Grid	Guest
Jorge Cintron	NRC	Guest
Todd Martin	Basler	Guest
Jalal Gohari	WSP	Guest
Angelo Tempone	DEF	Voting Member
Craig Palmer	Power Comm Solutions	Guest
Andre Uribe	Qualus Power Services	Guest
Dolly Villasmil	Power Grid Engineering	Guest
Hani Al-Yousef	Eaton	Guest
Roger Whittaker	Home	Guest
Zitao Wang	S&C Electric	Guest

Louis Garavaglia	G&W Electric Co.	Guest
Brian Mugalian	S&C Electric	Guest
Dave McGuire	Hubbell Power	New Voting Member
Tony Bell	Ametek	Voting Member
Jim Niemira	S&C Electric Company	Guest
Robert Frye	TVA	Voting Member and Host

- Officer presiding: Marilyn Ramirez
- Officer recording minutes: Marilyn Ramirez
- Call to order, approximately 10:10 am Central Time
- Chair's remarks, general welcome
  - Oscar Bolado has resigned. Marilyn stepped up to the Chair of the Working Group. Need a Vice Chair
- The meeting had 4 members and 15 guests in attendance. Quorum was achieved.
- Patent slides were shown, no claims were made. Copyright slides were shown.
- Approval of Agenda: N/A
- January 2020 Meeting Minutes were approved  
Motion by: Robert Frye; Second: by Angelo Tempone
- One subcommittee item to be voted on: Changing of title, scope and purpose per the draft.
  - Proposed Title, Scope and Purpose were presented. Changes were approved.  
Motion by: Tony Bell; Second by: Robert Frye
- Sections of the Standard were reviewed. No assignments have been made to start working on any revisions and/or recommendations.
- Action Items:
  - Chair will make a request via email for volunteers to review the different sections of the Standard.
  - Chair will schedule follow up meetings prior to January to review assignments and propose changes.
- Final adjournment, approximately 11:10 am Central Time.  
Motion by: Tony Bell; Second by: Robert Frye
- Next meeting date and location, tentative virtual meetings on October and November.

**I-38: IEEE PC37.92 - IEEE Draft Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers**

**Chair:** Ritwik Chowdhury

**Vice Chair:** Eric A. Udren

**Output:** Standard

**Draft:** 2.1

**Established:** January 2019

**Status:** 6th Meeting (Virtual) – September 23, 2020

**Expected Completion Date:** September 2022

**PAR Expiration Date:** December 2022

**Assignment:** To revise and update IEEE C37.92-2005 - IEEE Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers

The working group met with 8 members and 13 guests. We had a quorum.

Minutes from May approved – Hugo moved; Hani seconded.

Chair reviewed the purpose and nature of the standard, evolution of use cases, and revision of title in line with this.

PAR may need extension; the official expiration is end of 2022. We will consider extension in the 2021.

Chair reviewed list of sections to be modified and assignments.

Assignments in meeting:

- **Eric with Ritwik** – Scope, Purpose and Introduction including use case overview
- **Hugo** – Create **Figures** Visio
- **Roger Whittaker** is now a member of I38 and the Chair for C37.90 development who will help with EMC standard **Section 4.5** content
- **Eric** will review and consider signal levels and any suggested changes or additions while driving to keep one good standard value set (**Section 5.1.1**)
- **Veselin** will contribute to **Sections 5.9** Physical Length and **5.10** Connectors
- **Ritwik** will think about a nameplate, Section 5.3 Output Burden Capability and eDatasheet

Discussion of normative versus bibliography references – all latter unless specifically cited in standard.

We need an electronic data sheet section author who will look through document and collect nameplate values and data.

Drafts of revised sections will be due on **December 18, 2020** – Ritwik will address contributors, looking for some where needed. Ritwik will post the latest Draft 2.1 on iMeet and send an email to group.

After the meeting **Hani volunteered to help Eric, Veselin and Roger** to pursue a well-defined task.

**I-40: PC37.90.1 - Standard for Relays, Relay Systems, and Control Devices used for Protection and Control of Electric Power Apparatus-Surge Withstand Capability (SWC) and Electrical Fast Transient (EFT) Requirements and Tests**

**Chair:** Roger Whittaker

**Vice Chair:** Todd Martin

**Secretary:** N/A

**Output:** C37.90.1 Standard Revision

**Established Date:** September 24, 2020

**Expected Completion Date:** December 31, 2024

**Draft:** 0

**Assignment:** To revise IEEE C37.90.1-2012 - IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus

Task Force I40 met on Wednesday, September 23rd at 1:10pm CDT and was presided over by Roger Whittaker. Total attendance was 26 with 10 members and 16 guests. A quorum was achieved. Minutes were recorded by Todd Martin.

After introductions, the IEEE patent slides were reviewed. No patent concerns were identified.

The agenda was presented and approved. The motion was made by Jerry Raime and seconded by Mike Meisinger.

Minutes from the May 2020 online meeting were reviewed and approved. The motion was made by Mike Meisinger and seconded by Jerry Raime.

Meeting was primarily a kick off of the I40 working group. Discussion were focused around how to proceed in to the project of revising the standard. Next meeting Jerry Raime will make a presentation on changes recommended by the EMC society. Before next meeting group members were encouraged to review the existing standards so we are ready to reviewing documents in earnest next meeting. Some initial observations were made. These include that IEC is becoming more discriminate on the drawings they allow IEEE to use, so we may need to reduce the included drawings. We will evaluate the drawings we need and try to get those. There was discussion about upcoming changes in the IEC standards and considering if we want to do similar. One change was an increased detail in the definition operating condition a relay should be in when under test. Further discussion will continue in future meetings

No action items came out of this meeting. I40 working group will be meeting again in January.

**I-41: PC37.90.3 – Draft Standard Electrostatic Discharge Tests for Protective Relays**

**Chair:** Steve Turner

**Vice Chair:** Dan Ransom, PE

**Secretary:** (open)

**Output:** Standard

**Established Date:** September 22, 2020

**Expected Completion Date:** TBD

**Draft:** 1

**Assignment:** Revise and update IEEE C37.90.3-2001 - IEEE Standard Electrostatic Discharge Tests for Protective Relays

1. Officer presiding

The presiding officer at this online meeting was Chair Steve Turner.

2. Officer recording minutes

Secretary Jerry Ramie recorded the minutes; Vice-Chair Dan Ransom, PE reported the minutes in this document.

3. Call to order

Chair Turner called the meeting to order at 10:20 a.m., Central Daylight Time

4. Chair's remarks

Chair Turner welcomed all to the online meeting, hosted by Mr. Frye. Chair Turner noted that we are working on a very old standard that needs changing.

5. Results of call for quorum

The quorum check established that a quorum was present.

6. Approval of Agenda (motion and second)

Chair Turner moved, and Vice-Chair Ransom seconded a motion to approve the agenda. This motion passed on a voice vote.

7. Approval of Minutes of previous meetings (motion and second)

This is the first meeting so there are no previous-meeting minutes to approve.

8. Brief summary of discussions and conclusions, including any motions

Secretary Ramie gave a presentation on the improvements needed in the standard, compared to the IEC standard. He volunteered to perform a draft of these updates and present these to the working group.

The group discussed group membership. Secretary Ramie and Mr. Frye agreed to send a note to each attendee asking if they want to belong to this working group.

9. Action items

AI1: Mr. Ramie to update the present standard with input from the IEC standard

AI2: Mr. Frye and Mr. Ramie to send a note to meeting attendees to enquire about group membership.

10. Items reported out of executive session (if such sessions have occurred)

There was no executive session.

11. Recesses and time of final adjournment (if different from our published face-to-face meeting agenda)

Chair Turner adjourned the meeting at 11:23 a.m. Central Daylight Time



12. Next meeting date and location (if different from our published face-to-face meeting schedule)

The next meeting will be in January, probably online, during the week of the 2021 IEEE PES JTCM (Joint Technical Committee Meeting).

**I-43: Investigate Response to USA Executive Order Regarding EMP Protection**

**Chair:** Angelo Tempone (Presiding)

**Vice Chair:** Robert Frye

**Secretary:** Robert Frye (Recording Minutes)

**Output:** Report

**Established Date:** May 11,2020

**Expected Completion Date:** 2023

**Draft:** None yet

**Assignment:** Write a report to, (1) Investigate and describe EMPs and their likely effects on protection and control apparatus, and (2) Determine and describe strategies generation, transmission, and distribution utilities can utilize to mitigate the effects of EMPs on their equipment.

The meeting was called to order at 3:20 PM ET on Tuesday, September 22, 2020

The chair called the roll and asked the attendees to introduce themselves.

The meeting had 10 members and 35 guests

A quorum was obtained since ten of the eleven members were attending the meeting.

The minutes of the previous meeting will be approved by email at a later date.

The Chair discussed that the working group was in need of a Secretary and Vice Chair and asked attendees to send him an email if they might be interested in filling the vacant positions. His email address is: [angelo.tempone@duke-energy.com](mailto:angelo.tempone@duke-energy.com)

The Chair discussed the recently prepared white paper contribution by the EMC society and offered to share it with the members of the working group.

The Chair displayed a proposed Table of Contents for the working group's output report. He also asked the working group to be consider volunteering to write specific sections of the Table of Contents. He will distribute these for review.

The Working Group had considerable discussion on filters for EMP and their associated turn-on time. Those experienced with EMP filters indicated that due to the nanosecond rise time of the E1 pulse, most filters were not capable of "catching" the pulse. Filters for lightning and other normal power system impulses will not catch an EMP, E1 pulse.

The Working Group received an outstanding presentation by the EMC Society entitled: *An Approach to Protect Electric Power Substation Electronics to the High Altitude Electromagnetic Pulse (HEMP)*. This presentation was followed by a Q&A session.

The Working Group had lots of discussion regarding cable shielding standards, shielded cables and their effectiveness of actually “shielding” against external signals. The Edward Vance book *Coupling to Shielded Cables*, published in 1987 by Krieger Publishing was discussed as an excellent resource.

The Working Group discussed the Russian geomagnetic disturbance incident in Murmansk where a low frequency event caused relay misoperations . It wasn't clear whether the misoperations were caused by CT/VT instrument errors or relay power supply issues due to the event. In general, relay power supplies don't like second harmonics and they will damage the power supplies.

A proposed Table of Contents was presented to the Working Group and will be shared to our members to request feedback before writing assignments are given. An additional meeting will be scheduled prior to the end of the year to discuss the Table of Contents.

The meeting was adjourned at 4:25 PM ET

#### **ITF-44 Skills Required to Program, Commission, Test, and Maintain Ethernet Based PAC Systems**

**Output:** Report

**Established (month/year):** 01/2020

**Expected completion date (month/year):** 01/2022

**Assignment:** Create report on Skills Required to Program, Commission, Test, and Maintain Ethernet Based PAC Systems

**Date and Location of Meeting:** Tuesday, September 24<sup>th</sup>, Virtual Meeting

**Chair (or Presiding Officer):** Will Knappek

**Recording Secretary (usually, the Vice Chair):** Andre Uribe

**Meeting Participants:** Pending

1. Introductions were held
  
2. January meeting minutes were reviewed and approved
  - a. Group met on Tuesday, January 14<sup>th</sup>, 2020
  - b. The need for the report was discussed and committee agreed the report would benefit the industry.
  - c. The title of the report was discussed and revised to include all technologies used in modern substations.
  - d. A concern was raised that since we will be reporting on skills such as communications and networking along with protection that this paper be jointly sponsored with the PSCC.

- e. Agreed to request to the I-subcommittee for the TF meet again in May (September) to develop the assignment statement and then request WG status.
3. Committee worked on finalizing the assignment statement:
- a. **Original:** Create report on Skills Required to Program, Commission, Test, and Maintain IEC 61850 Protection, Automation, and Control (PAC) Systems
    - i. Wanted to include technologies used in modern substation
    - ii. An **objective** was to address the skills needed for new technologies as the new generation enter the workforce
  - b. **Revised:** Create report on Skills Required to Program, Commission, Test, and Maintain Ethernet Based Protection, Automation, and Control (PAC) Systems
    - i. Reason for the revision was so we don't specific to IEC-61850
  - c. **Alternative 1:** Create report on useful skills to Program, Commission, Test, and Maintain Ethernet Based Protection, Automation, and Control (PAC) Systems
  - d. **Alternative 2:** Create report on skills used to Program, Commission, Test, and Maintain Ethernet Based Protection, Automation, and Control (PAC) Systems
  - e. **Alternative 3:** Create report on Skills Beneficial to Program, Commission, Test, and Maintain IEC-61850 and other Ethernet Based Protection, Automation, and Control (PAC) Systems
  - f. **Alternative 4:** Create report on recommend skills required to Program, Commission, Test, and Maintain Ethernet Based Protection, Automation, and Control (PAC) Systems
4. Task Force agreed to request the I-Subcommittee to approve a working group status be formed to take on the assignment starting next meeting in January, 2021 with the following assignment statement:
- Create report on Skills Beneficial to Program, Commission, Test, and Maintain IEC-61850 and other Ethernet Based Protection, Automation, and Control (PAC) Systems
5. Meeting Adjourned

**ITF-45: Investigation of Grounding and Bonding Issues Associated with Substation Wiring Practices and Instrumentation**

**Chair:** Adrian Zvarych

**Vice Chair:** TBD

**Secretary:** Adrian Zvarych

**Output:** Report to the I-Subcommittee

**Established Date:** January 2020

**Expected Completion Date:** September 2020

**Draft:** N/A

**Assignment:** Investigate the need for a working group regarding grounding and bonding issues associated with substation wiring practices

Brief summary of discussions and conclusions including any motions.

- a. Report to the I—Subcommittee. Including observations, how to perform grounding and bonding in a substation as a whole. How can we all work together to accomplish a unified goal.
- b. 24 participants attended.
- c. Question regarding scope of this Task Force, should we restrict the scope to just communication cables or CT/PT/Control Cable shielding and grounding/bonding?
- d. A question was asked – how do we meet NEC and other standards in the control house, regardless of whether the cables are CT/PT/Controls or communication cables.
- e. One participant supports developing a document that will define or recommend grounding/bonding practices.
- f. Should this be a joint effort between PSRC and PSCCC?
- g. A suggestion was made – instead of a report to a Subcommittee, consider developing a report to the Main Committee. Jean H agrees that a higher level report could be generated.
- h. Scope to include
- i. Should control, instrumentation, low voltage power cables be included?
  - i. Do we want to consider how to separate cables to minimize interaction? The main purpose of this TF is grounding and bonding, though. Might be worth a mention within the Report.
- j. Should we include case grounding, for secondary circuits? C57.13.3 – covers instrument transformers.
  - i. Overall approach would be to clearly define what grounding & bonding needs to be in the CEE, then see what other standards might need to be modified to support the CEE, where we “need” to have everything working reliability.
  - ii. Every standard is “right” within its’ own perspective, but we want to be able have a homing document...
- k. A recommendation was made to draft an assignment to develop a report to the Subcommittee.
- l. Action items
  - i. Assignment Statement - ‘the purpose of this Subcommittee is to develop a Technical Report clarifying grounding and bonding of instrumentation, protective relaying, communication, power supply, and other facilities within other electric facilities (such as control buildings, outside control cabinets, etc..).

- ii. Include conflicts or omissions in existing standards
- m. Items reported out of executive session n/a
- n. Recesses and time of final adjournment n/a
- o. Next meeting date and location: IEEE JTCM meeting January, TBA.

## 11. Liaison Reports

- a. Instrument Transformer Subcommittee – Will Knappek

The Transformer Committee did not meet in April due to COVID.

Instrument Transformer Subcommittee held a web meeting on July 14<sup>th</sup>, 2020. The agenda is below.

### Agenda

- 1) Introduction of members and guests – w/ affiliation
- 2) Quorum check
- 3) Approval of Columbus meeting minutes
- 4) Approval of Agenda
- 5) IEEE Copyright Policy
- 6) Status of C57.13 Standards
- 7) WG Report – IEC-IEEE 63253-5713-8
- 8) WG Report – C57.13.9
- 9) WG Report - C57.13.2
- 10) TF Instrument Transformer Accuracy Report
- 11) Related work conducted under parts of IEEE
- 12) Old Business
- 13) New Business
  - A survey regarding C57.13.2 is has been circulated. Results of the survey and related items will be discussed.
  - Discussion of what is known about the Fall meeting.
- 14) Adjournment

Next meeting of the Main Transformer Committee meeting will be web based held the week of October 19, 2020.

## 12. Old Business

- a. Email ballots passed since the May 28, 2020 meeting – reporting results of the ballots for the record; no additional action required.

### **Motion 1 to extend PAR for PC37.2, WG I35 (Mike Dood)**

Motion 1: Working Group I35 motions to extend the PAR for PC37.2 - Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations (Revision of IEEE Standard C37.2-2008), for 2 years. Motion by: Mike Dood; Second by: Craig Preuss

Justification: The WG has revised and updated the standard with multiple new acronyms and clarifications of definitions and is in final stages of WG ballot. This fast changing area of technology adds new acronyms all the time and it has taken more time than

anticipated to debate some of the additions. More time is needed to work through the process of Sponsor approval and the balloting process.

MOTION 1 APPROVED - 21 responses (38 members, quorum=20); 21 Approve, 0 Disapprove, 0 Abstain

**Motion 2 to extend PAR for P1613, WG I31 (Brian Mugalian)**

Motion 2: Working Group I31 motions to extend the PAR for P1613 - Standard for Environmental and Testing Requirements for Intelligent Electronic Devices (IEDs) Installed in Transmission and Distribution Facilities (Revision to IEEE Standard 1613-2009), for 2 years.

Motion by: Brian Mugalian; Second by: Craig Preuss

Justification: The WG has revised and updated the standard and is coordinating and harmonizing with related standards in the IEEE C37.90.x family and related IEC standards. The coordination effort with four other WG has taken more time than was foreseeable. More time is needed to work through the process of harmonizing and to then work through Sponsor approval and the balloting process.

MOTION 2 APPROVED - 21 responses (38 members, quorum=20); 20 Approve, 1 Disapprove, 0 Abstain

13. New Business

- a) Motion by Uribe second by Tempone to form WG I44 – Report on Skills Beneficial for Relay Test Technicians for IEC 61850 and Other Ethernet Systems.

Assignment: Create a report on skills beneficial to program, commission, test, and maintain IEC-61850 and other Ethernet based protection, automation, and control (PAC) systems

Proposed Chair: Will Knapek

Motion passed by unanimous acclamation

- b) Motion by Zvarych second by Meisinger to form WG I45 - Report on Grounding and Bonding Issues Associated with Substation Wiring Practices and Instrumentation.

Assignment: The purpose of the WG is to develop a Technical Report reviewing grounding and bonding of circuits associated with instrumentation, protective relaying, communications, power supplies, and other electric facilities in substations. The report will review existing practices and standards, identify where conflicts or omissions exist, and address means of reconciling conflicts.

Proposed Chair: Adrian Zvarych

Motion passed by unanimous acclamation

- c) Motion by Preuss second by Mugalian: The PSRC should form a Task Force in the I-Subcommittee to investigate joint sponsorship by the PSRC of IEEE 1854 Guide for Smart Distribution Applications. Motion to amend by Preuss second by Mugalian: Revise motion to: I-SC should recommend to PSRC Main Committee to joint sponsor IEEE 1854 Guide for Smart Distribution Applications

IEEE 1854 DRAFT Scope: This guide identifies and categorizes important smart distribution applications and operational technology that integrate power measurements, two-way communications, cybersecurity, analytical decision making, and supervision to execute decisions that improve the delivery of electric energy. It develops descriptions of the critical functions involved, defines important components, and provides examples of the smart distribution applications.

IEEE 1854 DRAFT Purpose: Provide guidance on identifying and categorizing important smart distribution applications, describing critical functions involved, and defining important components. The guide will also include examples for these items.

Motion to Amend passed by unanimous acclamation.

Motion as amended passed by unanimous acclamation.

- d) The following motions for PAR revisions of title, scope, and purpose statements of P1613, PC37.90, and PC37.90.2 were tabled due to time limitations and will be placed before the Subcommittee in email format. An email ballot will be conducted to continue progress of the Subcommittee's effort.

These are minor revisions to clarify without expanding the scope and to bring these documents into alignment with each other and other related documents PC7.90.1 and PC37.90.3.

**Motion 1 (Motion by Mugalian, Second by Preuss): Working Group I31 moves to revise the PAR for IEEE Standard 1613**, Standard for Environmental and Testing Requirements for Intelligent Electronic Devices (IEDs) Installed in Electric Power Transmission or Distribution Facilities, with the following revisions to the Title, Scope, and Purpose:

**WG Assignment:** Revise IEEE Std 1613-2009, IEEE Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Electric Power Substations.

**Output:** IEEE Standard, **Project Number:** P1613

**Present Approved Title:** ~~IEEE Standard for Environmental and Testing Requirements for Communications Networking Devices-Intelligent Electronic Devices (IEDs) Installed in Electric Power Distribution Substations-Transmission and Distribution Facilities~~

**Proposed Title (changes from approved):** Standard for Environmental and Testing Requirements for ~~Intelligent Electronic Devices (IEDs)-Devices with Communications Functions Installed in Transmission and Distribution Facilities-used with Electric Power Apparatus~~

**Present Approved Scope:** This document specifies standard service conditions, standard ratings, environmental performance requirements, and testing requirements for ~~communications networking devices and communications ports in protective relays IEDs~~ installed in ~~electric power substations transmission and distribution facilities.~~ ~~It does not cover such equipment designed for operation in other environments, such as office locations.~~ These devices and/or systems may or may not include communication ports and may or may not be port powered. ~~Other than their communications ports, it does not cover such equipment used in protective relaying applications, for which IEEE Std C37.90TM-2007 [B8], 1,2 IEEE Std C37.90.1TM-2002 [B9], IEEE Std C37.90.2TM-2004 [B10], and IEEE Std C37.90.3TM-2001 [B11] shall apply.~~

**Proposed Scope (changes from approved):** This ~~document standard~~ specifies ~~ratings and standard~~ service conditions, ~~standard ratings,~~ environmental performance ~~requirements,~~ and testing requirements for ~~IEDs devices with communication functions installed in transmission and distribution facilities used with electric power apparatus.~~ ~~These devices and/or systems may or may not include communication ports and may or may not be port powered.~~ Environmental and electromagnetic compatibility (EMC) immunity levels and type-tests simulating environments associated with electric apparatus are described. Acceptance criteria for evaluating device functionality are provided.

For devices with communication ports, where the device does not perform protection or control functions, testing of the communication functions is covered by IEEE Std 1613. Where the device performs protection or control functions and has communication ports, tests for all communication functions are covered by the IEEE C37.90 family of standards.

**Present approved Purpose:** The purpose of this standard is to define the environmental conditions present in ~~electric power substations transmission and distribution facilities~~ and to establish a common reproducible basis for designing and evaluating ~~communications networking devices IEDs to be installed in those substations locations.~~ ~~It is a freestanding document, with no normative references to other standards.~~

**Proposed Purpose:** The purpose of this standard is to define the environmental ~~and EMC~~ conditions ~~present in electric power transmission or distribution facilities and required~~ to establish a common ~~and~~ reproducible basis for designing and evaluating ~~IEDs devices with communications functions to be installed in those locations used with electric power apparatus.~~

**Motion 2 (Motion by Ramirez, requires second): Working Group I37 motions to revise PAR for IEEE Standard C37.90,** Standard for Relays and Relay Systems Associated with Electric Power Apparatus with the following revisions to the Title, Scope, and Purpose.

**Proposed Title:** Standard for Relays, ~~and~~ Relay Systems, ~~and~~ Control Devices used for Protection and Control of ~~Associated with~~ Electric Power Apparatus – General Requirements Tests

**WG Assignment:** Review of C37.90 Standard due for withdrawn in 2021.

**Output:** IEEE Standard, **Project Number:** C37.90

**Chair:** Marilyn Ramirez

**Proposed Scope:** This standard ~~specifies establishes standard the~~ service conditions, ~~standard~~ ratings (electrical, thermal, and mechanical), ~~performance requirements,~~ and testing requirements for relays, ~~and~~ relay systems, ~~and~~ control devices used for the



protection and control of ~~to protect and control~~ electric power apparatus. ~~A relay system may include computer interface equipment and/or communications interface equipment, such as teleprotection equipment. It does not cover relays designed primarily for industrial control, for switching communication or other low-level signals, or any other equipment not intended for control of power apparatus.~~

For devices with communication ports, where the device does not perform protection or control functions, testing of the communication functions is covered by IEEE Std. 1613. Where the device performs protection or control functions and has communication ports, tests for all communication functions are covered by the IEEE C37.90 family of standards.

**Proposed Purpose:** ~~The purpose of~~ This standard ~~is to~~ establishes a common reproducible basis for validating designs and testing for the service conditions, electrical ratings, thermal ratings, and testing requirements for ~~designing and evaluating~~ relays, ~~and~~ relay systems, and control devices used for the Protection and Control of Electric Power Apparatus.

**Motion 3 (Motion by Lockhart, requires second): Working Group I36 motions to revise PAR for IEEE Standard C37.90.2,** Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers with the following revisions to the Title, Scope, and Purpose.

**WG Assignment:** Revision C37.90.2 Standard.

**Output:** IEEE Standard,

**Project Number:** PC37.90.2

**Chair:** Chase Lockhart (formerly Jeff Pond)

**Existing Title:** Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers

**Proposed Title:** Standard for ~~Withstand Capability of~~ Relays, Relay Systems, and Control Devices used for Protection and Control of Electric Power Apparatus – ~~to~~ Radiated Electromagnetic Interference ~~from Transceivers~~ Withstand Capability Requirements and Tests

**Existing Scope:** The scope of this project is to establish a test method for evaluating the susceptibility of protective relays to single-frequency electromagnetic fields in the radio frequency domain, such as those generated by portable or mobile radio transceivers.

**Proposed Scope:** This standard specifies design tests for relays, relay systems, and control devices used for protection and control of electric power apparatus that relate to the immunity of this equipment to radiated electromagnetic fields.

For devices with communication ports, where the device does not perform protection or control functions, testing of the communication functions is covered by IEEE Std. 1613.

Where the device performs protection or control functions and has communication ports, tests for all communication functions are covered by the IEEE C37.90 family of standards.

**Existing Purpose:** The purpose of this standard is to provide a common reference and test procedure that industry can use for evaluating the performance of protective and control relays used in electric power facilities.

**Proposed Purpose:** This standard establishes a common and reproducible basis for evaluating the performance of relays, relay systems, and control devices used for protection and control of electric power apparatus, when subjected to radiated

electromagnetic fields. This standard requires that an evaluation is performed during both quiescent and operate states.

14. Motion to Adjourn, by Mike Meisinger, second by Andre Uribe; passed unanimously.  
Meeting Adjourned at 11:20 AM CDT.  
See you in New Orleans, LA, in January 2021, or again on WebEx!

Reference Material:

WG and TF Minute Format Template: **Please use the template provided by PSRC Secretary Mike Thompson to simplify compilation of the Minutes from all the groups! Refer to PSRC P&P for Working Groups, Section 6.4 for the minimum information to be included in the Minutes.**

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**L##: Title of Working Group**

**Chair:** ???

**Vice Chair:** ???

**Secretary:** ???

**Output:** ??? (Paper, Report, Tutorial, Guide, Recommended Practice, Standard, etc.)

**Established Date:** ??? (Month, Year)

**Expected Completion Date:** ??? (Month, Year)

**Draft:** ???

**Assignment:** ???

The following information should be included in your minutes as appropriate. The working group is free to use whatever form they choose to cover the items from the below list that apply to the meeting.

- a) Officer presiding
- b) Officer recording minutes
- c) Call to order
- d) Chair's remarks
- e) Results of call for quorum
- f) Approval of Agenda (motion and second)
- g) Approval of Minutes of previous meetings (motion and second)
- h) Brief summary of discussions and conclusions including any motions.
- i) Action items
- j) Items reported out of executive session (if such sessions have occurred)
- k) Recesses and time of final adjournment (if different from our published face-to-face meeting agenda)
- l) Next meeting date and location (if different from our published face-to-face meeting schedule)

Additional notes:

- a) Be diligent to keep the standard header information up to date.
- b) Expected completion date gives anyone a reasonable idea of where you stand in your work – without having to seek out another document such as the excel spreadsheet listing what rev you are on.

- c) **Do not include meeting room requests and conflict avoidance requests in your minutes.**
- d) Do not use significant paragraph indents.
- e) Keep multilevel numbered lists to no more than two levels if possible.
- f) If this is PAR related activity, include the SA document number in the Title of the Working Group.

***Proposal for New TF or WG***

**Date:**

**Definition of the Problem**

**What is happening?**

**What should be happening?**

**Proposal for Task Force**

**Submitted by:**

**J: Rotating Machinery Protection Subcommittee**

**Chair:** Dale Finney

**Vice Chair:** Gary Kobet

**Rotating Machinery Protection Subcommittee Scope**

Evaluate and report on protective relaying concepts and practices applicable to generators, motors, synchronous condensers, associated auxiliary systems, and performance of plant protective systems. Develop and maintain related relaying standards.

J SC met with 21 out of 29 members and 12 guests, reaching quorum.  
Sept 2019 J SC meeting minutes were approved.

The following J SC WGs met

**J12: Improved Generator Ground Fault Protection Schemes**

**Chair:** Dale Finney

**Vice Chair:** Manish Das

**Established:** Jan 2013

**Output:** Report to subcommittee

**Status:** 23rd Meeting

**Assignment:** To review new methods related to generator ground fault protection

### **WG Report**

J12 met with 10 members and 22 guests

The chair, Dale Finney opened the meeting

January 2020 meeting minutes were approved

The final report was sent to the PSRC officers, some comments were received and incorporated

The report is available in IEEE PES Resource Center as PES-TR82 dated September 2020

[https://resourcecenter.ieee-pes.org/technical-publications/technical-reports/PES\\_TP\\_TR82\\_PSRC\\_WGJ12\\_090129.html](https://resourcecenter.ieee-pes.org/technical-publications/technical-reports/PES_TP_TR82_PSRC_WGJ12_090129.html)

The chair gave a brief tour of the final document, reminded this is intended to be a feeder into C37.101 (J16).

The report will be submitted to regional relay conferences, but probably not PowerGen

Luis Polanco suggested a conference in Central or South America and will provide some details

Nader Safari-Shad volunteered to assist with the reformatting of the conference paper

Possibly one additional meeting to review the conference paper and presentation For the next meeting a single session is requested with seating for 30 and a projector

### **J13: Modeling of Generator Controls for Coordinating Generator Relays**

**a. Chair: Juan Gers**

**Vice Chair: Phil Tatro**

**Assignment:** Work jointly with the Excitation Systems and Controls Subcommittee (ESCS) of the Energy Development and Power Generation Committee (EDPG) and the Power Systems Dynamic Performance Committee (PSDP) to improve cross discipline understanding. Create guidelines that can be used by planning and protection engineers to perform coordination checks of the timing and sensitivity of protective elements with generator control characteristics and settings while maintaining adequate protection of the generating system equipment. Improve the modeling of the dynamic response of generators and the characteristics of generator excitation control systems to disturbances and stressed system conditions. Improve the modeling of protective relays in power dynamic stability modeling software. Define cases and parameters that may be used for the purpose of ensuring coordination of controls with generator protective relays especially under dynamic conditions. Write a report to the J-Subcommittee summarizing guidelines.

### **WG Report**

The working group met in one session with 15 members and 27 guests present. A quorum was achieved.

The working group approved minutes of the January 14, 2020 meeting.

Dale Finney reported that the J Subcommittee ballot has reached the required 75 percent threshold for approval. The next steps are for the working group to address any remaining comments and then forward to the PSRC officers for final approval.

Juan Gers reviewed the ballot comments received. Editorial comments were omitted from the review to allow the working group to focus on technical issues. The working group supported resolution of comments as proposed by the chair and vice chair. The working group also discussed comments received just prior to the meeting and provided general direction to the chair and vice chair for resolution. The chair and vice chair will meet to finalize changes to the report and circulate an updated report and summary of ballot comments by mid-October. After final comments from Members are received and implemented, the paper will be submitted to the J Subcommittee.

The requirements for the next meeting are a single session and, if held in-person, a meeting room for 40 people and a computer projector.

#### **J14: Plant Protection Issues Associated with Black Starting of Generators**

**Chair: Chris Ruckman**

**V Chair: Zeeky Bukhala**

**Established: May 2014**

**Output: Report to Subcommittee**

**Expected Completion: January 2017**

**Status: 17<sup>th</sup> Meeting**

**Assignment:** Investigate and report to the J Subcommittee on plant protection issues associated with black start.

#### **WG Report**

WG 14 did not meet.

#### **JSC chair note:**

The report has been successfully balloted in the SC and the WG. The final report will be reformatted and submitted to the PSRC officers for final approval.

#### **J-15: Investigation of the Criteria for the Transfer of Motor Buses**

**Chair: Wayne Hartmann**

**Secretary / Vice Chair: Joseph Valenzuela**

**Established 2015 (1/15)**

**Output: Report (D2)**

**Status: 14<sup>th</sup> Meeting (190917)**

#### ***Assignment:***

1. Review, compare, and contrast NEMA MG-1 with ANSI C50.41 regarding transfer criteria.
2. Examine published reports and papers on motor bus transfer criteria to compare the conclusions with NEMA MG-1 with ANSI C50.41 regarding fast transfer criteria.
3. Investigate existing open-transition motor bus transfer (MBT) actual data from multiple events at the medium voltage level. Examine for current and torque ratio versus Volts/Hz at transfer periods to see if there is a correlation.
4. Examine published reports, papers, C50.41 and NEMA MG-1 on motor fast bus transfer criteria to reconcile the conclusions with the field-measured results.
5. Study existing motor protection oscillography voltage and current to identify which motors are generating and which are motoring. Examine v/Hz of composite bus and individual motors, and individual motor reacceleration current versus total bus reacceleration current (if available).
6. Produce a Report to Subcommittee with findings of the above

#### **WG Report**

#### ***Activity:***

1. The Working Group (WG) met September 22, 2020, with 12 members and 14 guests.
2. Will English performed Vice Chair duty for this meeting.
3. The WG assignment was reviewed as well as a brief history of WG activities.

4. The WG reviewed “Modeling Group B” section of the Draft Report (D4-B). Edits and additions were discussed and resolved by the WG. D5 will reflect those editing decisions which will be used to add assignments to compile D5.
5. The WG reviewed Modeling A section of the Draft Report (D4-B). Edits and additions were discussed and resolved by the WG. D5 will reflect those editing decisions which will be used to add assignments to compile D5.

**WG Assignments:**

Note for comments use “Review,” “track changes” and comment bubbles as needed

**A. Modeling B**

- a. Reference for Simulink Standard Model (Kraus, Maughan)
- b. Dale F., Investigate and verify parameters used in model are realistic
- c. Derrick H., Author a note for certain data points at 120 and 140 degrees shown in figures 6, 7, 8 and 10 exhibit lower torque than rest of same motor power curve
- d. Add any salient conclusions after each figure and its discussion as appropriate.

**B. Test Protocol for Synchronous Transfers**

- a. Jason Espinosa
- b. Raju Alla

**C. MBT Field Data from MV Buses**

- a. Dale Finney
- b. Mani Sankaran (Chair to contact)
- c. Prem Kumar (Chair to contact)

**D. “Modeling Results for MBT Modelling, Team A”**

- a. Doug Weisz
- b. JC Theron

**E. “NEMA MG-1, IEEE 666 and ANSI C50.41”**

- a. Dennis Tierney to provide brief write up on impact of time limits on transfers. This will be added to Section 3.
- b. Chris Ruckman and Wayne Hartmann to compare and contrast these three works for their motor bus transfer criteria

1. Chair to issue D5 with incorporated comments and edits to D4-B to be issued to Members and Guests by October 1, 2020.
2. Assignments to D5 are due on April 15, 2020, so Chair can compile Draft 6.
3. Chair to issue Draft 6 before the next WG meeting.

**Adjournment**

**Next Meeting:**

- In Person: Double session, projector, room for 30 people for in-person meeting
- Virtual: WebEx or similar from PSRC

**J16: PC37.101, Guide for Generator Ground Protection**

Chair: Ryan Carlson  
Vice Chair: Doug Weisz  
Established: 2016  
Output: Guide  
Status: 9<sup>th</sup> Meeting

## WG Report

The WG met with 9 out of the 12 voting members present. A total of 47 participants joined the Webex meeting.

**Ryan** reviewed the patent slides required for IEEE PAR WGs. The C37.101 format changes were then reviewed where it is proposed to replace “Table 1 – Summary of recommended protective schemes” with a new format where the grounding methods, protection schemes, and legacy schemes each have their own section in the guide.

Next, assignments were reviewed:

- 3<sup>rd</sup> harmonic – **Ritwik** mentioned that this section was previously reviewed by WG.
- Injection schemes – **Nader** will look for his write-up on injections schemes he had written and will send it to **Ryan** and then that section can be reviewed.
- Low impedance grounding – This section was assigned to **Ryan & Kelvin**. **Kelvin** will check with **Nate** to see if he has any submittals or write-ups for this section.
- Hybrid Grounding – **Derrick Haas** volunteered to help with this section.
- Resonant Grounding – **Dale** submitted his write-up on this section and **JC Theron** volunteered to review this section.
- High Impedance Grounding – **Hasnain Ashrafi** initiated a discussion on broken delta 3Vo protection for MV systems and on systems other than just for generator bus ground fault protection. This is Grounding Method VI in current guide. **Ryan** requested we shelf that discussion for now and noted we will look into it and discuss in a future meeting.
- Legacy Schemes – **Kelvin** and **Onur** volunteered for this section. There was discussion whether to have this section in the main body vs putting it in the Annex. **Ritwik** outlined some arguments for possibly keeping it in the main body of the guide. **Ratan** mentioned it could be placed in a “normative” Annex rather than an “informative” Annex. **Dale** weighed in as well and **Ryan** suggested we focus on developing the section first and then we can decide where best to place it.
- System Provides 3Io – **Ryan** will contact **Vinod** to see if he is still willing to help with this section.
- Grounding Methods – **Sudarshan Byreddy** volunteered for this section.
- Annex A, example calculations – **Will English** volunteered to review and **Matchyaraju Alla** followed up with the Chair after the meeting and volunteered to review Annex A as well. Currently this is using a 1450 MVA generator. **Ritwik** asked if we should use the same 150 MVA generator that is used for C37.102 and C37.106. **Dale** mentioned that J12 “Improvements in Gen Ground Fault Schemes” uses the 1450 MVA unit for the example calculations so he lobbied for continuing to use this same unit in C37.101. It was discussed that using one smaller unit and one larger unit for the different guides and reports may be OK.
- Figures Team – **Ratan, Dale, Wayne, and Derrick Haas** volunteered to help review the figures. **Ratan** said he found the Visio files used in the current guide and said he would post on imeetcentral.

Ryan made a motion to adjourn meeting.

As a result of the assignments made during this session, **10 new voting members** have been added to the J16 working group. They are as follows:

- **Matchyaraju Alla**
- **Sudarshan Byreddy**
- **Will English**
- **Derrick Haas**
- **Wayne Hartman**
- **Onur Usmen**
- **Vinod Yedidi**
- **Ritwick Chowdhury**
- **Jacobus Theron**
- **Nader Safari-Shad**

Single session, 40 people.

### **J17 - Revision of C37.102 Guide for AC Generator Protection**

**Chair: Manish Das**

**Vice Chair: Gary Kobet**

**Output: IEEE Guide**

**Draft: 1.6**

**Established: May 2017**

**Status: 11th WG meeting**

**Expected completion date: December 2021** (initial sponsor ballot by January 2021)

**Assignment: Revise C37.102 Guide for AC Generator Protection**

#### **WG Report**

WG met on September 21, 2020 virtually via Webex in double sessions with attendance recorded from 25 members and 29 guests. Quorum was achieved. The Jan 2020 and Sep 2019 minutes were approved.

The Chair presented the patent slides, no claims were made.

The Chair provided an overview of the status of Annex and the guide body followed by review and discussion of recent updates. Comments were made as follows.

Subclause A.2.1 Stator Ground Fault Protection: (1) In the Jan 2020 meeting the group had discussed eliminating any third harmonic based schemes from the Annex in favor of 64S, but after some discussion in this meeting there was consensus that since 27TN scheme is still being used in the industry there is value in keeping it. Dale Finney and Ritwik Chowdhury will help with the 27TN example (2) The existing 64S description will be reviewed and improved if needed.

Subclause A.2.10 Overexcitation (24): (1) Enhancements made to this section were discussed. The V/Hz coordination plot has been moved to subclause 4.5.4. C37.106 Chair Ritwik agrees that consistency is preferred in the coordination plot used in both guides as much as possible. (2) Bob Pettigrew asked how the overexcitation limiter in the excitation system could be shown in V/Hz coordination such as those required by NERC PRC-019. The group responded that the overexcitation limiter is associated with the field current parameter that has different characteristics than the V/Hz and therefore does not need to be coordinated on the V/Hz plot.

Subclause A.2.11 Abnormal Frequency (81): (1) Per last WG discussion Phil Tatro has helped revise the 81U and 81O setpoints to align with the PRC-024 and consistency in C37.106 will be sought.



Subclause A.2.13 Stator Thermal Overload (49): Enhancements made to this new section were discussed, including its application in absence of or in combination with RTDs. Doug Weisz and Dale Finney will review and help move some background material into 4.1.1 as appropriate.

Subclause A.2.18 Blocking Inputs: (1) The Chair proposed moving the blocking criteria table into subclause 7.2.1, either into Protective Functions table or Trip table. The group agreed - adding this to one of these tables will allow the reader to quickly look up this information. (2) Ritwik asked if the V/Hz protection should be blocked by VT fuse loss condition. The Chair responded that it normally should. The blocking criteria content is new and will need to be reviewed. (3) Meyer Kao asked why in the line relays blocking is already built into the relay logic but in the generator relays this is not the case. The group responded that the extent of the blocking logic implementation mostly varies by relay manufacturers, but his observation generally is true.

Will English, Dale Finney will review the recently completed J13 report for feeder material into C37.102, and Luis Polanco, Ritwik Chowdhury and Ryan Carlson will do the same for the J14 report. Dale will forward the final copies of these reports and the Chair requests review inputs soon so they could be implemented into the guide for review by the Jan 2021 meeting.

The group agreed that adding a reference to the Generator Tutorial in the C37.102 would be valuable and that the guide, Annex and the tutorial would go hand in hand in helping a relay engineer develop settings. After some discussion, it was agreed that the reference is best made somewhere in the introductory material of this guide with a brief description included on the purpose of the tutorial and how it could be a supplement to the guide. The tutorial will also be added in the Bibliography list.

Will English suggested getting a copy of the IEEE style manual for guidance on document formatting, editorial requirements, etc, and reaching out to the standard coordinator Don Lukach for further guidance.

The Chair will request WG members to quickly assist with open items, figures and will make any new assignments as needed in order to expedite completion, final reviews and preparation for WG ballot.

The WG requests a single session for January 2021, and if conference is held in New Orleans, space for 40 people with a computer projector. The WG also requests no conflict with other J meetings, especially J16 (C37.101) and J19 (C37.106).

### **J18 Investigate the effects of sub-synchronous oscillations due to inverter based resources (IBR) on rotating machinery protection and control**

**CHAIR: Normann Fischer**

**VICE CHAIR: Jared Mraz**

**Output: Report**

**Established: September 2017**

**Status: WG**

#### **WG REPORT**

The chair presented the outline for the report which was sent to the working group prior to the meeting. The chair also presented the working draft of the paper. Writing assignments were made for the report.

The working group discussed the scope of the paper and agreed that it should be limited to the impacts of SSCI on rotating machines since this is within the scope of the J subcommittee. If impacts to other apparatus are identified, they will be flagged for future follow-up by the appropriate subcommittee.

The working group discussed the contributions of Type 3 WTG's to SSCI and discussed a recent paper which showed that Type 4 machines may also contribute to SSCI.

The working group agreed the report should contain some discussion about the capabilities of present-day relays to respond to SSCI, as well as high-level discussion of what capabilities relays may need in the future.

The working group discussed the need to reference the reports of other working groups studying similar topics, such as C32, "Protection Challenges and Practices for Interconnecting Inverter Based Resources to Utility Transmission Systems." Coordination with C32 will be important for developing the section of the J18 report related to mitigation options for SSCI.

Yanfeng Gong suggested that J18 also coordinate with another working group that is working on SSCI modelling.

The chair discussed the present issue with having the papers required for review by the membership placed in a central repository. The Chair will discuss this further with the chair of the J subcommittee and investigate options for sharing these papers with the working group.

**Next meeting:**

For the next meeting, if it is not held virtually, J18 will need a room for 60 and an overhead projector.

**J19 PC37.106 Guide for Abnormal Frequency Protection for Power Generating Units**

**Chair: Ritwik Chowdhury**

**Vice Chair: Jason Espinosa**

**Output: Guide**

**Draft: 4.1**

**Established: January 2019**

**Status: 5<sup>th</sup> WG meeting, Virtual**

**Expected Completion Date: May 2021**

**PAR Expiration Date: December 2022**

**Assignment:** To revise and update C37.106, IEEE Guide for Abnormal Frequency Protection for Power Generating Plants

**WG REPORT**

There were 19 members in attendance, we met quorum. Onur motioned to accept previous meeting minutes, Vinod seconded.

- We will have online meetings going forward to speed up progress and try to expedite finalizing the draft
  - **Action Item: Ritwik & Jason to send out Webex invites**
- Add language in body (possibly section 4.2.1) on OEL vs V/Hz coordination with limiter, why OEL cannot coordinate with V/Hz protection element
  - **Action Item: Bob Pettigrew, Jason Espinosa**
- We will modify language V/Hz element blocking on fuse loss conditions
  - V/Hz may use positive sequence voltage quantity or maximum of 3-phase voltage quantity
  - We added language to instruct user to verify V/Hz algorithm/design
  - **Action Item: Dale Finney, Normann Fischer, Steve, Doug will discuss this language in section 4.4.2.1, come up with a conclusion and merge into guide before next meeting. They will also suggest relevant changes to portions of Annex A.**
- We will modify Annex D, we will refer users to IEC Testing of frequency 60255-181
  - **Action Item: Jason Figure A.6 change horizontal time axis to begin at 0.01 minutes**
  - **Action Item: Ritwik will remove Annex D for now. It is possible we may resurrect it at a later time depending on whether the working group considers it useful and relevant material.**
- Review all Annexes
  - **Action Item: Will English**

- After the meeting Manish provided a manufacturer reference for off-nominal frequency operation capabilities of turbine blades. **Manish and Ritwik will follow up for the next meeting.**

**Next meeting:**

Double session. If virtual, capacity for 35. If physical, a room for 25.  
Request no conflict with I38 and J20.

**J20 Practices for Generator Synchronizing Systems**

**CHAIR: Jason Espinosa**

**VICE-CHAIR: Luis Polanco**

**Output: Report**

**Established: January 2019**

**Status: WG (1st meeting 20190508)**

**WG Report**

- The WG was updated on the location to store documents
  - PSRC leadership has established accounts with Sharefile for the WG to use
- We pushed the generator breaker presentation back due to the virtual meeting and presenter preference
  - We will attempt to have the presentation in the January meeting
- We discussed whether or not using a CCVT on the system side is a suitable voltage source for synchronization
  - CCVTs are burden sensitive which can have an effect on secondary voltage output
  - Multiple WG members communicated that they use CCVT for synchronization
  - It is believed that CCVTs are suitable sources for synchronization as long as entities are aware of this burden sensitivity
  - The WG will add language to the report to inform entities of this
- The WG discussed Out-of-Phase Current Capability
  - In terms of current, there are no specific industry requirements for Out-of-Phase capability, most entities use the C51.12.00 transformer requirement for current magnitudes
  - Most industry documents specify voltage angle differences, which correlate with the amount of current applied to the generator for a faulty synchronization event
  - It was identified that manufacturers do not specify a maximum voltage angle difference for the generator, they typically provide recommended angle windows to stay within
  - The WG will provide guidance in the report through voltage angle difference
- For January we request a single session with room for 30 people and a projector
- Request to avoid conflicts with J17 and J19

**J21 - Motor Protection Tutorial**

**CHAIR: Kelvin Barner**

**VICE-CHAIR: Derrick Haas**

**Assignment – Develop a practical motor protection tutorial based around IEEE C37.96. The intent is to aid the reader to develop effective relay settings.**

**Output: Report**

**Established: September 2019**

**Status: WG (1st meeting 20200115)**

**WG report**

Working Group J21 met for the first time on Wednesday, September 23, 2020 via virtual meeting. Attendance was recorded in WebEx. The Working Group chair ran the meeting and Ritwik Chowdhury

filled in for the Vice Chair.

Minutes from the January 2020 meeting of JTF1 (Investigate the need and interest for a motor protection tutorial) were reviewed.

The Working Group assignment statement was revised for errors and clarity. The working group discussed several modifications and accepted the revised change to:

*“Develop a practical motor protection tutorial based around IEEE C37.96. The intent is to aid the reader to develop effective relay settings for motor protection and control schemes.”*

Formatting and content of the tutorial was discussed to follow the Generator Protection tutorial precedent and use C37.96 as a guide.

The rough outline developed in the last meeting was presented and discussed on how to handle differences between induction and synchronous motors. The Working Group decided to handle the differences in the individual function subsections.

Motor Bus Transfer (MBT) and its benefit to a tutorial was also discussed. Feeder material from other publications and material in progress such as J15, IAS, several transactions papers will be considered in the tutorial.

The group discussed the thermal model (49) element and the value in providing guidance since there are several misoperations associated with the thermal model when starting a motor.

The Working group also discussed unusual applications, including protection considerations for special motor starting conditions and motor protection vs plant processes.

The chair started discussions on the outline and looked for volunteers to review and/or author.

Assignments, due before the next meeting, were made based on C37.96 as follows:

- **Will** volunteered to look at equipment descriptions, Section 4
- **Jason** volunteered to help with Section 5
- **Prem** volunteered for 5.2 and 5.4 Stator Protection and 5.9 Nuclear 1E
- **Marcos** volunteered for rotor, stator and thermal
- **Raju** volunteered for 5.7 Abnormal power supply conditions
- **Ritwik** for 5.8 Surge protection
- **Tom, Dale and Marcos** volunteered for Section 6.4 MBT
- **Kelvin, JC Theron and Subhash** volunteered for Adjustable-speed motor protection Section 6.3
- **Sungsoo** volunteered for section 7
- **Dale** to provide material from the previous revision of C37.96

For the January 2021 meeting, a single session is requested with room for 30 and a projector.

#### **JTF1: Investigate the Need for a Generator Condition Monitoring WG**

**Chair:** Steve Turner

**Vice Chair:** Open

**Secretary:** Open

**Output:** Report

**Established Date:** 09-22-2020

**Expected Completion Date:** Open

**Draft:**

**Assignment:**

- j) Officer presiding – Steve Turner
- k) Officer recording minutes – Dale Finney
- l) Call to order- Check
- m) Chair’s remarks:
  - The chair pointed out that condition monitoring can help to find a problem before a fault develops
  - The chair mentioned the possibility of an APS field project

- Scope might be extended to include motors
- Chair will circulate a report from Jay Mearns (NCPA)
- Nader Safari-Shad (Alliant Energy) Dale Finney (SEL) to provide condition monitoring technical papers (see below)
- Manish Das (GE) pointed out that condition monitoring can help end users decide to perform maintenance
- Jay Mearns (NCPA) pointed out that the report may seek to determine the difference between a protection action and a control action

Jay Mearns (NCPA) suggested that the efforts of the working group be coordinated with prior investigations created by the CEATI Hydraulic Plant Life Extension Interest Group (HPLIG) and the Turbine Generator Interest Group (TGIG); Lizzie Smith is his point of contact for the HPLIG, and can likely established contact with the relevant representative from the TGIG

- n) Results of call for quorum – Not applicable
- o) Approval of Agenda (motion and second) - Check
- p) Approval of Minutes of previous meetings (motion and second) – Not applicable
- q) Summary of discussions and conclusions including any motions – see notes above (d)
- r) Action items:
  - Invite industry experts to join the working group
  - Gather and review pertinent industry technical papers
- s) Next meeting date and location – 01/2021 Virtual

1. S. B. Lee, K. Younsi, and G. B. Kliman “An online technique for monitoring the insulation condition of ac machine stator windings,” IEEE Trans. on Energy Conv., Dec. 2005, pp. 737-745
2. IEEE Recommended Practice for Measurement of Power Factor Tip-Up of Electric Machinery Stator Coil Insulation, (R2006)
3. S. Nandi, H. A. Toliyat, and X. Li, “Condition monitoring and fault diagnosis of electrical motors—A review,” IEEE Trans. Energy Convers., vol. 20, no. 4, pp. 719–729, Dec. 2005

### **JTF2: Investigate the Need for a Disturbance Recording WG**

**Chair:** Dennis Tierney

**Vice Chair:** open

**Secretary:** open

**Output:** Report

**Established Date:** 9-22-2020

**Expected Completion Date:** 9-22-2021

**Draft:**

**Assignment:**

The task force met on 9/22/2020@2:20pm CDT with 29 people in attendance

Chair couldn't make the beginning of meeting so the J-SC chair called the meeting to order

J-SC chair discussed fact that event reporting following a protective trip may not be entirely useful

J-SC chair reviewed NERC PRC-002-2 requirements

J-SC chair also reviewed PSRC C5 report “Considerations for Use of Disturbance Recorders”

Shane Haveron pointed out that the NERC requirements may be low due to the fact that a lot of equipment would have to be replaced otherwise and that the focus is on continuous recording in order to avoid triggering issues. He mentioned that the integration of IBR has increased the need for better disturbance recording and that grid oscillation with DG is becoming a greater concern

Abder Elandaloussi commented that there is a need to investigate machine learning to do data analytics.

The chair pointed out that WaveWin software provides analysis tools

Daniel Sabin commented on the work currently being carried out by the PES data analytics group

11 members were added to the task force

For the next meeting a single session with accommodations for 30 people is requested

### **Liaison Reports:**

**Electric Machinery Committee - G. Brunello** – C50.12 (Salient pole 50/60Hz turbine generators rated 5MVA and above) revision progressing, started late 2019, meeting every two weeks. Discussion on capability curves. Steve Conrad and Bob Pettigrew participating. Murty Yalla pointed out this document may impact C37.102 so J17 needs to stay informed on C50.12 work.

**Industry Applications Society (IAS) / Industrial & Commercial Power Systems (I&CPS) - M Donolo** IEEE dot std 3004.2 Protective Relays (buff book) will be updated, headed by Danny Kleibert and Rob Hoerauf.

**Nuclear 1E WG - Prem Kumar** - IEEE 741 (Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations), will ballot early 2020. Open PAR for small change - open phase detection. Revision will state this protection is needed. New standard 742 (Standard for Bus Voltage Monitoring of the Class 1E Power Systems in Nuclear Power Generating Stations) will discuss the available schemes. Failure to implement 741 will result in NRC violation.

### **Old Business**

The chair mentioned the introduction of a file sharing application for non-PAR working groups - PSRC.sharefile.com.

### **New Business:**

Revision of C37.96 Guide for AC Motor Protection, expires 2022, may require revisions. Some discussion, but consensus is that we should proceed immediately to open up a new PAR for possible revision of the guide. Murty Yalla officially made a motion to J-SC to open up new PAR for revision C37.96 Guide for AC Motor Protection, seconded by Gene Henneberg.

This is Dale Finney's last meeting as J-SC Chair (first meeting January 2018). Gary Kobet will assume J-SC Chair as of January 2021. Will English has been asked and accepted the role of J-SC Vice-Chair.

Meeting was adjourned

### **K: Substation Protection Subcommittee**

**Chair:** Jeff Barsch

**Vice Chair:** Adi Mulawarman

#### **Substation Protection Subcommittee Scope**

Evaluate and report on methods used in protective relaying of substations and the consumer or independent power producer, associated equipment and performance of these protective systems. Develop and maintain relaying standards which relate to this equipment and the utility-consumer interface.

- **Introductions**
- **Call for Quorum** – Quorum Met (Need information from daily 123 report).

- **Approval of previous meeting minutes;** (Jacksonville PSRC - January, 2020) – motion by Abu Bapary, second by Charlie Sufana, unanimous approval.
- **Approval of agenda** – motion by Pratap Mysore second by Steve Conrad, unanimous approval.
- **Advisory Committee items of interest** –
  - Please have working group meeting minutes to K SC chair by Oct 2, using the recently provided template.
  - Please send working group minutes to members for their review ASAP.
  - Please send agendas one month in advance of meetings, including online meetings.
  - There were 412 PSRCC Attendees for this meeting, including 98 first time attendees.
  - PSRC Sharefile site for non-PAR related Working Groups will be available.
  - O&P and P&P manual updates will be available in early 2021.
- **Working Group Reports:**

### **K10 SCC21 Distributed Resources Standard Coordination**

**Chair: R. Benjamin Kazimier**

**Vice Chair: Mark Siira**

**Established, 1999**

**Output: Standard through the SCC 21**

**Expected Completion Date: 20xx**

**Assignment:** To interface with SCC21/P1547 in order to reduce unnecessary delays by getting PSRC input into the process without having to wait for after-the-fact coordination.

K10 met Monday from 11:30am to 12:30pm by web meeting. There were 9 Voting Members and 21 non-members present. Benjamin Kazimier chaired, presided over the meeting, and recorded the minutes. Wayne Stec presented updates on 1547.2. It was noted that 1547.2 will be meeting virtually, most likely until the work concludes early next year. A call for participation was made.

The next round of 1547.X meetings is the week of Oct 5<sup>th</sup>. The registration can be accessed at the following link: <http://www.cvent.com/events/p1547-meetings-october-2020/custom-17-c89d63ddbde146b8a4d1c2901b4ec90b.aspx>.

The revision of IEEE-2030 par is approved and the working group met Friday Sept. 18<sup>th</sup>. Because the standard will soon expire it will likely receive a minor revision to keep the standard active and then enter into a more comprehensive revision.

Dr. Jens Boemer gave a review and update on P2800 and discussed distribution protection settings and BPS reliability impacts.

Dean Miller raised a question regarding the status and need for revision of IEEE 1547.7 Guide for Conducting Distribution Impact Studies for Distributed Resource Interconnection which was published in 2014. After discussion the chair agreed to raise the topic at the forth coming SCC21 meeting.

Additional notes:

Mark Siira has retired and will continue as a contributing member as he will not be traveling to the PSRC meeting furthermore. The Chair is looking for volunteers for vice chair / secretary.

### **K11 Open Phase Detection for Nuclear Generating Stations**

**Chair: C. Sufana**

**Vice Chair: M. Urbina**

**Output: Report [Draft 7.30]**

Did not meet. Report is available on PSRC, IEEE PES sites.

Disband K11. Motion by Charlie Sufana, second by Roger Whittaker, unanimous approval.

## **K12: PC37.431.20 IEEE Guide for Protecting Transmission Static Shunt Compensators**

**Chair: Satish Samineni**

**Vice Chair: Martin Best**

**Secretary: -**

**Output: Guide**

**Established Date: 2013**

**Expected Completion Date: 2021**

**Draft: 23**

**Assignment:** To work jointly with Substations WG I9 to write a guide for protecting transmission static shunt compensators. PSRC WG K12 will provide guidance and review on topics that are already covered in other IEEE guides to prevent overlap and identify areas where interpretation of existing guides is necessary to meet the specific application challenges unique to transmissions static shunt compensators.

PSRC WG K12 and Substations WG I9 had a web meeting on Wednesday, September 23rd, 2020. K12 had 4 members present and 8 guests. Quorum was not met.

Joe M. Warner, Vice Chair of Substations WG I9 gave an overview of the current draft and we continued where we left of from the last web meeting. We addressed comments from sections 4.3 to 7.1.

Current version of the draft is D23.

## **K16: Revision of C37.91 Guide for Protecting Power Transformers**

**Chair: Will English**

**Vice Chair: Steve Conrad**

**Secretary: Steve Conrad**

**Output: Guide**

**Established Date: May 2014**

**Expected Completion Date: January 2021**

**Draft: 17**

**Assignment:** To revise and update C37.91, IEEE Guide for Protecting Power Transformers to correct errors and address additional protection related topics.

The Chair Will English presided over the meeting. Vice Chair & Secretary Steve Conrad recorded minutes. The meeting was called to order at 8am CDT on September 23, 2020 as part of the September PSRC Virtual Meeting. The working group met with 15 voting members and 67 guests; quorum was achieved.

The chair displayed the IEEE copyright slides; no copyright issues were raised.

The chair displayed and reviewed the required patent information slides related to the PAR activity of the WG and provided opportunity for participants to identify patent claims. No one acknowledged or identified having a patent claim.

The agenda was displayed and approved as presented.

The minutes from previous meetings were called for approval by the chair:

September 2019, January 2020, February 2020, March 2020, and June 2020

Motion to approve the 5 meeting minutes made by Abu Bapary, second by Pat Carroll. Motion carried

The request to extend the PAR beyond December 2020 had been submitted, awaiting results from REVCOM.

Draft 17 was discussed regarding comments in Clause 7.5.4 Case Ground, concerning the term resistivity in the third paragraph. The WG voted to modify the paragraph as follows:

*Construction techniques for mounting power transformers may include resting on metal rails that are bolted into reinforced concrete foundations. The leakage resistance of concrete can be in the range of 10  $\Omega$  to 100  $\Omega$ , which is affected by many factors. These factors include the mix ratio and components themselves, water concentrations, placement of the rebar within the foundation, etc.*

Mike Thompson withdrew his comment (i70) concerning item 4 of Clause B.5.

A motion to approve the re-circulation of Draft 17 for balloting by the balloting body was requested by the chair. Motion by Don Lukach, second Mike Thompson, motion carried.

Having no more business a motion to adjourn was made by Don Ware, second by Rene Midence, motion carried.

Meeting adjourned at 8:41am CDT.



**K18: C37.108, Workgroup K18: Secondary Network Systems Protection**

**Chair: Adi Mulawarman**

**Vice Chair: Roger Whittaker**

**Secretary: Roger Whittaker**

**Output: Guide for the Protection of Secondary Network Systems**

**Established Date: May 2015**

**Expected Completion Date: February 2021**

**Draft: D2.22\_ballotresponse1**

**Assignment:** Revise the Guide for the Protection of Secondary Network Systems

Vice chair Roger Whittaker called the meeting to order and recorded these minutes. A quorum of 50% was obtained as five members of ten were present. There were sixteen guests. There was no response to the call for patent issues and the copyright policy was described.

Rafael Garcia motioned to approve the agenda with a second by Jim Van De Ligt. There was no opposition and the agenda was approved. Rafael Garcia moved to approve the January 2020 meeting minutes with a second by Don Lukach. There was no opposition and the minutes were approved.

Roger provided an overview of the status of ballot comments received after the recirculation and also of the workgroup's resolutions to those comments. It was decided that because the resolution of final comments would not change any content from the draft that was recirculated, the ballot resolution was complete.

Don Lukach motioned to send the latest approved and resolved draft, titled D2.22\_ballotresponse1, to IEEE-SA REVCOM for final (MER) mandatory editorial review. Jim Van De Ligt seconded the motion, which passed with no opposition.

Jeff Barsch advised that the workgroup remain active in the case that the MER would require further resolution. The meeting was adjourned.

**K22: C37.234, IEEE Guide for Protective Relay Applications to Power System Busses**

**Chair: Abu Bapary**

**Vice Chair: Alla Deronja**

**Secretary: Alla Deronja**

**Output: Guide for Protective Relay applications to Power System Busses**

**Established Date: January 2017**

**Expected Completion Date: December 2021**

**Draft: 8.1**

**Assignment:** Revise and ballot IEEE Standard C37.234 prior to its expiration in 2019

Call to order

The IEEE patent and policy slides were presented. There were no responses or questions regarding the slides.

Quorum was achieved. The meeting was attended by 19 voting members, 7 non-voting members and 27 guests.

A motion was made by Mike Thompson to approve the minutes from the Webex Meetings (May 23 PSRC, Jun 23, and Sep 8). The motion was seconded by Jay Anderson. The minutes were unanimously approved.

The meeting agenda was reviewed, and no revisions were made to it.

**Technical topics:**

- 1.) The WG continued resolving the internal WG voting comments
- 2.) A revision to the definition of the breaker-and-half bus to remove the phrase "A variation has four circuit breakers and three circuits per diameter" was approved and will be submitted to the I2 for approval.
- 3.) A change to the definition term "CT column ground fault protection" to "Column ground fault protection" was approved and will be submitted to the I2 for approval.
- 4.) The existing definition for double-bus single-breaker was revised and will be submitted to the I2 for approval.

The revised definition is:

double-bus single-breaker: A substation configuration having one breaker per circuit connected to two separate buses, one at a time, via disconnect switches.

- 5.) A discussion concerning the new percentage-restrained differential definition ensued based on the proposed signification revisions to it. The proposal contained the language that could imply the advantage of this protection method as compared with others, and this is not appropriate for definitions. Another issue with the proposed definition was that it stated the purpose of this protection method to discriminate between the internal and external faults. This is the common purpose for all protection systems. The original definition was slightly revised and will be submitted to the I2 for approval.

The revised definition is:

percentage-restrained differential: A differential method of protection where the differential, or operating, current across the protected zone is compared to a percentage of the through, or restraint, current as its primary means of stabilization from false operation on CT error. Other common names for this type of scheme include restraint, multi-restraint, percentage with restraint, percent differential, and percentage differential.

**K24: Summary paper for PC37.245, Guide for the Application of Protective Relaying for Phase Shifting Transformers**

**Chair: Brandon Davies (filled-in by Hillmon Ladner )**

**Vice Chair: Hillmon Ladner**

**Established: January 2019**

**Output: Summary Paper for PC37.245 PST Guide**

**Expected Completion: May 2021**

**Assignment:** Write a summary paper for the recently completed PC37.245 Guide for the Application of Protective Relaying for Phase Shifting Transformers (PST) for presentation at regional conferences.

Did not meet. Paper and presentation are complete. Will not meet in January. Will have online meetings as needed.

**K25: PC37.99 IEEE Guide for the Protection of Shunt Capacitor Banks**

**Chair: Meyer Kao**

**Vice Chair: Rick Gamble**

**Secretary: NA**

**Output: Guide**

**Established Date: January 2019**

**Expected Completion Date: 2023**

**Draft: 1.3**

**Assignment:** Revise and Update C37.99, IEEE Guide for the Protection of Shunt Capacitors

Formalities:

- The WG met via Webex Meetings on 9/23/2020 from 2:20 to 3:20 PM CDT.
- Officer presiding – Meyer Kao
- Officer recording minutes – Pratap Mysore (in place of absent VC)
- The meeting was called to order by the Chair, who then showed the patent/copyright slides.
- The Webex Meeting was attended by 17 members and 29 guests. Quorum was met.
- Minutes of January 2020 meetings was approved - motion by Steve Conrad and second by Satish Samineni
- Minutes of May 2020 WebEx meetings was approved - motion by Pratap Mysore and second by Steve Conrad

Meeting Summary:

- Mike Bloder reviewed clause 4.4.4.1 on 110% rating of the capacitor units and mentioned that it is appropriately worded.
- Pratap discussed Clause 4 on capacitor bank configuration suggesting the removal of discussions on unfused banks from the main body of the guide.
- Pratap also discussed about fuse reference to NEMA and will now be referenced to C37.48 . He also agreed to review to add wordings on the use of current limiting fuse for protection in enclosed spaces.

- Review of Figures in the guide- Dean Sorenson, Rafael Garcia, Andy Kunz, and Wani Hakim volunteered to review and update the figures.
- Specifics of bank grounding will be removed and just referred to 1036 as suggested by Nathan.
- A new section (subclause) will be added to address supervision of voltage, current, breaker position, etc., in monitoring protective functions.
- Juan Piñeros discussed undesired trappings of capacitor banks on ANSI 46 function due to power system events in Columbia. Juan will send WG chair information and description of those events.
- Discussions on simplifying calculation of unbalance to replace the existing tables continued till the end of the session. Meyer will email his thoughts on alternatives he was envisioning to the WG.
- Steve Conrad called a motion to adjourn the meeting and was seconded by Dean Sorenson

## **K26: C37.109 IEEE Guide for the protection of Shunt Reactors**

**Chair: Kamal Garg**

**Vice Chair: Iliia Voloh**

**Output: Guide**

**Established Date: Aug 2019**

**Expected Completion Date: 2023**

**Draft: V 1.3, Sep 22 2020**

Date: Tuesday, Sep 22, 2020

Time: 3.30 – 4.30 PM (CST)

Venue: WEB Meeting

1. Introduction and agenda (50 participants and 17 members). Reached Quorum. (Total WG members 20)
2. Approval of the previous meetings-approved (May and Aug 2020). Minor type update was made to Aug 2020 meeting
3. Patent slides were presented
4. Kamal gave progress update
5. Jason Byerly gave presentation on tertiary reactor, followed by discussion. Good discussion on tertiary reactor grounding.
6. Iliia gave line section update-Dean miller commented that circuit switchers capable to trip fault current
7. Kamal showed 4-th reactor protection and bypass-discussion on bypass. Neutral breaker bypass for TRV. BC Hydro uses that. AEP does not use it.
8. Discussion online reactor protection settings
9. Jason and Josh Warner will write BF section, Josh needs Imeet access. Jason has the access.
10. Lander will review section 6.1 for line reactor protection.
11. Charlie H suggested to add overrated breaker for the tertiary reactors can be added.
12. Dean Miller asked question about circuit switcher. Some circuit switcher has rating similar to breakers.
13. Joshua Watson expressed concern about long DC decays from switching on line reactors. This has caused breaker failures when reclosing into L-G. Will be discussed in next meeting. Some of this included in the guide already
14. Charlie will review sections 5.4, 6.1.4.2.1 and 6.1.4.4 and provide feedback in 8 weeks.

## **K27: C37.95 IEEE Guide for Protective Relaying of Utility-Consumer Interconnections**

**Chair: Paul Elkin**

**Vice Chair: Hillmon Ladner**

**Secretary: NA**

**Output: Guide**

**Established Date: January 2020**

**Expected Completion Date: TBD**

**Draft: 0**

**Assignment:** Review and update C37.95 IEEE Guide for Protective Relaying of Utility-Consumer Interconnections

Online Meeting September 22, 2020 (PSRC Meeting)

Meeting Minutes

2<sup>nd</sup> WG Meeting

1. Welcome

- Hillmon led the meeting, Paul Elkin was unable to attend. Brandon Davies took meeting minutes.

2. Patent Slides – were presented, no essential patents were identified.

3. Call for Membership

- 6 of 7 members present – Quorum was met
- Open for new members interested in participating in this working group. The following guests asked to be added as members via the WebEx chat (11 New Members):

- Steve Klecker
- Madhab Paudel
- Sebastien Billaut
- Zach Lawson
- Femi Oyebanjo
- Joshua Watson
- Onur Usmen
- Ted Warren
- Robert James
- Abu Bapary
- Jim van de Ligt

4. Approval of Agenda

- Jeff Barsch – Motion to approve
- Brandon Davies -Second

5. Approve Minutes July 2020 Virtual Meeting Minutes (May Meeting)

- Brandon Davies – Motion to Approve
- Steve Conrad - Second

6. PAR Update

- K Approved
- SA Approval Pending
  - Conditionally approved, 2 comments to be resolved.
  - Need to submit correction of these items before we proceed.
  - Proposed solution of comments was reviewed with the working group.
    - Jeff Barsch – Moved to accept the changes
    - Steve Conrad – Second
    - No opposition was shown and the motion was approved
  - A note will be added discussing the version of 1547 referenced in the PAR scope. These notes will be added to the “Additional Explanatory Notes” section of the PAR.
  - Hillmon requested guidance on how to resubmit these comments to NesCom. Jeff Barsch reach out after meeting to assist with the revision of the PAR.
  - Approval expected on the next NesCom meeting December 2<sup>nd</sup>.

## 7. Assignment Updates

- Section 4 - Steve Conrad, Koustubh Banerjee
    - Steve's review is underway, a few comments mostly related to PV added to customer. Steve to follow up with his notes via email.
      - 4.3.2.2 discusses voltage excursions, these sections should be modernized
      - 4.3.3 Needs reference updates.
      - 4.3.5, 4.3.6, 4.3.10, 4.3.11 Load considerations should add some discussion on PV.
  - Section 5 – Paul Elkin (Review Underway)
  - Section 6 – Brandon Davies (Review Complete)
    - Comments were reviewed
    - Most comments were editorial
    - Question on clause 6.2.5 discussing in detail the properties of microprocessor relays. Is this level of detail useful?
      - Juan Piñeros commented that many of their customers tend to specify the simplest relay possible to meet the needs of the project. The discussion in this section could help them understand the advantage of multifunction relays even if all functions are not used. Additional language discussing the flexibility for future uses/needs being an additional benefit of microprocessor relays could be useful.
    - Clause 6.2.5 the life cycle of microprocessor relays was discussed. The guide states that this is “typically a few decades” and it was questioned if this is accurate. Discussion included observations of typical life expectancy of relays and the possibility of rewording the statement to not include a specific range of years.
  - Section 7 – Mohammad Zadeh
  - Section 8 – Hillmon Ladner, Jeff Barsch (TFK27 discussion around generation types), Onur Usmen
    - Hillmon presented his comments on this section:
      - No major issues with the technical information.
      - Editorial review will be needed to remove several uses of: should, must, required, etc
      - There are a few uses of the word customer instead of consumer
      - The sections describing use of PTs to detect ground faults state it is recommended practice to install a stabilizing resistor. While it is true, research for K22 (bus guide) and K26 (reactor guide) showed there is no recommended practice. We need a reference, softer language or both.
      - On the islanding section, it would be good to expand to include proper pick-up and delay ranges for 27,29 and 81 elements, supervision and discussion on issues affecting the choices.
  - Section 9 – Paul Elkin (Review Underway)
  - The WG will postpone the review for the following:
    - Annex A
    - Normative References and Definitions
8. Onur Usmen volunteered to provide additional review of Section 8. No additional assignments were made.
9. Will plan to assign detailed review and editing of sections in future meeting once PAR is approved.
10. IMeet Central will get set up once the PAR is approved, and an editable version of the guide will be available for working group members. Until then all members are providing reviews on their own copies of the guide.
11. Schedule Next Meeting
- Plan another meeting first week in November.
12. Adjourn
- Steve Conrad – Motion to adjourn

- Jeff Barsch – Second

**K28 WG: Transaction Paper on GMD Impacts on Protection Systems**

**Chair: Qun Qiu**

**Vice Chair: Steve Klecker**

**Secretary: Steve Klecker**

**Established: 2019**

**Output: Transaction Paper**

**Expected Completion Date: 2020**

**Assignment:** This paper provides background and historical events of Geomagnetic Disturbances (GMD), and reviews GMD impacts on power systems equipment, and associated protection and control systems, mitigating measures, and Geomagnetic Induced Current (GIC) monitoring methods. This paper is a summary of the IEEE PES-TR72 report, titled, GMD Impacts on Protection Systems, which is prepared by the Working Group “GMD Impacts on Protection Systems”, the Substation Committee of the Power System Relaying Control committee.

- t) Officer presiding – Qun Qiu
- u) Officer recording minutes – Steve Klecker
- v) Call to order – Qun Qiu
- w) Chair’s remarks – Presented the May 28 meeting minutes and PowerPoint slides
- x) Results of call for quorum – Had a quorum
- y) Approval of Agenda (motion and second) - Approved
- z) Approval of Minutes of previous meetings (motion and second) - Approved
- aa) Brief summary of discussions and conclusions including any motions. – Discussed Draft 2 and no revisions. Voted and approved Draft 2.
- bb) Action items - Subcommittee K will review. The next meeting of the working group will discuss the comments.

**Liaison Reports:**

T&D Committee, Capacitor Subcommittee, **Pratap Mysore**, <http://grouper.ieee.org/groups/td/cap/>

Pratap did not attend and had no updates. Reports are available on web site.

Transformers Committee, **Will Knappek** <http://www.transformerscommittee.org/>

The spring meeting was canceled. Will plans to attend the next upcoming meeting.

**Old Business**

**New Business**

- K3 report – “Reducing outage durations through improved protection and autore restoration in distribution substations”  
Is there interest in refreshing the paper and putting it in the new PES technical report format?
- The chair requested show of hands of those interested in participating and at least 12 are interested. Sebastian Billaut is willing to chair. Nobody volunteered for Vice Chair or Secretary. The chair requested that those interested in these positions send him an email. Motion to form a task force was made by Ben Kazimier, second by Gene Henneberg, unanimous approval. This will be KTF29. PSRC officers must approve chair. PSRC officers must also approve the assignment. Proposed assignment is “Provide recommendation to the K Subcommittee as to whether or not the K3 report entitled ‘Reducing outage durations through improved protection and autore restoration in distribution substations’ should be updated and published as a PES technical report.”

**Items of General Interest**

**Adjourn** Motion by Mike Thompson, second Gene Henneberg.