POWER SYSTEM RELAYING AND CONTROL COMMITTEE
OF THE IEEE POWER AND ENERGY SOCIETY
MINUTES OF THE MEETING
May 3-7, 2021, WebEx Virtual Meeting, FINAL

I. Call to order / Introductions: Murty Yalla

Chair Murty Yalla, called the meeting to order at 1:10 pm on Thursday, May 7, 2021.

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 verified. Attendance was recorded via a WebEx report. Attending this Main Committee meeting were 89 voting members (66.4% of 134 Main Committee voting members, quorum achieved), 3 non-voting members, and 100 guests for a total attendance of 192.

II. Sponsors

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

III. Approval of Minutes / Financial Report: Gene Henneberg

A motion to approve the minutes of the January virtual meeting of the PSRC Committee was made and seconded (Bogden Kasztenny and Jim Neimera). The motion was approved unanimously.

The PSRC committee financial status is healthy. Attendance was very good for the January virtual meeting and expenses were low.

IV. Chairman's Report: Murty Yalla

PSRC had 426 participants (441 including PSCC) for our May 2021 virtual (online) meeting, including 62 first time attendees (66 with PSCC).

Attendees came from the following 22 countries:
Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, France, Germany, Greece, India, Ireland, Japan, New Zealand, Saudi Arabia, South Africa, Sweden, Switzerland, UAE, UK, USA

V. Reports of Interest

A. Technical Paper Coordinator's Report: Michael Thompson

A reminder for all Main Committee members. ***Reviewing papers for IEEE Transactions and Conferences is one of the responsibilities of all Main Committee Members.***

IEEE PES General Meeting 2021 (July 25-29, 2021) – Due to COVID Virtual meeting

The conference theme is: Managing Energy Business During a Pandemic

- 23 papers submitted, 11 accepted
- 1 Paper Session, Moderator, Russ Patterson
- 1 Poster session, Moderator, Ali Hooshyar
- 2 Panel sessions, Protection challenges with high penetration of Inverter Based Resources (IBRs)
    - Part 1: Transmission System, Moderator Michael Thompson
    - Part 2: Distribution System , Moderator Murty Yalla

THANK YOU! To our 36 Paper Reviewers –

Markos Asprou	Joerg Blumschein	Paul Elkin	Robert Frye
Abu Bapary	Sukumar Brahma	Jason Espinosa	Nathan Gulczynski
Jeffrey Barsch	Gustavo Brunnello	Normann Fischer	Wayne Hartmann
Tony Bell	Alla Deronja	Fred Friend	Michael Higginson
Yi Hu	Kevin Jones	Hessam Keshtkar	Gary Kobet
Jongmin Lim	Ken Martin	Manish Patel	Steven Turner
Yu Liu	Rene Midence	Kornel Petri	Benton Vandiver
Hanif Livani	Dean Miller	Qun Qiu	Subrahmanyam Venkata
Bruce Mackie	Adi Mulawarman	Michael Thompson	James Warren

B. Future Meetings: Murty Yalla

- 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 for the January 2022 and May 2022 meetings are posted on the PSRC website. The PSRC officers will send an email survey to all PSRC and PSCC participants with response requested by Friday, May 14 regarding potential in-person attendance at the September 2021 meeting to help gauge the financial risks to make a hotel commitment. If this meeting is in-person it will likely be a hybrid with virtual attendance.

C. CIGRE B5 Activities Report: Rich Hunt

- International Body
- Membership in Study Committees, Working Groups is by Country

- Publishes Technical Brochures, webinars, hosts conferences
  - IEC is the parallel organization responsible for Standards

New Working Groups

The two newest working groups are:

- B5.73 Experiences and Trends related to Protection Automation and Control Systems Functional Integration
- B5.74 Busbar Protection Considerations When Using IEC 61850 Process Bus

Both working groups have had their initial meeting.

Possible new working groups will be discussed at the B5 meeting in August. Preliminary information on possible topics will be found on the USNC B5 Mirror Site. If you have ideas for Working Groups, please forward them to your country CIGRE B5 representative.

New Publications

Technical Brochure 829 Challenges with series compensation applications in power systems when overcompensating lines. Available on e-cigre. Free download for CIGRE members.

CIGRE EVENTS

2021 CIGRE Centennial Session, Paris, France, August 2021

The CIGRE 2021 Centennial Session is to be held as a hybrid session, both virtual, and in person in Paris, from 21 to 25 August 2021.

The Centennial Session will use the same format as the normal General Session, and will use all the technical papers originally submitted for the 2020 General Session.
The Preferential Subjects for this session were:

- 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

There are 2 papers in B5 from US authors. Note that anyone registered delegate can participate in the Special Reporter sessions at CIGRE.

2021 CIGRE Grid of the Future Conference to be October 17- 21 in 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.

The Call for Papers is out. Full papers are due by July 23, 2021.

For complete details on the CIGRE Grid of the Future, visit the website at https://cigre-usnc.org/grid-of-the-future-2021/.

2022 CIGRE General Session

The Call for Papers for the 2022 CIGRE General Session is now out. Details can be found at https://www.cigre.org/GB/events/cigre-session-2022 and https://www.cigre.org/userfiles/files/Events/2022/CIG-S49-2volets-CFP-11.pdf.

The USNC will be submitting 22 abstracts for the General Session. Authors will be notified by 2 July 2021. Full papers are due by 7 January 2022.

The B5 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

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
RHunt@quanta-technology.com

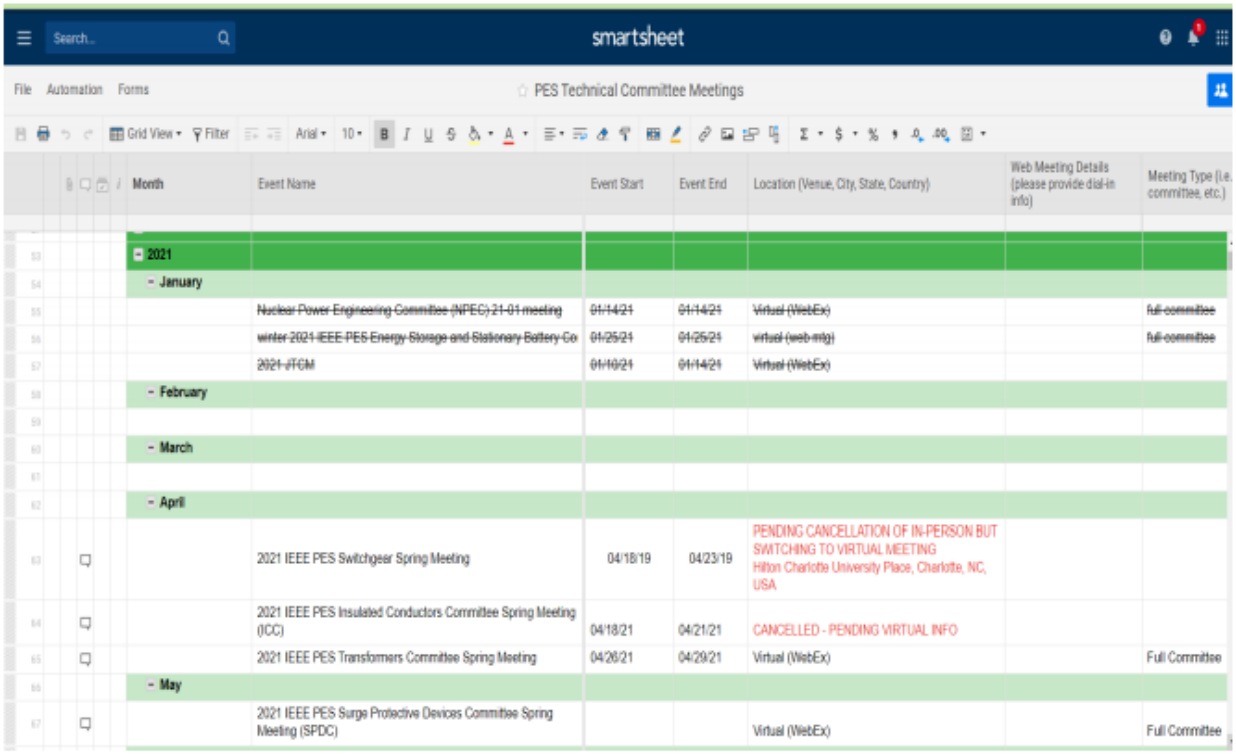
IEEE PES Report: Shana Pepin, IEEE PES Program Manager (presented by Murty Yalla)

- IEEE PES Technical Council Meeting, April 16, 2021
- Make updates to the IEEE PES Technical Committee Meeting Calendar via Smartsheet
- PES GM Brochure of Technical Committees will remain the same as 2020 digital version
- Vijay Vittal presenting to the IEEE SASB on May 6 to review the motion that was approved by IEEE PES Tech Council & the IEEE PES Gov. Board for the specific naming and differentiation between entity & individual standards. More info to come on this topic.
- PES GM '21 Session Planning was reviewed by Hong Chen – advanced program now live
  - 163 Panel sessions planned – 95 live – 68 pre-recorded
  - 366 conference papers accepted 52% acceptance rate. 32 best papers grouped into 2 best paper sessions; 96 paper forum papers grouped into 6 sessions; rest 238 in poster sessions.

  - 116 transaction papers are grouped into 11 transaction paper sessions.
- Discussion among Technical Committees and the new IEEE PES Entity Proposal Management (EPM) Committee chaired by Farnoosh Rahmatian & Dan Sabin.
  - Learn more and see upcoming meeting dates on the IEEE PES EPM webpage linked here or contact Shana Pepin for more details (s.pepin@ieee.org)

Summary of Action Items related to Murty Yalla (PSRC)
- Action: M. Zaman to send information to M. Yalla about this iMeet Central update
- Action: YC Zhang (RSICC) to connect w/ M. Yalla related to off-shore wind topic
- Action: PSRC & PSCC liaisons to attend next EPM Committee Meeting (July 22, 2021)

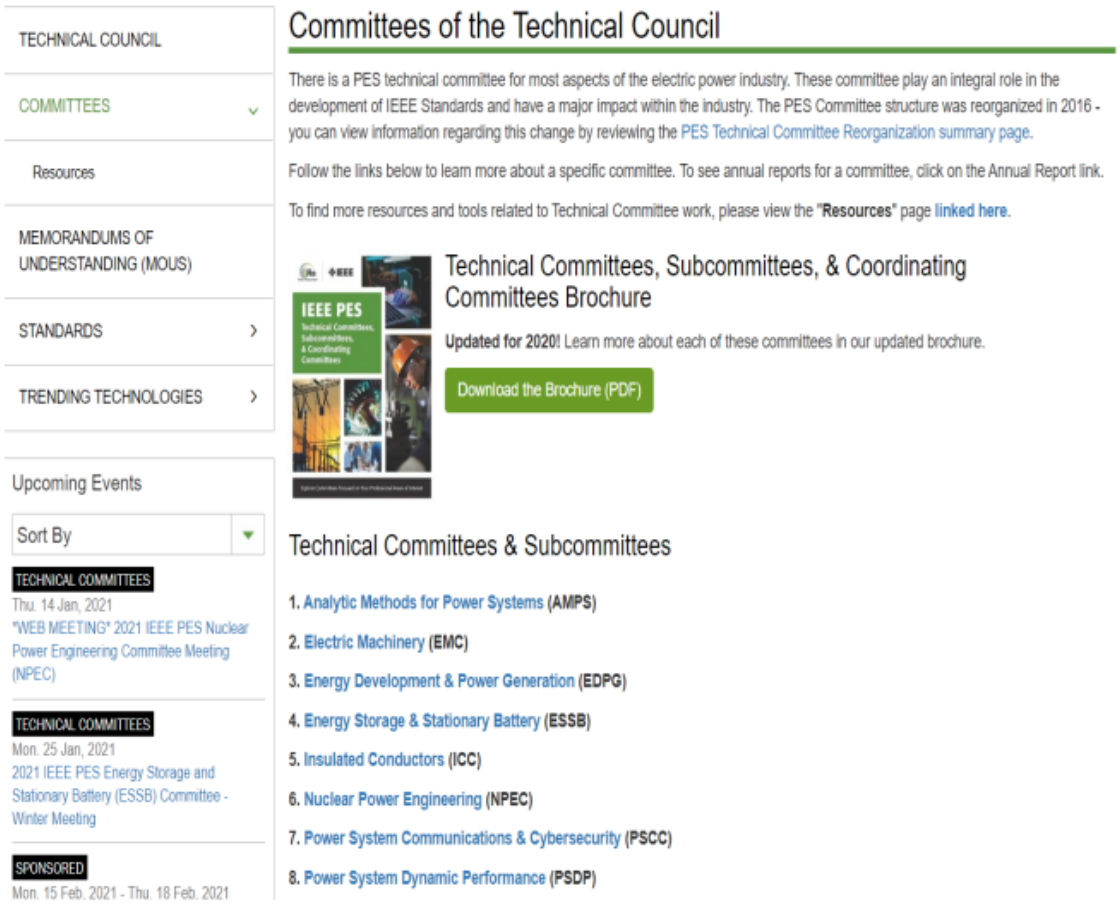
Technical & Coordinating Committee Meetings Promotions



	Month	Event Name	Event Start	Event End	Location (Venue, City, State, Country)	Web Meeting Details (please provide dial-in info)	Meeting Type (i.e. committee, etc.)
	2021						
	January						
		~~Nuclear Power Engineering Committee (NPEC) 21-01 meeting~~	~~01/14/21~~	~~01/14/21~~	~~Virtual (WebEx)~~		~~full committee~~
		~~winter 2021 IEEE PES Energy Storage and Stationary Battery Co~~	~~01/25/21~~	~~01/25/21~~	~~virtual (web mtg)~~		~~full committee~~
		~~2021 JTCM~~	~~01/10/21~~	~~01/14/21~~	~~Virtual (WebEx)~~		
	February						
	March						
	April						
		2021 IEEE PES Switchgear Spring Meeting	04/18/19	04/23/19	PENDING CANCELLATION OF IN-PERSON BUT SWITCHING TO VIRTUAL MEETING Hilton Charlotte University Place, Charlotte, NC, USA		
		2021 IEEE PES Insulated Conductors Committee Spring Meeting (ICC)	04/18/21	04/21/21	CANCELLED - PENDING VIRTUAL INFO		
		2021 IEEE PES Transformers Committee Spring Meeting	04/26/21	04/29/21	Virtual (WebEx)		Full Committee
	May						
		2021 IEEE PES Surge Protective Devices Committee Spring Meeting (SPDC)			Virtual (WebEx)		Full Committee

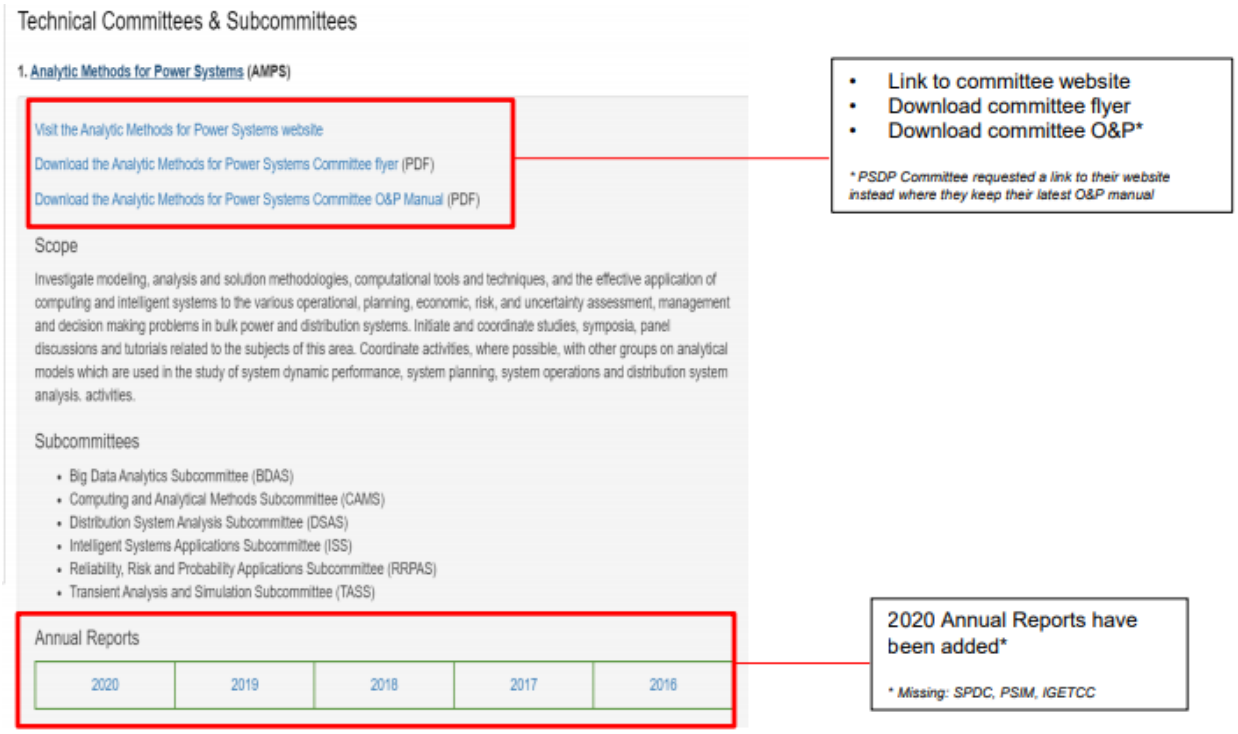
For any of the IEEE PES Technical Committee meetings, whether they are part of the GM or outside of it during some other time this Spring or Summer, as long as the committees enter their meeting information into my Smartsheet here then I get alerted and put the meeting info onto our PES website calendar here and I work with PES Marketing to get them listed in the PES E-bulletins.

Technical Activities Flyer & Brochure



https:/www.ieee-pes.org/images/files/Technical_Activities/pes-committee-brochure.pdf

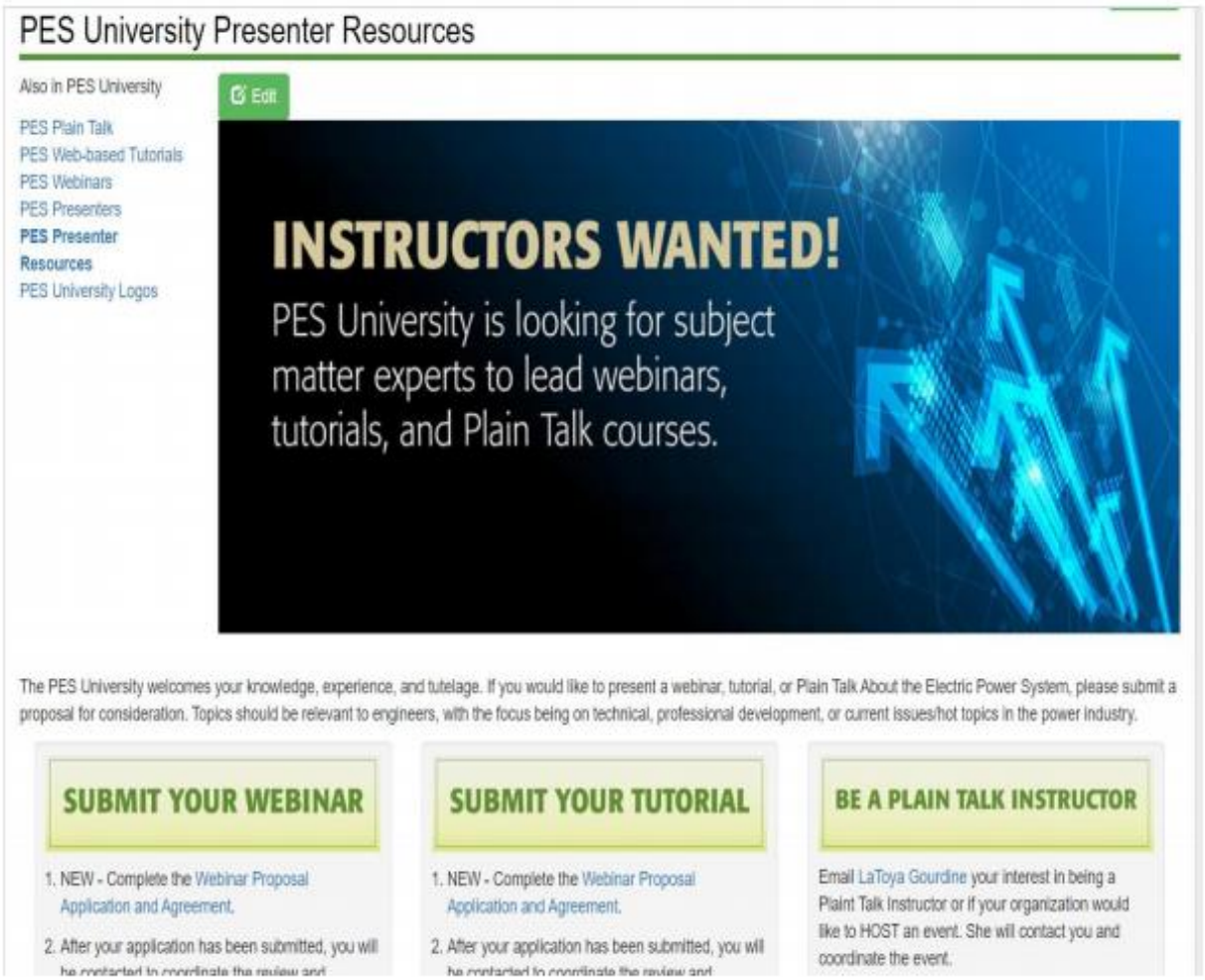
Technical & Coordinating Committee Information on PES Technical Activities Tab



Technical & Coordinating Committee Websites

- Please keep these up to date as these are used to find the latest information related to your committee's activities (i.e. officers, meetings, subcommittees, working groups, task forces, etc.)

Submitting Proposals for IEEE PES Webinars



https://www.ieee-pes.org/professional-development/pes-university/pes-university-presenter-resources

D. IEC Report: Eric Udren (presented by Normann Fischer)

IEC Technical Committee 95, Measuring relays and protection systems

- Chair – Dr. Murty Yalla, US
- Secretary – Thierry Bardou, France
- 22 participating member nations

US Technical Advisory Group to USNC for TC 95

- Eric Udren, TA to US National Committee of IEC & Chair of host PSRC I4
- Normann Fischer, Deputy TA and Vice Chair of I4

Financial support for US & USNC work in TC 95 standards:

- US DOE & Pacific Northwest National Labs (PNNL)
- Jeff Dagle, PNNL, TAG Administrator

Standards Projects

- 60255-1 Ed 2 - Common Requirements – New Committee Draft (CD) with comments due on June 4.
- 60255-27 Ed 3 - Safety requirements – New CD, comments due 6/4.
- 60255-26 Ed 4 - EMC requirements – New CD, comments due 6/4. Functional standards:
- 60255-187-1 – Functional standard for motor, generator, xfmr percentage differential relays – CDV going to FDIS.
- 60255-187-2 – Functional standard for busbar differential relays – early.
- 60255-187-3 – Functional standard for line differential relays – headed for CD with PSRC inputs.
- 60255-216-1 – Requirements for relays with digital I/O (e.g. MUs) – Draft in circulation. TC 95 proposed JWG with PSRC H47 into - awaiting H47 response.
- New TC 95 Ad Hoc WG starting for HVDC protection topics – US nominated participants.
- New TC 95 Ad Hoc WG starting for traveling wave protection and fault location – US nominated participants.
- TC 95 wants to start JWG for 60244-24/C37.111 dual logo COMTRADE revision – awaiting PSRC revision description document approval.
- TC 95 WG for 60255-216-1 – Requirements for relays with digital I/O – proposes JWG with PSRC H47 – awaiting our response.
- JWG with TC 8 on 62786-41 Ed 1, Distributed energy resources connection with the grid – Part 41 Requirements for frequency measurement used to control DER and loads – with US participation. First CD issued with comments due May 14.

TC 95-PSRC Standards Collaboration

- New TC 95 functional standards help developers create & demonstrate relays that reliably meet application needs.
  - Substantial US contributions to international writing teams.
  - PSRC WGs formed to specifically contribute to selected projects.
- Revisions to TC 95 product design and type testing standards improve robustness and safety of products.
  - Substantial US contributions and comments to international writing teams.
  - PSRC is aligning IEEE standards with IEC methods to achieve a single test setup/procedure and a single test (most cases) to meet IEC and IEEE requirements – reduce effort and cost for manufacturers as we get better products.
- IEEE PSRC and IEC TC 95 are collaborating more than ever to bring the best relays and applications internationally.

E. Standards Coordinators Report: Don Lukach

This report summarizes the status of PAR related projects as of the May 2021 meeting.

Training was provided at the virtual Standard's Coordinator Meeting on topics that generate many questions and conversations. Topics included Copyrights & Patents, P&Ps, Word Usage, Cosponsored (Joint Committee) PARS, and Entity PARS.
All PARs that needed actions were individually addressed before and during the PSRC meeting week.

Main Committee PAR Submissions:

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

Published PAR projects in 2021:

C37.108	Guide for the Protection of Secondary Network Systems
C37.230	Guide for Protective Relay Applications to Distribution Lines

PAR projects in Pre-Publication SA Editorial Review:

PC37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control
PC37.91	Guide for Protecting Power Transformers

Joint Committee PAR projects that PSRC is in a Non-Lead Role:

P2800	Standard for Interconnection and Interoperability of Inverter Based Resources Interconnecting with Associated Transmission Electric Power Systems
P2800.2	Recommended Practice for Test and Verification Procedures for Inverter-based Resources (IBRs) Interconnecting with Bulk Power Systems
P1854	Guide for Smart Distribution Applications
P0018 (PAR # TBD)	Standard for Resilient Positioning, Navigation and Timing (PNT) End-User Equipment
PC37.431.20	Guide for Modern Protection System for Static Var Compensators

PAR Expiration dates and their Status:

Project Number	Project Title	Expiration PAR Date	Project Status
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	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
PC37.101	Guide for Generator Ground Protection	31 Dec 2021	Draft Development
PC37.235	Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes	31 Dec 2021	SA Ballot: Comment Resolution
PC37.110	Guide for the Application of Current Transformers Used for Protective Relaying Purposes	31 Dec 2021	SA Ballot: Comment Resolution
PC37.234	Guide for Protective Relay Applications to Power System Buses	31 Dec 2021	SA Ballot: Comment Resolution

All PSRC Lead Committee PAR Projects:

Project Number	Project Title	Project Status
PC37.1.2	Guide for Databases Used in Utility Automation Systems	Draft Development
P1613	Standard for Environmental and Testing Requirements for Devices with Communications Functions used with Electric Power Apparatus	Draft Development
PC37.90	Standard for Relays, Relay Systems, and Control Devices used for Protection and Control of Electric Power Apparatus – General Requirements and Tests	Draft Development
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	Draft Development
PC37.239	Standard for Common Format for Event Data Exchange (COMFEDE) for Power Systems	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	Draft Development
C37.90.3	Standard for Electrostatic Discharge Tests for Protective Relays	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
C37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	Completed
C37.111	Standard for Common Format for Transient Data Exchange (COMTRADE) for Power Systems	Completed
C37.99	Guide for the Protection of Shunt Capacitor Banks	Completed
C37.101-2006/Cor 1	Guide for Generator Ground Protection - Corrigendum 1: Annex A.2 Phasor Analysis (Informative)	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
C37.104	Guide for Automatic Reclosing of Circuit Breakers for AC Distribution and Transmission Lines	Completed
C37.95	Guide for Protective Relaying of Utility-Consumer Interconnections	Completed
C57.13.3	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases	Completed
C37.241	Guide for Application of Optical Instrument Transformers for Protective Relaying	Completed
C37.243	Guide for Application of Digital Line Current Differential Relays Using Digital Communication	Completed
C37.114	Guide for Determining Fault Location on AC Transmission and Distribution Lines	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
C37.245	Guide for the Application of Protective Relaying for Phase Shifting Transformers	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
2030.100	Recommended Practice for Implementing an IEC 61850 Based Substation Communications, Protection, Monitoring and Control System	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
C37.246	Guide for Protection Systems of Transmission to Generation Interconnections	Completed
60255-118-1	Measuring Relays and Protection Equipment - Part 118-1: Synchrophasor for Power System - Measurements	Completed
C37.119	Guide for Breaker Failure Protection of Power Circuit Breakers	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
C57.13.1	Guide for Field Testing of Relaying Current Transformers	Completed
C37.230	Guide for Protective Relay Applications to Distribution Lines	Completed
C37.91	Guide for Protecting Power Transformers	Completed
C37.250	Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes	Completed
PC37.249	Guide for Categorizing Security Needs for Protection and Automation Related Data Files	SA Ballot: Invitation

PC37.2	Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations	SA Ballot: Invitation
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
C37.248	Guide for Common Format for Naming Intelligent Electronic Devices (COMDEV)	Completed
C37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control	Completed
C37.108	Guide for the Protection of Secondary Network Systems	Completed
PC37.233	Guide for Power System Protection Testing	SA Ballot: Pre-Ballot Review
PC37.251	Standard for Common Protection and Control Settings or Configuration Data Format (COMSET)	Draft Development
C37.112	Standard Inverse-Time Characteristic Equations for Overcurrent Relays	Completed
PC37.234	Guide for Protective Relay Applications to Power System Buses	SA Ballot: Comment Resolution
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	SA Ballot: Comment Resolution
PC37.101	Guide for Generator Ground Protection	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
PC37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	SA Ballot: Comment Resolution

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

F. PSCC Committee Report: Mark Benou, Secretary PSCCC (presented by Craig Preuss)

- PSCCC held 24 meetings of working groups, task forces, and study groups of the P, S, and C subcommittees this week, and 3 subcommittee meetings.
- C0's WG for PC93.5 – Standard for Power Line Carrier Transmitters/Receivers used to Transfer Discrete Teleprotection Signals – has been approved for publishing.
- C0 has made a request for participation for IEEE-643, Guide for PLC applications.
- S0 disbanded 3 WGs/TFs after they completed their tasks and approved P1686, Standard for Intelligent Electronic Devices Cyber Security Capabilities, to proceed to sponsor ballot.
- P0 - a new PAR was approved for P5, P1615, Recommended Practice for Network Communications in Substations. PARs were also approved for P18, IEEE 2030, Guide for Smart Grid Interoperability of Energy Technology and Information Technology Peration with the Electric Power System (EPS), EndUse Applications, and Loads, and P20, Joint Revision of IEC 61850-9-3 with TC-57 WG10F0 is to ballot IEEE 1138 Standard for Testing and Performance for Optical Ground Wire (OPGW) for Use on Electric Utility Power Lines in Q1 or Q2.
- Study Group P21 is investigating if a working group should be formed to generate a standard for addressing system architectures that support the virtualization of substation protection and control applications. This work is happening in parallel with PSRC H45 work on PC37.300 addressing Centralized Protection and Control but is not specifically addressing this scope. Anyone who missed the meeting and wants to join the work can contact the study group chair, Craig Preuss, preusscm@bv.com.

G. IEEE P2800 - Standard for Interconnection & Interoperability of Inverter-Based Resources Interconnecting with Associated Transmission Electric Power System: Manish Patel

IEEE P2800: Interconnection Requirements for BPS-Connected Inverter-Based Resources

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

- The P2800 SA Initial Ballot recently closed; the public review is scheduled to close on May 9 (https://publicreview.standards.ieee.org/ [publicreview.standards.ieee.org]) but no comments have been received to date.
- The Initial Ballot was successful with a 79% response rate (>75% was required) and a 84% approval rate (>75% was required)
- Received 1,407 comments (659 are “must be satisfied”) that will all need to be resolved prior to recirculating a new Draft 6.1 in, hopefully, early June.

- The high approval rate in the Initial Ballot is an encouraging signal that suggests IEEE P2800 may be published within the anticipated timeline towards the end of 2021.
- The Comment Resolution Group (CRG) is reviewing and resolving the Initial Ballot comments and create the Recirculation Draft (Draft 6.1). The CRG will consult and request approval from the WG after each step of the IEEE-SA ballot resolution, i.e., prior to the recirculation.

H. NERC Report: Rich Bauer

Approved Reliability Guidelines

- Model Verification of Aggregate DER Models used in Planning Studies Posted for comment October 15th
- Performance, Modeling, and Simulations of BPS-Connected Battery Energy Storage Systems and Hybrid Power Plants – Posted for 45 day comment December 15th

Standards Projects

- PRC-005 – current state
  - Maintenance requirements for protection functions in the AVR system and any other control system
  - Change the protection system definition
- PRC-019 * Approved by the Standard Committee January 2021
  - Combined with MOD-025 into one project
  - Inverter Based Resources
  - SSSL
- PRC-023 * Approved by the Standard Committee January 2021
  - Should be posted for command and SDT nominations solicited, soon
  - Remove OOSB Requirement R2
- PRC-002 * Approved by the Standard Committee January 2021

Whitepapers / Reports

- PRC-019 Technical Reference

Lessons Learned

- Lesson Learned LL20210203 – Transient Induced Misoperation I
- Lesson Learned LL20210203 – Transient Induced Misoperation II

I. Advisory Subcommittee Reports - Murty Yalla

- There was a good amount of discussion on virtual meetings in the future. Officers will be discussing about virtual/in person meeting combinations in the future.
- We will be sending out a survey regarding virtual or in person meeting preference from members in the next few days. We will be making a decision based on the survey and other IEEE/CDC guidelines for in person meetings. See discussion above on Future Meetings.

Email Usage Guidelines for Leaders and Participants – Michael Thompson

PSRC active participants and members have access to the PSRC directory, including email addresses. We have a Guideline posted to outline appropriate usage, consistent with the IEEE Data Privacy Guidelines (GDPR). Email address access is authorized for any PSRC business. It will often also be OK to use for other professional (not commercial) business contacts consistent wit the GDPR.

Ralph Mackiewicz – in Memorium

Ralph Mackiewicz was warm and friendly individual and a selfless contributor to the IEEE PSRC, IEC, and the UCA International Users Group where he was Chairman of the Board.

He was a champion for foundational technologies and standards that are facilitating digital transformation of the electric utility industry: IEC 61850, Common Information Model (CIM), synchrophasors, and ICCP/TASE.2.

He regularly presented tutorials, papers, and seminars on important industry topics and became involved in IEEE PSRC and PSCC committees related to these technologies. His commitment to these standards translated into commercial products for the industry.

Ralph volunteered at Detroit's "City of the Future" in order to promote engineering and problem solving to the new generation.

I. B1: Awards and Technical Paper Recognition Working Group

Chair: Hugo Monterrubio
Vice Chair: Mal Swanson

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 of the Monday reception dinner.

January 2021 Meeting Minutes:
The B1 Working Group met virtually on Monday January 11, 2021 with 13 members. All the SC's were represented in this meeting. The September 2020 meeting minutes were discussed and approved.

The following items were discussed during this meeting:

1. The WG reviewed and provided updates to the WG Matrix. The WG continues to maintain a list of completed working groups that have been disbanded since our suspension of face-to-face meetings to make sure all pending awards and recognitions are accounted for. Pending awards will be delivered once we resume the face-to-face meetings during our awards ceremony.
2. IEEE PSRC Career Service Award - This award is intended for PSRC members that have or are about to retire from attending PSRC meetings and that have a minimum of 15 years of active participation in our meetings with a proven track of contributions and mentoring of fellow PSRC members. The WG identified potential candidates and made nominations, the results will be kept confidential until the award is announced and issued.

3. Discussion and updates on IEEE PES Individual Award nominations. WG members continue their work in trying to nominate a select number of PSRC members for IEEE and PES level industry related individual awards. The names of these nominees are kept confidential and will be announced if and when an award is issued.

Respectfully Submitted
Hugo Monterrubio, B1 Chair

J. B3: Membership Working Group

Chair: Mal Swanson

Vice-Chair: Cathy Dalton

Assignment: Assist in searching for new attendees.

Requesting support from attendees' employers.

Attendance during the January Joint remote meeting was 441, which is a new record in attendance for us (426 for PSRC).

Out of 66 new attendees (62 in PSRC or both), 38 were in the PSRC remote Newcomers Orientation meeting on Monday. Cathy Dalton sent follow up meeting emails to each newcomer, to support our retention program. In that way we are encouraging each of the newcomers to continue their attendance and participation.

No management support letters were sent. If any attendee or potential attendee needs stronger management support for PSRC participation, we encourage them to let us know.

K. B4: Long Range Planning Working Group

Chair: Pratap Mysore

No report.

L. 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.

Cathy recognized the pes-psrc.org website and what an important tool it has been for publicity and continuity of communications for PSRC membership. The website continues to get better and better; we use it as a tool at the newcomers orientations, as well as a reference for all of our current membership. With meetings being virtual over the past year, the website has been essential in providing information and links to WebEx meetings and informational sessions.

PACWorld Update: Cathy Dalton submitted information to include in PSRC update for the next issue of PACWorld, based on information discussed at our virtual (via WebEx) May 2021 meeting. Additional updates from subcommittee chairs were included. Also included was technical presentation information that was presented at the Main Committee meeting. Hugo shared that the next awards reception/dinner will need publicity once we determine when the next face to face meeting will convene.

Cathy will respond to requests as they arise, to continue to promote PSRC membership and activity.

M. B8: O&P Manual Revision and Working Group Chair Training Working Group

Chair: Phil Winston

No report.

N. B9: Web Site Working Group

Chair: Rick Gamble

No report.

O. Items of Interest from the Main Committee Meeting: Gene Henneberg

System Protection "C" Subcommittee Report on WG progress of note – Fred Friend

C25: Report on Protection of Wind Electric Plants WG resolving PSRC Officer comments

C26: C37.242 C37.233 Power System Protection Testing Guide
Formation of balloting body underway – closes February 3
Approved to ballot by Subcommittee via email

C28: C37.242 Guide to the Synchronization, Calibration, Installation and Testing of PMUs for Power System Protection and Control
Re-circulation ballot ends on January 14. Two negative ballots resolved – changed vote to approve

C31: C37.120 Protection System Redundancy for Power System Reliability
Formation of balloting body formed with 117 registered
Approved by Subcommittee via email to ballot

C36: Summary of Role of Protective Relays in the Smart Grid
Unanimous working group approval to send to Subcommittee

CTF41: Investigation of Distribution PMU Requirements. Elevated to Working Group (C41)
WG Assignment: Prepare a technical report on the performance requirements for Distribution PMUs.

CTF44: Investigate the possibility of preparing one journal paper and one conference paper exclusively based on the material from WG C24 report. Elevated to Working Group (C44)

WG Assignment: Prepare a summary paper for IEEE Transactions on Power Delivery based on the contents of the report prepared by the C24 working group.

CTF45: Investigate additional need for protection practices for interconnecting solar or other inverter based generation to utility transmission systems (continuation of WG C32). Elevated to Working Group (C45)

WG Assignment: Prepare a technical report on protection practices for interconnecting solar or other inverter based generation to utility transmission systems from work of WG C32.

New Task Force:

CTF46: Investigate preparing a summary report and/or presentation from the work of C28, revision of IEEE C37.242, IEEE Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control

Line Protection "D" Subcommittee Report on WG progress of note – Bruce Mackie

D28: C37.230 Guide for Protective Relay Applications to Distribution Lines – Approved – Should be Published very soon

D46: Started to create summary paper, Thanks to Brian and Claire

D45: Working Group created to document protection methods used to reduce wildfire risks due to transmission and distribution lines.
Jonathan Sykes – Chair
Scott Hayes – Vice Chair

Relaying Communications "H" Subcommittee Report on WG progress of note – Aaron Martin

IEEE PSRC SC H is responsible for 16 (out of 60) IEEE PSRC Standards.
It currently has 16 active Working Groups (WGs): 8 are producing IEEE PSRC Standards and 8 are generating IEEE PSRC and PES Reports.

H6: **H**as finished and published Report on "IEC 61850 Application Testing", it was approved by PSRC Officers. Chair: C. Sufana. This WG first met on March 11, 1999.

H17: Submited draft report to HSC on "Establishing Links between COMTRADE, IEC 61850, and CIM" for initial approval

H22: HSC Passed motion to submit IEEE Guided PC37.249 Guide for Categorizing Security Needs for Protection Related Data Files is starting to form IEEE-SA Sponsor Ballot Pool. Chair: A, Makki

H32: Requests to give a presentation at the next MC meeting on the technical report Channel Performance Considerations for Ethernet Circuits Applied to Teleprotection

H47: **I**s continuing work on a report on Impacts of IEC 61850 sampled values, GOOSE and PTP time synchronization on protection and control applications using process bus. It also **asking for contributions from protection experts** regarding the impact to specific schemes.
Chair: M. Kanabar.

H51: HSC Passed motion to Revise**:** IEEE Standard PC37.239, Standard for Common Format for Event Data Exchange (COMFEDE) for Power Systems, with the following Assignment, Scope, and Purpose. Chair: M. Adamiak

H-SC: **P**asses Motion to form TF to revise C37.232 IEEE Standard for Common Format for Naming Time Sequence Data Files. Chair: (A. Makki)

Relaying Practices "I" Subcommittee Report on WG progress of note – Jim Niemira

I SC met today with 22(+?) members present – quorum was met.

- Neglected to Approve I SC Minutes from January 2021; will do email ballot.
- WG updates of note: 20 Active WG and TF (including 2 TF converted to WG and 1 new TF added today)

WG updates of note:

- I36 – IEEE 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 – Revision of C37.90.2-2004 • Final draft completed and WG voted to go to IEEE SA Ballot. • Subcommittee Approved to proceed to IEEE SA Ballot
- I35 – IEEE PC37.2 Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations -- Revision of C37.2-2008 • Submitted for Mandatory Editorial Review by IEEE-SA; proceeding to form balloting body.
- I29 – PC37.110 - IEEE Draft Guide for the Application of Current Transformers Used for Protective Relaying Purposes – Revision of C37.110-2007 • reconciling ballot comments.
- I32 – A Survey of Protective System Test Practices • Not much progress since last time. • Niemira work with Knapek to try to get this back on track. • Plan to solicit additional survey respondents through PES database.

TF elevated to New WG for existing Guides/Standards expiring soon:

- I46 – PAR to Revise IEEE C57.13.3-2014 - IEEE Guide for Grounding of Instrument Transformer Secondary Circuits and Cases (expires 2024); Chair TBD.
- I47 – PAR to Revise IEEE C37.231-2006(R2012) – IEEE Recommended Practice for MicroprocessorBased Protection Equipment Firmware Control (expires 2022); Chair TBD.
- ITF48 – Review IEEE C37.103-2015 - IEEE Guide for Differential and Polarizing Relay Circuit Testing and determine need for revisions (expires 2025). Chair: Mohit Sharm

Rotating Machinery "J" Subcommittee Report on WG progress of note – Gary Kobet

J SC met today with 19 members present – quorum was met.

- J13 Modeling generator controls (report)
- J14 Power plant protection issues associated with black starting of generators

Both reports essentially complete, incorporating comments from MC officers

Now have four PAR activities:

- J16 Revise C37.101 Generator ground protection: requesting PAR extension (3yr)
- J17 Revise C37.102 AC generator protection: WG ballot initiated, requesting PAR extension (1yr)
- J19 Revise C37.106 Abnormal Frequency: WG ballot initiated, sponsor ballot by end of 2021
- J22 Revise C37.96 Motor protection: PAR scope/purpose developed

J21 Motor protection tutorial – in process, will be working closely with J22

New task force JTF23 Investigate the need for a WG to develop a report on synchronous condenser protection

- Such report would cover all aspects related to the protection of synchronous condensers, including design, settings, and protective schemes.
- Report could be a feeder document into a future revision of C37.102 since a synchronous condenser would fall under the category of a synchronous generator.

Possible technical committee overlap with Energy Dev/Power Gen Committee

Substation Protection "K" Subcommittee Report on WG progress of note – Jeff Barsch
Published guide!
- – C37.108-2021, IEEE Guide for Protection of Secondary Network Systems
- – Thank you to WG and officers:
  Chair: Adi Mulawarman
  Vice-chair: Roger Whittaker

Established WG's continuing work:
- – K10 – SCC21 DER std coordination
- – K12 – Static Shunt Compensators
- – K25 – Shunt Capacitors
- – K26 – Shunt Reactors
- – K27 – Utility-Consumer Interconnections
- – K29 – Reducing outage durations

Motions:

There were no motions.

P. Presentations: Gene Henneberg

Summary report on The Role of Protective Relaying in a Smart Grid, WG C2/C36
- Taylor Raffield

Performance requirements for teleprotection over Ethernet
-- Ken Fodero

Q. Adjournment:

At the completion of the meeting, a motion to adjourn and seconded. The motion carried and the meeting was adjourned.

R. Subcommittee Reports

C: SYSTEM PROTECTION SUBCOMMITTEE

Chair: Fred Friend
Vice Chair: Michael Higginson

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 May 6, 2021 at 9:10 AM via WebEx. The participants were displayed by the teleconferencing software tool. A quorum was achieved (42 of 61 members and 59 guests), and the January 2021 minutes were approved (Gene Henneberg made motion, Jonathon Sykes seconded, passed with no opposition).

Advisory Committee 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, May 14. Please use the new template and include your assignment.
- WG meeting attendance should be logged in 123Signup.
- First-time attendees need to create 123Signup PSRC account.
- A custom web page is available for each WG, if the WG Chair wishes to use it. Contact Rick Gamble, 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.
- Registration for this meeting was about 428, including 61 first time attendees.
- The Awards Ceremony will take place during the Monday night reception for the May and September meetings when we can resume in-person meetings.
- WG officers should request certificates for their members upon completion of their work. Hugo Monterrubio can address any open questions.
- The IEEE SA style manual was revised in 2020. Working group reports should follow word usage indicated in Clause 12.2.5.
- WGs with a PAR must show Copyright and Patent Policy slides at each meeting.
- New templates for the O&P and P&P were approved in 2020 and are coming soon. Additional information is expected to follow.
- WG chairs for PAR work must be IEEE PES and IEEE SA members.
- A file share application for non-PAR working groups has been developed. If you are interested in using this please request from Subcommittee Chair.
- The Entity Proposal Management system will be used for all potential joint work.
- All are reminded and encouraged to apply for Senior Membership in the IEEE, if you are eligible.
- There is a review process in place for Entity standard development, and IEEE is working on facilitation.
- Emails with some attachments are blocked by some participants' firewalls. Please be aware of this when sending files via email.

Working Group Reports

The minutes of the Working Groups are attached.

Old Business

Open ideas for new projects include:

- Impact on the power system for a successful cyber-attack at a substation
- Impact of Electro Magnetic Pulses (EMP) on System Protection

Working group H41 is updating IEEE Std 1646, "Draft Standard for Power System Communication Delivery Time Performance Requirements". TW Cease, working group vice chair, and Dennis Holstein, working group chair, are requesting feedback on the ¼ cycle time allowance referenced in this standard. Please send your feedback to them at twcease@ieee.org or holsteindk@ocg2u.com. Dennis will provide the latest draft to the Subcommittee officers.

New Business

Matt Black brought a motion to extend the PAR for C26 to 12/31/2022. The motion was seconded by Gene Henneberg, and was approved by the subcommittee with no opposition.

Technical Report PES-TR87 "Protection of Wind Electric Plants" prepared by Working Group C25 has been published the on the PES Resource Center.

General Discussion

There was no general discussion.

Jonathan Sykes made a motion to adjourn, and Allen Goldstein seconded the motion. The meeting was adjourned at 10:12 AM.

Working Group Minutes

C-23: Coordination of Synchrophasor Related Activities
Chair: Allen Goldstein
Vice Chair: Gustavo Brunello
Secretary: N/A
Output: Discussion Forum
PAR and PAR expiration: N/A
Established Date: January 2014
Expected Completion Date: On Going
Draft: N/A
Assignment: The ongoing task force will provide three main functions: -Liason with NASPI (North American Synchrophasor Initiative) (specifically the PRSVTT) to keep the PSRC in sync with the changes and needs in the industry with respect to the development and usage of PMU devices. Formalize transfer process of PRSVTT developed documents to PES PSRC including making recommendations which PRSVTT activities should be transferred to IEEE reports, guides and standards. -Make recommendations to PSRC for assignments that would require the creation of working groups in PSRC and also recommend what the output of those working groups might be (Guides, reports, etc.) based on the needs of the industry. -Coordinate related activities with other IEEE PES committees.

Meeting Date and Time: Web-Meeting, On May 05, 2021 at 2:20pm CT

Attendance: Four (4) members, Sixteen (16) guests
Call to order
Officer presiding: Allen Goldstein
Officer recording minutes: Gustavo Brunello

Quorum was not reached

Call for Patents: N/A

Summary of Activities and Discussions
1-Allen provided an overview of the C23 work group scope
2_Allen presented the NASPI past and present activities and industry working groups related to synchrophasors, including those at IEEE.

3_ Allen addressed some of the questions that came out during our last January meeting
4- Evangelos Farantatos made a presentation about EPRI activities regarding Synchrophasors. Presentation title was:
"Monitoring, Analysis and Control using Synchrophasors". A lively discussion about inertia followed.

Adjourn at 3:23pm

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: 6.5
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 May 3, 2021 at 1:10 PM CST with 12 members and 51 guests.

Meeting Agenda

1) Introductions
2) Review January 2021 meeting minutes.
3) Update of report progress to date.
4) General Discussion
5) Adjourn

Summary of Meeting Discussion

a) The meeting started with a brief review of the January 2021 minutes.
b) Martin Best announced that the working group report has been accepted and is now on the IEEE Resource Center website as PES-TR87.
c) The working group discussion then turned to what to do next. Several members were in favor of writing a summary paper of the report.
d) Steve Miller suggested the possibility of having a panel discussion at the Summer 2022 PES Conference.
e) For the immediate future, the working group members decided to ask the C Subcommittee if the working group assignment could be changed to allow them to write a summary paper of the report.
f) Juan Gers, Steve Klecker, Aboutaleb Haddadi, Lalitha Devarakonda, Raluca Lascu, Steve Miller, Jim van de Ligt, Lynn Schroeder, and Mukesh Nagapel volunteered to work on the summary paper.
g) There being no other business, the working group adjourned.

h) At the C Subcommittee Meeting on May 6, the C25 Working Group will ask to change their assignment to "Prepare a summary paper and presentation on the PES Technical Report TR87 - Protection of Electric Wind Plants".

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

Chair: Don Ware
Vice Chair: Matt Black
Secretary: Zach Zaitz
Output: Revise Guide
Established Date: January 2016
Expected Completion Date: November 2021
Draft: 4.2
Assignment: Complete revised Guide by end of 2021

The C26 working group met online instead of in-person meeting due to COVID-19 on Monday, May 3, 2021 with 38 attendees, 11 members and 27 Guests. Membership quorum was satisfied.

Mathew Black hosted the meeting as he has done on all Web meetings. Fred Friend kicked off meeting as a C-SC Host.

Matt reviewed the IEEE Patent Policy and Copyright Policy slides.

Meeting Notes:

- Matthew Black and Don Ware presided over meeting.
- Reviewed minutes, Will Knapek motioned to approve, 2nd by Wayne Stec
    - Minutes approved without objection
- Vice-chair and Chair's comments:
    - Document submitted for editorial review, and comments were received.
- The patent slides were displayed. No patent concerns were raised.
- Discussed formatting issues and cross reference
- Alex Apostolov mentioned incorporating IEC Standards in Bibliography additions
- Discussed eliminating the use of "ensure" and "minimize" to avoid making guarantees.
- Discussed not using color as the only differentiator in figures.
- Cross-references need to be fixed prior to sending the document out for balloting.
- Vice Chair requested volunteers to support making required editorial changes.
  The following individuals volunteered to help with these edits:
    - Cross references:
        - Vahid Madani (lead)
        - Matt Black
        - Zach Zaitz
    - Remove use of "Ensure" and "Minimize"
        - Tony Seegers
    - Update information in front matter
        - Will Knapek
    - Add citation for TC95
        - Alex Apostolov to ask Murty

    - Metrication
        - Mike Bloder
    - Graphics
        - Sughosh Kuber
        - Nestor Casilla
        - Angelo Tempone
    - All Section 1 edits are requested to be completed by 5/17.
    - All Section 2 edits are requested to be completed by 6/21.
- The latest version of the draft may be found at https://ieee-aa.imeetcentral.com/pc37233/folder/WzIwLDc5MTY3OTdd
- Working group members recommended pursuing a PAR extension.
- The meeting adjourned at 4:31 Central. Tony Seegers moved to adjourn and Vahid Madani 2nd the motion.

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
PAR and PAR Expiration:
Established Date: September 2015
Expected Completion Date: May 2021
Draft: D5
Assignment: Revision of C37.242 Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control

Meeting Date and Time: Web-Meeting, On May 05, 2021 at 10:20pm CDT

Attendance: 13 members, 31 guests
Call to order
Officer presiding: Allen Goldstein
Officer recording minutes: Gustavo Brunello

Quorum was reached, Minutes previously approved by email vote.

Call for Patents: No response

Summary of Activities and Discussions

Revision is complete, All balloting and reballoting complete with 100% approval. Approved by Nescom. Awaiting editing by SA editorial staff.

Discussion of summary paper:
A new TF to consider drafting a summary paper will meet for the first time immediately following this, in order to allow C28 members to attend other meetings, we will ask for volunteers now and start the discussion to be repeated and continued at the next meeting also.
Volunteers to work on a summary paper and or presentations.

Ken Martin. Jeff Zhao. Deepak Maragal. Mahendra Patel. Gustavo Brunello. Bonian Shi. Erin Jessup. Prasad Shrawne. Jayprkash P. Dinesh Gugusinge.

Possible target publications for summary paper:

- Transactions (e.g. Power Delivery or Smart Grid)
  - Must have some unique content
  - Deepak: this would be a "practice paper"
  - We could talk about future work in order to add unique content
  - Vahid: K subcommittee published a TR. The PSRC said that they should not add new topics to a summary paper. 67% matched the TR so the transactions did not accept.
  - Page Limit to 8 pages or need to pay for additional pages
    - Who would pay?
- Conference Papers
  - Georgia Tech Conf. (submission deadline 9/17/22 – too soon for 2022 but maybe 2023)
  - SGSMA (May 2022?)
  - PES
- Other organizations: (will not be listed in IEEE Xplore)
  - NASPI
    - Could be written in conjunction with NASPI PSRVTT
- Magazines
  - Power
  - Pac World (also a conference)

CTF46 will meet monthly to determine an assignment/output. Target becoming a WG after September PSRC. We will also consider nominations for Chair and Vice Chair for a WG.

Adjourn at 11:20 CDT, **Next Meeting:** Same time slot, Room for 30 people (if in-person).

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: May 2016
Expected Completion Date: May 2022
Draft: 1.06
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 in a single WebEx session on Tuesday, May 4, 2021, 8:00-9:00 AM CDT with 23 attendees (10 Voting Members and 13 Guests). Mike Kockott, Vice-Chair, presided over the meeting and recorded the meeting minutes.

Mike welcomed all attendees, then went on to review the minutes from the January 2021 WebEx meeting. Mike asked if anyone objected to approving the minutes. As no objections were raised, the minutes from January 2021 were thus approved.

The next agenda item was the review of writing assignments for this meeting. Some attendees indicated that they had not received the latest draft of the report (1.06). Based on this, Mike asked the C-subcommittee host about getting a ShareFile C29 folder. The C-subcommittee host stated that there should be no problem to set this up, and would pass this request on to Rick Gamble. The C29 ShareFile will be setup such that only Kevin and Mike will be able to post to this folder, and make edits to documents posted there. All other working group members and guests will have download-only access.

Mike then led discussion on the latest revision of the draft (1.06). Teams were assigned to work through all received comments for chapters 1 to 3. The task is to 'clean-up' these chapters, resulting in a 'clean' version for these chapters. Any future review and comments on these chapters going forward will then be based on the new 'clean' version.
Chapter 1: Kevin and Mike
Chapters 2 and 3: Deepak to lead. Mohit and Yuchen offered to join Deepak. Jun and Rob also offered their assistance as both have worked previously on the two chapters.
Target date for Deepak and his team to submit a new 'clean' version for chapters 2 and 3 to Mike and Kevin is Friday 30 July. Kevin and Mike to complete chapter 1 by the same date.
A next version of the draft report with 'clean' chapters 1 to 3 will be sent out to all C29 members and guests before the meeting in September.

Daniel said he would attempt to get some test results using RelaySimtest that he could present at the September meeting.

With the targets for September having been set, and there being no further open discussion or proposal for new business, Mike thanked all for attending and adjourned the meeting.

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 Date: December 2021
Draft: 10.8
Assignment: Development of a guide for protection system redundancy

WG C31 met on Tuesday, May 4, 2021, in a single session with 13 voting members, 6 non-voting members, and 24 guests attending. 1 guest requested to become a non-voting member.

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 (13 voting members out of 24 were in presence).

The WG voted to approve March 1, 2021 webex #26, March 15, 2021 webex #27, March 29, 2021 webex #28, April 12, 2021 webex #30, and April 26, 2021 webex #31 meeting minutes. (Motion: Jay Anderson, 2nd: Gene Henneberg).

IEEE-SA initial ballot of the standard was conducted in Jan-Feb 2021. The ballot response rate was 82% (the minimum response rate is 75%), and the guide's approval rate is 79% (minimum is 75%). We received 11 negative ballots and 280 comments. We have been meeting since early March to resolve the ballot comments, and our goal is to resolve the ballot comments by July 1 and recirculate the guide.

The PAR expires at end of 2021. Based on the results of the upcoming recirculation, a decision will be made whether the PAR needs to be extended.

The WG then proceeded to continue addressing the ballot comments. The team went through the comments for 5.4 *Battery/dc source circuit redundancy*, 5.6 *Breaker trip coil circuit redundancy*, and started 5.7 *Relay system redundancy*.

Comment resolution highlights:

a) In 5.4, we added a commenter's contribution that discusses a dual battery system that may be configured such that each batter is oversized, so each battery is capable to carry the full load of both System A and System B. A benefit of such sizing is that a transfer scheme may be implemented to support the condition when one battery fails.

b) In 5.4, another commenter noted a paragraph discussing battery chargers with the battery eliminator function and the claim made in the guide that such chargers are capable of tripping breakers. The commenter stated that the battery eliminator feature of a charger means that its output is filtered such that it does not need a battery connected to reduce the ripple to acceptable levels. It should not mean the charger would not reach current limit when the momentary high current drawn by trip coils is placed on it. The commenter thought this paragraph is misleading for general application. The WG decided to remove it.

c) In 5.7, the introductory paragraph stated that "…a review and evaluation of the control system, including redundancy, is warranted. By invoking redundancy evaluation techniques, the substation systems performance and reliability of the power system can be measured and possibly improved." A comment was that the paragraph is not clear and needed evaluating techniques to be added. The WG decided to remove it.

The WG will continue resolving the comments during the scheduled bi-weekly webex meetings. We tentatively request a meeting at the PSRC September 2021 meeting and ask to avoid conflicts with DTF47, K22, and I2.

C-33: 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: December 2021
Draft: D2
Assignment: Support the development of this IEEE recommended practice in cooperation with PELS, IAS,

and IES efforts

Working group C-33 did not meet during this meeting.

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 8 voting members and 52 guests (60 total). The Vice-Chair presided over the meeting in the Chair's absence and also recorded the minutes. The meeting was called to order by Gary Kobet on Wednesday, May 5, 2021 at 0910 CDT. The minutes from the January 13, 2021 WebEx meeting were reviewed and approved.

The Chair reviewed action items for other PSRC working groups as noted in the document:

- C25 Protection of Wind Electric Plants - Dean Miller: Work completed, paper posted on PES-PSRC website, TR-87 https://resourcecenter.ieee-pes.org/publications/technical-reports/PES_TP_TR87_PSRC_050121.html; C25 working on conference paper.
- C38 Guide for the Design of Microgrid Protection Systems - Mike Higginson: Still working on draft, will start monthly meetings with intent to send draft out for ballot this year.
- C45 Protection and short-circuit modeling of systems with high penetration of inverter-based Resources – Ali Hooshyar: Held first meeting yesterday, working on initial outline, writing assignments made, will hold couple meetings before September. Will address system-wide impacts instead of just IBR/tie-line impacts, also need to improve models from C24 work, also application considerations, will focus on transmission system impacts.
- D29 Tutorial on Setting Impedance-Based Power Swing Blocking and Out-of-Step Tripping Functions on Transmission Lines - Kevin Jones: No report
- D38 Impact of High SIR on Distance Relaying - Christopher Walker: Working on draft 0.5, initial writing assignments being developed, section on IBR impacts included. Impact for three-phase faults more significant than for single-phase-to-ground faults due to inverters hitting upper limits plus connection transformer is typically wye-grounded on system side.
- J18 Investigate the effect sub-synchronous oscillations due to inverter based resources (IBR) on rotating machinery protection and control- Normann Fischer: No report
- NERC –
    - Modification to PRC-019 ongoing, applicable to IBR but standard generally addresses synchronous machines, language being modified to include IBR-specifics, also discussion of SSSL for synchronous machines, SAR posted for comment, taking nominations for drafting team members, coupled with MOD-025 (real/reactive power capability testing) as one project

        - https://www.nerc.com/pa/Stand/Pages/Project_2021-01_Modifications_to_MOD-025_and_PRC-019.aspx
    - Guideline recently published concerning Battery/Hybrid facilities, for Planners
        - https://www.nerc.com/comm/RSTC_Reliability_Guidelines/Reliability_Guideline_BESS_Hybrid_Performance_Modeling_Studies_.pdf
- P2800
    - Initial ballot closed, public review still open (closes May 9) P2800 public review - https://publicreview.standards.ieee.org/ [publicreview.standards.ieee.org])
    - Results from initial ballot positive, working through comments, recirculation early June
        - Each comment will be addressed whether ballot positive or negative
    - Hope to publish standard by end of 2021
    - P2800.2
        - P2800.1 entity standard on IBR testing
        - NESCOM reviewing P2800.2 similar to 1547.1, allows wider stakeholder input, NESCOM did vote and approved.

Allen Goldstein asked about need to review C17 report from 2013 to see if it needs to be updated. Plan is for C45 to review this (and other?) old reports to see if that material needs to be updated. Gene Henneberg noted that C24 and C25 were formed to include IBR impacts on the collector side.

Vice-Chair Gary Kobet adjourned the meeting at 1010 CDT.

C-36 Summary of Role of Protection Relaying in the Smart Grid
Chair: **R. Benjamin Kazimier**
Vice Chair: Steve Klecker
Secretary: Steve Klecker
Output: Summary Paper
Established Date: January 2018
Expected Completion Date: January 2023
Draft: 5.3
Assignment: To develop an IEEE summary paper based on the C2 report "Role of Protective Relays in the Smart Grid"

C36 met on Wednesday, May 5, 2021, by a web meeting from 1:10PM to 2:10PM. There were 9 voting members, and 21 non-members present. Benjamin Kazimier chaired and presided over the meeting. Steve Klecker recorded the minutes.

Alex Apostolov submitted the abstract for the Georgia Tech Relay Conference, and Taylor Raffield presented it in April, 2021. Taylor will present at the PSRC Main Committee meeting on May 6, 2021. Alex submitted the abstract last week for the Pac World meeting. Pac World will be virtual in August, 2021. Pac World is 15 minutes for the presentation and 15 minutes for questions. Some slides will need to be removed. Yuan Liao volunteered to present at Pac World. Steve Klecker submitted the abstract for the virtual MIPSYCON meeting in November, 2021, and it was approved. A new person is needed to present at the virtual Iowa-Nebraska System Protection and Substation Conference in October, 2021. Steve submitted the abstract for the Western Protective Relay Conference(WPRC), and Steve is waiting for the approval. As of now, the WPRC is scheduled to be in-person in Spokane, WA, October 18-22, 2021, and Steve has volunteered to present the paper. Taylor will update the spreadsheet for conferences for possible submission.

There was discussion that a transaction paper isn't allowed. It was decided to change to a summary paper. C36 will continue as a working group for the presentations. Fred Friend suggested that he discuss with Aaron Martin, the H Subcommittee Chair, about forming a joint C2/H2 working group. The H2 report is titled, "Protective Relay Applications using the Smart Grid Communication Infrastructure". It was agreed for Fred to do this.

Additional notes:
C36 will not meet for the PSRC in September, 2021. 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 summary 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 Fowler
Cigre – Grid of the future – organized by US National committee – Alex A.
IA/NE, October, 2021 – Volunteer Needed
MIPSYCON, November, 2021 – Steve K.
GA Tech – Presented by Taylor in April, 2021
Texas A&M – 2022 – Volunteer Needed
WPRC – October 18-22, 2021 - Steve K.
Pac World – August, 2021 - Yuan L.
APAP - Asia 2021– Alex A.
DPSP European developments in power system protection 2022– Alex A.
IEEE general meeting – Have to submit summary paper
IEEE T&D - Have to submit summary paper
PSRC Main Committee Meeting – Presented by Taylor, May, 6, 2021.

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

C-38: 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: 0.8
Expected Completion Date: February 2022
PAR Expiration Date: December 2022
Assignment: To create P2030.12, Guide for the Design of Microgrid Protection Systems

May 4, 2021 Meeting Minutes Online Meeting

Officer Presiding: Mani Venkata
Minutes Prepared By: Michael Higginson / Geza Joos

This meeting was an online meeting (WebEx). It was chaired by Chair S. S. (Mani) Venkata.

The meeting commenced at 3:30 PM central time. There were 72 attendees, with 24 voting members, 9 non-voting members, and 39 non-members. Quorum was met.

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

Minutes for the last meeting 12 January 2021 were reviewed. Sukumar Brahma moved to approve the meeting minutes. The motion was seconded by Jim van de Ligt, and the minutes were approved by the working group without opposition.

The working group reviewed the agenda for this meeting. Fred Friend moved to approve the agenda. The motion was seconded, and the agenda was approved by the working group without opposition.

Mani Venkata started the meeting 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, the PAR expires December 2022; (c) all writing assignments have been completed, except for a few outstanding issues to be resolved in meetings between now and September 2021, see action items at the end of minutes; (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 requirements and process for submission to the IEEE SA Mandatory Editorial Coordination, to follow; (f) the IEEE SA balloting process would begin in early 2022 after approval of the guide by the appropriate bodies within PSRC.
The working group reviewed progress on the draft guide, examining all sections in order. Updates and discussion, and commitments and action items were as follows:

- Section 4:
    - The question of the connection point to the distribution was revisited; the following were considered: PCC, commonly used for DER as in IEEE Std 1547, and for industrial installations as in IEEE Std 519; POI, as used in IEEE Std 2030.7, Standard for microgrid controllers. Since P2030.12 is a guide on microgrid protection, and is based on information contained in IEEE Std 2030.7, it was agreed to use POI in this guide, text and figures, in reference to the operation of the microgrid controller interaction with the grid, and to use PCC wherever it is appropriate or called for in relation to applicable guides, recommended practices and standards referring to the PCC.
- Section 5:
    - This section is accepted by its lead author and considered complete.
    - **Action Item:** Jim van de Ligt will resolve comments remaining.
- Section 6:
    - Updates have been made since the last meeting by Mike Bloder and others. These updates were shared with the working group. This section is accepted by its lead author and considered complete, except for the addition and removals proposed, see below.
    - A discussion was added on self-healing feeders, given that the reconfiguration will impact the microgrid protection system design and operation.
    - **Action Item:** Sebastien Billaut to propose justification for voltage withstand requirements to address Jim van de Ligt's comment.

- The paragraph on communications (6.6) is removed. The required information is presented in other sections.

- Section 7:
  - Updates have been made since the last meeting by Matthew Reno and were shared with the working group. This section is considered complete by the lead author (Matthew Reno), except for the items mentioned below.
  - **Action Item:** Black Start, Section 7.1.3, will be completed by Michael Higginson, coordinated by the lead author.
  - **Action Item:** Fernando Calero proposed contributions on inverter-based fault current section (7.3). He will propose revisions to the section to Matthew Reno.
  - The working group discussed section 7.4 on relay interoperability and what was intended for this section. Questions were raised regarding what was needed to interoperate with.
  - **Action Item:** Relay interoperability, Section 7.4, will be completed by Neil Shepard.
  - The working group discussed Impacts of Microgrid Control Strategy on its Protection, Section 7.5. This section includes some information that is duplicated with other sections in the Guide.
  - **Action Item:** Matthew Reno will remove duplicate components from section 7.5, integrate high-level text with section introduction, and connect with transitions.
  - The working group discussed contributions from Lalitha Devarakonda and Mohammad Zadeh to FLISR, Section 7.6. It is mentioned that the microgrid controller is involved in the reconfiguration process.
  - **Action Item:** Yuan Liao, Lalitha Devarakonda, and Mohammad Zadeh will propose how to integrate their contributions and provide a recommendation to Matthew Reno.
- Section 8:
  - This section is complete. Some of the contents of Annex B was moved to this section.
- Section 9:
  - This section is considered complete and is accepted.
- Section 10:
  - This section is considered complete and is accepted.
- Section 11:
  - This section is removed. The information is included in Section 5, among others in Section 5.3.4.
- Section 12:
  - This section is removed from the body of the guide and moved to an annex, Annex C. The discussion was refocused on the impact of the microgrid operation on the protection devices installed in the distribution grid. Annex C is an edited version of the old Section 12.
- Sections 13 and 14:
  - These sections are considered completed.

Individual commitments and action items should be completed within one month. The revised document will be circulated with contributions integrated.
It is proposed to hold a short 1 hr meeting once a month to resolve the outstanding issues and finish the review of the complete document by end of September 2021, or at the latest December 2021.
The mechanism for obtaining approval from the main committee, allowing the formal IEEE SA ballot to be initiated, will be established by the Chair.

The next regular meeting is planned for Jan 2021 PSRC Committee meeting (JTC meetings).
Geza Joos moved to adjourn, Ward Bower seconded the motion, and 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: February 2019
Expected Completion Date: December 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.

Working group C-39 did not meet during this meeting.

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: January 2020
Expected Completion Date: December 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.

Working group C-40 did not meet during this meeting.

C-41: Investigate performance requirements for Distribution PMUs
Chair: **K. Martin**
Vice Chair: N. Perera
Secretary: D. Gurusinghe
Output: Technical Report
Established Date: May 2021
Expected Completion Date: TBD

Assignment: WG C41 will prepare a technical report on the measurement performance needs and requirements for PMUs that are intended for use in distribution systems. This will include examination of the measurement environment, detailing the data requirements of phasor based distribution applications, and supporting liaisons with other groups working with synchrophasors in the distribution environment including other IEEE TC's, NASPI, NERC, and IEC.

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liaisons with other groups working with synchrophasors in the distribution environment including other IEEE TC's, NASPI, NERC, and IEC.

Working Group C41 met on Tuesday, May 04, 2021 at 9:10am (CDT) with 36 participants (13 M, 23 G)via WebEx. Ken Martin (Chair) welcomed participants and briefed the objective of the WG, which is described in the assignment above.

Paolo Romano provided a presentation on "*Enabling the energy transition with a breakthrough smart grid solution*". In his presentation, Romano pointed out distribution PMUs communicate via 4G public network, GNSS signals in distribution systems are not reliable, and often monitoring and automation in distribution systems are poor compared to transmission. He also discussed use cases for monitoring, analytics, SCADA integration for improved observability, fault location and restoration, and intermittent fault location. As the presentation contained more commercial material than is allowed for IEEE PSRC meetings, Paolo was asked to complete the presentation after removing the excessive company material. It was also noted that it would be more helpful to the WG to have more specifics on the data requirements of the described applications.

Sukumar stated state estimation in distribution systems is a challenging research problem due it's highly unbalance nature. Allen pointed out state estimation is an important application for distribution systems and suggested to add it as a use case for distribution PMUs. Ken pointed out SE is not an end use application but rather an application to extend and improve the PMU data for use in other applications. Harold agreed that state estimation can be used for distribution, but the information regarding angle is not useful in the way it is used in transmission. An angle of a few degrees between two parts of the low voltage system would be enough to cause a large circulating current if it is made a parallel on the low side. The angle down a line is not important to know to determine the power flow. Unfortunately, the small angle gets across a predominantly resistive line is lost under the noise.

Mario mentioned providing additional sensing points will increase observability in distribution systems. Allen added distribution systems have special requirements in particular angle accuracy. Ken pointed out it is not reasonable to specify PMU requirements/error limits based upon a few special applications.

Mario agreed to share distribution PMU data/use cases that illustrate type of uncertainties in synchrophasor measurements.

Ken will circulate a notice to set our next meeting, proposed for early June via WebEx.
Recorded by Dinesh Gurusinghe, updated by K. Martin

C-42: Write A Summary Paper for C37.250 Guide for Engineering, Implementation and Management of System Integrity Protection Schemes

Chair: Gene Henneberg
Vice Chair: Yi Hu
Output: Summary Paper
Established Date: September 2020
Expected Completion Date: December 2022
Draft: 0
Assignment: Write a conference paper summarizing the new C37.250 Guide for Engineering, Implementation and Management of System Integrity Protection Schemes.

Working Group C-42 met in web session on May 4, 2021 beginning at 1:10 pm CDT with 22 attendees. WG Chair Gene Henneberg started the meeting by describing the objective of the WG to meeting attendees, overview the status of the paper preparation work since January meeting. Gene reported that several web meetings were held after the January meeting and informed the attendees that he has submitted an abstract for the 2021 WPRC meeting, for which an initial response has been received.

Gene led the discussion as to how to answer several questions in the WPRC's initial response. WG attendees made and Gene took note of several suggested answers to WPRC questions. Since WPRC is relaying and protection focused, the paper and the answer to WPRC should also be similarly focused in relaying and protection. Gene will revise and clean up the draft answers before replying to WPRC.

The WG discussed the plan to work on the paper after this meeting. It was decided to hold regular bi-weekly calls on Fridays at 11 AM PT starting on May 14, 2021 and Gene will send meeting invite to WG members who have volunteered to work on the paper. Some WG members did not receive meeting invite for meetings held between January and May, Gene will check on this when sending the new meeting invites.

Gene then led the review of the status of the current draft paper and discussed the paper presentation slides preparation plan. The webinar slides deck created by Gene and Yi for a webinar last year will be used as the starting point for drafting the paper presentation slides.

Meeting adjourned at 2:10 pm CDT.

Meeting minutes by Yi Hu 05/04/2021.

The next Working Group meeting is scheduled in conjunction with PSRC meeting in September 2021.

Avoid conflict with PSRC B2/PSCC A2TF, PSRC B1, B10, CTF41, C23, C43 and AdCom sessions and PSCC P8TF, P9 and P10 sessions

C-43: Artificial Intelligence and Machine Learning technologies for power system protection and control applications

Chair: **Yi Hu**
Vice Chair: **Adi Mulawarman**
Output: **Report**
Established Date: **January 2021**
Expected Completion Date: **December 2022**
Draft: **0**
Assignment: 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.

Working Group C-43 met in double WebEx session on May 5, 2021 with 85 attendees. Yi Hu and Adi Mulawarman presided the meeting. 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 Working Group chairs.

Chair briefly reviewed WG C43 assignment and proceeded with the following presentations proposed at the January 2021 meeting:

- Neural network for High Z detection – Alex Apostolov
- AI on detecting challenging fault, incipient fault – Daqing Hou
- AI to detect secondary arc-extinction – Jorg Bluemschein
- Use of synchrophasor and AI/ML to detect Voltage Instability – Athula Rajapakse

- Challenges of AI/ML implementation – Sukumar Brahma
- Controlled Islanding with AI method – Ramakrishna Gokaraju

After the presentations, Chair made a call for participation and contributions in four areas of the report which received responses from the following volunteers:

a. Recommend or write an AI/ML primer that engineers with no background in the field can read and understand – Zach Makki, Athula Dayanart Rajapakse
b. Collect bibliography – Matthew Reno
c. Contributions to challenges section – Sukumar Brahma
d. Recommend applications to be included in the report – Daniel Sabin, Zach Makki, Athula Dayanart Rajapakse

Chair also made a call for joining the WG C43 as members. Those responded to the call has been added to the Member Sign-Up List.

The WG proceeded to review and discuss the initial contributions to the first two sections made by the writing team:

- Introduction: Jayaprakash Ponraj
- Scope: Jayaprakash Ponraj, Abder Elandaloussi, Juan Piñeros, Athula Dayanart Rajapakse

The writing team for these two sections will update the current draft based on the discussion at the meeting and send the updated draft to WG Chair and Vice Chair by 5/14/2021 for distributing it to C43 attendee for further comments and suggestions.

Chair informed the meeting attendees that a request has been made to setup an iMeet Central account for C43 writing team to share the draft documents. Chair will inform the WG once this has been setup.

Chair and Vice Chair will follow up on the contributors signed up for the four areas to start work on these areas.

Meeting adjourned at 12:30 PM CST.

Next meeting: Single session to be held in conjunction with PSRC May 2021 virtual meeting.

Avoid PSRC B1, CTF41, C42, K18, D47/DTF47, D39, and D42, PSCC P9 and P10, and PSRC B2/PSCC A2TF

C-44: Prepare a Summary Paper for IEEE Transactions on Power Delivery Based on the Contents of the Report Prepared by the C24 WG "Modification of Commercial Fault Calculation Programs for Wind Turbine Generators"

Chair: **Sukumar Brahma (Clemson University)**
Vice Chair: **Evangelos Farantatos (EPRI)**
Output: Summary Paper
Established Date: May 2021
Expected Completion Date: January 2022
Draft: N/A
Assignment: Prepare a Summary Paper for IEEE Transactions on Power Delivery Based on the Contents of the Report Prepared by the C24 WG "Modification of Commercial Fault Calculation Programs for Wind Turbine Generators"

C44 met virtually from 2:20 to 3:20 pm CST on Monday, 5/3/2021 with 27 attendees.

The group discussed a draft of the paper based on contributions that were received prior to the meeting by Dean Miller, Sherman Chan, Yazid Alkraimeen and Mohammad Zadeh.

The following were discussed during the meeting:

- The paper sections, including the figures, should be different compared to the C24 report or other references e.g. website material
- The target length of the paper is 8 pages
- Each vendor section should be around 1 page (IEEE 2-column format)
- The vendor sections in the paper will be listed alphabetically based on the tool name

Based on the above, updated contributions were requested by end of May. Sukumar and Evangelos will collect and compile all contributions and send the paper for review to all WG members by end of July.

The WG will need a room of 30 with a computer projector (in case of physical meeting).
Please avoid conflict with C38, CTF34, C45, B10 and C25, in that order.

C-45: Protection and short-circuit modeling of systems with high penetration of inverter-based resources

Chair: Ali Hooshyar
Vice Chair: Manish Patel
Output: Report
Draft: N/A
Established Date: May 2021
Expected Completion Date: December 2024
Assignment: To prepare a technical report to investigate short-circuit modeling and protection of systems with high penetration of IBRs as a continuation of the works of WGs C32 and C24

This was the first meeting of WG C45. The chair provided some background for the working group – this effort will cover more than tie-line protection and in systems with higher penetration of IBRs. Fred Huang and Manish Patel presented in the CTF45 meeting which resulted in the formation of C45.

The working group had excellent engagement and discussions on several items.

- Sukumar suggested a change in the title to include “transmission”. Deal Miller questioned why this addition is required. **Ali** to update the title/assignment to include the word “transmission” based on following discussion as applicable.
- The chair explained the different sections in the first tentative draft of the table of contents for the report. There was some discussion on phasor domain vs time-domain modeling language.
- There were some discussions on Section 2. The heading was slightly modified to not suggest that we are going to a low inertia. The was a subsection on Critical Clearing Time added. Sherman provided an example from Spain where they added control to improve system inertia. Rich provided some discussion on elements that can be provided in IBRs that can combat that based on controls. ROCOF is one of the main considerations.
- Mike Thompson brought up that Section 3 is probably a very important section in the report. Evangelos talked about improved models and other items. Sukumar pointed out convergence

issues are an important item; a bullet was added on whether the convergence still applies with high penetration. Mike Jensen agreed saying convergence issues for higher penetration is a big item. **Rich** will review Section 3d "Effect of wind and solar intermittency and its impact on short circuit studies" once written. There was further discussion on how Section 3 is very important.

Several individuals volunteered for assignments and will become voting members:

- Section 1: Ali Bidram, Ali Hooshyar, Ilhan Kocar, Steve Miller, Matthew Reno, Mehrdad. Yuan Liao volunteered for Section 1.a.
- Section 2: Allen, Sumit Paudyal, Bonian Shi, Ali Bidram
- Section 3: Steven Miller, Sukumar, Evangelos, Kamal, M. Ropp, Aboutaleb, Lynn Schroeder, Athula, Sebastien, Matthew Reno, Aboutaleb, Looja will contribute to Section 3. Lingling will contribute to Section 3c on "IBR time-domain model vs phasor-domain models".
- Section 4: Kamal, Deepak, Ali Bidram, Mukesh, Jason, Charles Adewole, Sebastien, Steve Miller, Zhiying, Bonian Shi
- Section 5: Jason, M. Ropp, Steve Miller
- Section 6: Lingling, M. Ropp, Ilhan Kocar

There were several others who requested membership and became voting members.

Next meeting:

Single session. If virtual, capacity for 100. If physical, a room for 60 and a projector.
Request no conflict with D39, J18, J19, and I38.

CTF46: Study the drafting of a summary paper of C37.242: Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control

Chair: **Allen Goldstein**
Vice Chair: **TBD**
Secretary: **N/A**
Output: **Recommendation to C Subcommittee**
PAR and PAR expiration: **N/A**
Established Date: **May 2021**
Expected Completion Date: **Sept 2021**
Draft: **N/A**
Assignment: Study the drafting of a summary paper of C37.242

Meeting Date and Time: Web-Meeting, On May 05, 2021 at 3:30pm CT

Attendance: 24 members, 1 guest

Call to order

Officer presiding: Allen Goldstein
Officer recording minutes: Allen Goldstein

Quorum was reached. This is the first meeting so there were no prior minutes to approve

Call for Patents: N/A

Summary of Activities and Discussions

Because this is the first TF meeting, all attendees are automatically made into voting members.

Continued discussion from C28 meeting:

The discussion from the previous C28 meeting was reviewed:
The goal of this task force will be to develop and publish a paper (approx. 8 pages long)
Any volunteers to work on this paper?
Ken Martin volunteered
Jiecheng Zhao volunteered
Deepak Maragal asked a clarifying question about the nature of the paper
Deepak Maragal volunteered
Gustavo Brunello volunteered
Mahendra Patel volunteered
Mahendra Patel asked about whether the paper needed to be constrained to the guide
Suggestion (by several) that the paper can include "future work" in this paper
Bonian Shi volunteered
Erin Jessup volunteered
Allen Goldstein affirmed that people who are not authors of C37.242 are welcome to participate
Prasad Shrawane volunteered
Fred Friend clarified that everyone's email is included in 123.
Murty Yalla clarified that Allen Goldstein should receive a detailed attendance list, if not follow-up with Fred to get one
Jayaprakash P. volunteered (call me JP)
Dinesh Gurusinghe (RTDC) volunteered
Where will we target publication? (We will repeat the discussion in the next session.)
It was previously common practice to publish a summary paper of a new standard in IEEE transactions. But recently this has been more arduous.
We should create a list of target publications for this summary paper.
Deepak Maragal: some transactions papers require new content. But there is a category of transaction papers called "practice papers", articulating what implementers and end-users encounter, and explaining the context for how this guide can be useful. The abstract should convey this aspect of a paper. Murty Yalla clarified that there needs to be new content in the summary paper beyond what IEEE has already published.

Continued discussion in CTF46

Ken Martin: May take a year or so.

More possible conferences:
- Western protective relay conference (Spokane)
- TAMU conf.
- PES General Meeting

Should we target only IEEE XPLORE listed?
- Gustavo: We should target a wider audience. By default, it will appear in XPLORE.

- Other consortiums NASPI, GPST (?).

would not be listed in Xplore

Deepak mentioned "practice paper" is what a transactions paper would need to be
it still needs some new content and cannot plagiarize the guide

IEEE University is another possible outlet

Tutorial - IEEE online tutorial. (e.g. upcoming Tutorial in July)

PES Technical Report?

Volunteers: Peiman Dadkhah.

When do we become a working group?
Allen: let's meet monthly and decide on our output and target publications type.
Also decide on Chair and Vice Chair.

Jeff Dagle:
Perhaps we can start with the transactions paper as a first proposal, then conf paper next...
Explore the options.

Tradeoffs are:
the amount of work and time required for Conf. paper
if we go over 8 pages transactions need to be paid for additional pages

Do we want a presentation for PSRC main meeting (Sep 21) or NASPI meeting in October 21?

Adjourn at 4:30 CDT

Post note: To control membership size, the chair has asked members to opt-in via email response.

Next Meeting:
Same time slot, Room for 30 people (if in-person).

D: LINE PROTECTION SUBCOMMITTEE

Chair: Bruce Mackie
Vice Chair: Meyer Kao

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, January 14, 2021 from 09:10 to 10:10 AM CST.
- 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 35 members and 49 guests. Quorum was met.
  New Line Protection Subcommittee Members: Sebastien Billaut and Greg Ryan
- Minutes from the September 2020 virtual meeting were approved - motion made by Adi Mulawarman and seconded by Steve Conrad.
- Agenda for the D Subcommittee January 2021 virtual meeting was approved - motion made by Phil Winston and seconded by Sebastien Billaut.

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)
- Reminder of Meeting Minutes format for 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
  - 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): www.pes-psrc.org
- 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 - https://www.pespsrc.org/psrcsharefile.html
  Russ Patterson discussed the who can access and how WG Chairs can share files with members and guests of WG
- New Style Manual Published in 2020
- Reminder to apply for Senior Membership in IEEE
- New Templates Approved for O&P and P&P

- Attendance 432 with 64 first timers
- Future Meetings
  May 3-6, 2021 – Virtual
  Future Meetings TBA
- The PSRC is international and open to anyone who cares to attend.
  Russ Patterson discussed there is an 800 member "PSRC China Satellite" group that was to be inserted into the PSRC structure. However, in November 2020 the PSRC leadership (and many others in sister committees) voiced concerns over this disruption of our existing committees. The PES Technical Council then voted against inserting satellite committees into existing technical committee structures. The PSRC officers stressed that PSRC is already open to anyone who wants to attend.
  In chat of this Virtual meeting, Jonathan Sykes stated: The PES Governing Board is aware of the requests coming out of China in respect to satellite councils and the technical council and the GB are addressing the questions and concerns. China and region 10 are some of our fastest growing regions in the PES.

IEEE Standards Documents currently involved with WGs in D Subcommittee

Number	Approval Date	Name
C37.113	2015	Guide for Protective Relay Applications to Transmission Lines
C37.114	2014	Guide for Determining Fault Location on AC Transmission and Distribution Lines
C37.143	2015	Guide for Application of Digital Line Current Differential Relays Using Digital Communication
C37.104	2012	Guide for Automatic Reclosing on AC Distribution and Transmission Lines
C37.230	2007	Guide for Protective Relay Application to Distribution Lines Working groups gave reports on their activity

Reports from the WG Chairs:

D28: Review of C37.230 Guide for Protective Relay Applications to Distribution Lines
Chair: Brian Boysen
Vice Chair: Claire Patti
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 Chair request the WG to be opened until publishing of the document is complete.

D29: Tutorial for Setting Impedance-Based Power Swing Relaying on Transmission Lines
Chair: Kevin 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 16 voting members, 6 non-voting members and 36 guests (58 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, January 11, 2021 at 1420 CST. Kevin led the review of the minutes from the September virtual meeting, then asked for a motion to approve. Jörg Blumschein motioned to approve, with second from Normann Fischer. As no objections were raised, the minutes from September were approved.

1) The chair gave an update on the test system and stated that the model is working well with up to 25% inverter-based resources (IBR's).
2) The chair reviewed the latest document (Draft 1_04) and update the attendees with respect to the changes made to the document.
3) The chair stated that the document is progressing well. New writing assignments were assigned with respect to:
    a. The introduction section will be reviewed by Melvin Joseph and Art Buanno.
    b. The Definitions section will be updated/expanded/reviewed by Abu Zahid.
    c. Section 3, "Power Swing Phenomenon", will be reviewed by Gopal Gajjar, Muhammad Hamid, Zhiying Zhang and Ramakrishna Gokaraju.
    d. Section 4, "Conventional Impedance Relay Power Swing Detection Methods", will be reviewed by Ramakrishna Gokaraju and Matchyaraju Alla.
    e. Section 7, "Conventional Impedance Relay Power Swing Settings Philosophy", will be reviewed by Qun Qiu, Muhammad Hamid, Kanchanrao Dase, Gopal Gajjar and Ramakrishna Gokaraju.
4) Manish Patel gave a presentation that asked the question "How should inverter based resources" be modelled /represented in out-of-step studies. Manish will write a couple of paragraphs to be considered for inclusion in the tutorial on the subject.

Kevin Jones adjourned the meeting at 1520 CST.

D30: Tutorial on Application and Setting of Ground Distance Elements on Transmission Lines
Chair: Karl Zimmerman
Vice Chair: Ted Warren
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 online at 2:20 PM on January 13, 2021 with 43 attendees, including 13 of 24 voting members. Thus, a quorum was established.

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 V-Chair Meyer Kao moderated the Chat window.

The Chair reviewed previous activities, including the Working Group title, output, and assignment. The Chair also reported that Draft 6.0 is available on the pes-psrc web site.

S. Billaut and Daniel Lebeau presented and discussed their write-up on the impact of CT saturation on distance elements. This included a proposed solution of adding timers to ride through a Zone 2 drop out during a fault. They also created some tables to show magnitude and angle errors based on CT saturation voltage and X/R ratio.

Ryan McDaniel and Jared Candeleria discussed some changes to Section 3.0 on Quadrilateral Element Design and Polarizing, including some comments to the existing section and an added section on how polarizing affects the tilt of the reactance line. There was some discussion on this section regarding different approaches used by different designers.

Meeting was adjourned.

D34: Coordination with IEC 60255-187-3 Functional Specification for Line Current Differential Requirements

Chair: Normann Fischer

Assignment: Coordinate activities with IEC 60255-187-3, Functional Specification for Line Current Differential Requirements.

Did not meet. The plan is to meet in September.

D35: Evaluation of Transmission Line Pilot Protection Schemes

Chair: R. Gamble

Vice Chair: Brandon Lewey

Assignment: Prepare a technical report to the line protection subcommittee to evaluate advantages and disadvantages of common transmission line pilot protection schemes, including step-distance, 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.

Working Group D35 met on Tuesday, January 12, 2021 at 8:00am remotely via WebEx with 20 members and 34 guests.

The WG discussed next steps in bringing the report to completion. A few pilot schemes will be added solely for discussion purposes. References and citations are being provided by the contributing members on their respective sections and figures within the report needs to be revised to follow PSRC Standard symbols. A separate meeting will be held to discuss the summary table with those volunteering to contribute.

Several assignments were made, some new and some old.

Draft 10 will be distributed to working group members for review.

For the next meeting, WG D35 will need a room for 40 and a computer projector, unless meeting remotely.

Action Items:

- Contributing Members – cite references in respective sections
- Scott Cooper – add a paragraph regarding Traveling Wave in Section 2
- Art Buanno – add a paragraph regarding PUTT Schemes in Section 2
- Contributing Members – finalize the Summary Table
- Rick Gamble – revise all diagrams to match PSRC Standards

D37: Impact of Series Compensation on Transmission Lines
Chair: M. Kockott
Vice Chair: Luis Polanco
Secretary: Nuwan Perera
Assignment: Prepare a report on the impact of fixed series compensation on transmission line protection.

D37 met as scheduled on Monday, 11 Jan 2020, 1.10-2:10 PM with 32 attendees (12 Members and 20 Guests).

Previous meeting minutes have been reviewed and approved.

WG reviewed the list of writing / review assignment. New/ revised Assignments Writing Assignments
Section 3.4: Bank unbalanced protection
- Provide a draft: Mukesh Nagpal

Section 5.2.1: Considerations for protection settings
- 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 6.2: Impact on faulted phase selection (distance vs current differential)
- Provide a draft: Jackie Wilson, Kanchanrao Dase, Athula Rajapakse

Section 6.3: Impact of system topology and operating configurations on fault location determination
- Provide a draft: Nuwan Perera Reviews Assignments

Section-3
- Normann Fischer

Section-4
- Mike Kockott

Section-5
- Nuwan Perera

Section-6.1
- Jayaprakash Ponra

Action items
- Volunteers to provide their feedback to Secretary: April 16
- Secretary to send the updated draft (1.05): April 23

With no further business, the meeting was adjourned.

Requirements for May 2021 meeting: single session, room for 25 attendees plus a projector (not applicable for WebEx meetings).

D38: Impact of High SIR on Line Relaying
Chair: Chris Walker
Vice Chair: Greg Ryan
Assignment: Prepare a technical report to the line protection subcommittee to evaluate the impact of high SIR on line protection.

64 total participates in attendance. 25 Voting Members, 10 Non-Voting Members, & 29 Guests.

Chris opened the meeting at 10:20AM CST. We approved previous minutes. Chris updated the group on where we stand with the current draft. We had 2 assignment turned in prior to today's meeting from Charles Sufana and Abu Zahid but those have not yet been incorporated into the current draft. Chris then went through the writing assignments and due dates.

Pratap spoke up and has written a paper that will help with this paper. Pratap will update pertinent sections based on that paper and other sections may benefit from review/rewrite based on that paper.

Bogdan also has written a paper that is waiting for peer review and then will send to Chris to help with this report as well.

Chris will incorporate the sections we have received recently and send out the latest draft to the working group within two weeks. All outstanding assignments are due by 4/1/21 to be incorporated prior to the May meeting.

Volunteers
Taylor Raffield volunteered to review a section as needed.
Melvin Moncey Joseph volunteered to review a section as needed.
Alla Deronja volunteered to review a section as needed.
Josh Lamb volunteered to review a section or the paper as a whole.
Karl Zimmerman volunteered to review any section or overall.
Romula Bainy volunteered to review any section.
Femi Oyebanjo EM relay review and other sections as needed.
Pratap and Rick will work on writing Operating Speed and Electromechanical Relays Section.
Steve Klecker volunteered for the Line Differential Section.
Nabil El Halabi Fares Volunteer for Application Example Section

Chris will organize the volunteers that agree to review sections as needed and let them know which sections require review. After discussing the report outstanding sections and volunteers Chris adjourned the meeting.

D39: Revise C37.104 IEEE Guide for Automatic Reclosing of Circuit Breakers for AC Distribution and Transmission Lines
Chair: Manish Patel
Vice Chair: Brandon Armstrong
Assignment: Revise C37.104 Guide for Automatic Reclosing of Line Circuit Breakers for AC Distribution and Transmission Lines.

The working group met via a conference call on January 12th, 2021 at 9:10 am CT with 22 members and 53 guests. Quorum was met (based on attendee list provided by webex meeting log). The meeting minutes for September 2020 were approved.

Presiding Officer – Manish Patel
Meetings recorded by – Manish Patel

In November 2020, the Chair had asked the voting WG members to review and vote on draft 1.1. The chair clarified that the WG vote was requested to approve to move the draft standard to the sponsor for IEEE Standards Sponsor Ballot. The chair noted that 23 out of 34 voting members casted vote. Results are noted below:

Approve – 12 votes
Approve with comments – 9 votes
Disapprove with comments – 2 votes

In summary, majority of voting members responded and more than two-thirds of responders casted vote to approve/approve with comments. The WG plans to review and resolve comments in upcoming months via web meetings (to be arranged by the Chair).

The WG used rest of the meeting time to review received comments and revised following definitions. Manish Patel via Addis Kifle will send revised definitions to the I2 WG for review and feedback.

autoreclosing: The closing of an interrupting device in order to restore a~~n~~ power system element to service following an automatic tripping of that device. ~~Autoreclosing does not include automatic closing associated with shunt or series capacitor banks or shunt reactors.~~

delayed autoreclosing: Refers to autoreclosing of an interrupting device ~~circuit breaker~~ after a time delay that is intentionally longer than that for high speed autoreclosing.

high-speed autoreclosing: ~~Refers to the autoreclosing of a circuit breaker after a necessary time delay to permit fault arc deionization with due regrard to coordination with all protective systems. This type of autoreclosing is generally not supervised by voltage magnitude or phase angle.~~ A type of autoreclosing that has minimal time delay to allow for fault arc deionization and to acheive the fastest possible restoration time.

D42: Revise C37.113, Guide for Protective Relay Applications to Transmission Lines
Chair: Jeff Barsch
Vice Chair: Rick Gamble
Secretary: Josh Lamb
Assignment: Revise C37.113-2015, IEEE Guide for Protective Relay Applications to Transmission Lines

a) Officer presiding – Jeffrey Barsch, Rick Gamble, and Josh Lamb
b) Officer recording minutes – Josh Lamb
c) Call to order – Jeff Barsch
d) Chair's remarks – Covered the IEEE Code of ethics, IEEE SA Copyright policy, Patent slides
e) Results of call for quorum – Quorum Achieved 30 of 43
f) Approval of Agenda (motion and second) – Daniel Lebeau Motioned to approve Sebastien Billaut second. Agenda approved.
g) Approval of Minutes of previous meetings (motion and second) – Alla Deronja Motioned to approve, Steve Conrad Second. Minutes approved.
h) Brief summary of discussions and conclusions including any motions.

a) Reviewed list of Writing assignments (complete by April 15th send comment via new document)
    i. iMeet central is set up.
    ii. Section 6.6 (Multiterminal line protection) – Sebastian Billaut, Kamal Garg, Jim van de Ligt, Pratap Mysore, Qun Qiu, Vamsi Vasireddy; assigned Qun Qiu as lead
    iii. Section 6.7.2 (Load encroachment and loadability) – Abu Bapary, Rafael Garcia, Steve Klecker, Alexis Mezco; assigned Rafael Garcia as lead
    iv. Loss of potential overcurrent scheme – Daniel Lebeau
    v. Section 6.5 (Ground directional polarization) – Jorg Blumschein, Madhap Paudel, Karl Zimmerman – lead not assigned
    vi. Long Radial Taps – Taylor Raffield, Chris Walker; assigned Chris Walker to lead
    vii. Dual element spot network – Abu Zahid
    viii. Section 6.2 (Enhance zone 2 protection section) – Alla Deronja, Nathan Gulczynski, Federico Lopez, Abu Zahid; assigned Nathan Gulczynski to lead
    ix. Resistive Reach for Ground Quadrilateral Distance elements – Sebastian Billaut, Daniel Lebeau; assigned Daniel Lebeau to lead
    x. Section 5.10 (parallel lines feeding a load) – Silviu Boanta, Arun Shrestha, Abu Zahid; assigned Arun Shrestha to lead
    xi. Section 5.2 (SIR and voltage discrimination) – Chris Walker
    xii. Torque and voltage control for phase time overcurrent relays – Jeff Barsch, Steve Conrad, Ilia Voloh; assigned Ilia Voloh to lead
    xiii. Figure updates – Steve Conrad, Charlie Sufana, Walter McCannon; assigned Walter McCannon to lead
    xiv. 4.1 – 4.5 - Mohammed Hamid, Femi Oyebanjo to review
    xv. 4.6 – 4.8 – Alla Deronja, Nabil El Halabi Fares, Don Lukach to review
    xvi. 5.1 – 5.5 – Kamal Garg, Onur Usmen to review
    xvii. 5.6 – 5.8 - Jim O'Brien, Chris Walker to review
    xviii. 5.9 – 5.13 - Mike Kockott, Ilia Voloh to review
    xix. 6.1 – 6.2 – Brandon Lewey, Bruce Mackie to review
    xx. 6.3 – Rick Gamble, Hardesh Khatri to review
    xxi. 6.4 – need a volunteer to review
    xxii. 6.7 – need a volunteer to review
    xxiii. 6.8 – 6.9 – Jorg Blumschein, Mike Kockott to review
    xxiv. – 6.11 – need a volunteer to review
b) Ilia Voloh and Kamal Garg suggested that more information should be added regarding subsynchronous resonance and how it affects line protection.
c) Use of Loss of Potential Overcurrent Protection presentation by Ted Warren

i) Motion to Adjourn – Sebastien Billaut First, Second – Abu Zahid

D43: Effect of Distribution Automation on Protective Relaying (Report)
Chair: Greg Ryan
Vice Chair: TBD
Assignment: Update the technical report "Effect of Distribution Automation on Protective Relaying".

Working Group D43 met virtually on January 13, 2021 at 09:10-10:10AM CST. There were total of 28 attendees in the meeting, 17 members and 11 guests.

Meeting Agenda

1) Introductions/Sign-up sheet/roster
2) Review Working Group Membership and Membership Process
3) Discuss status and assignment of report
4) Discuss updates to report
5) Discussion of next steps
6) Adjourn

Summary of Meeting Discussion

a) Since the attendee list was available and, to save time, no formal introduction was done. The meeting started with the review of September 2020 minutes.
b) The current Roster includes all the guest who attended the TF meeting as the member. Membership continuity will be treated similar to PAR-related activities (2 attendance out of last 4 meetings).
c) The scope of assignment was created based on the discussion on September meetings with the proposed additions by members (distance protection application in distribution systems, telecommunication requirements, DTT for DERs, microgrids, etc.). It was also agreed to first revise report and then investigate the possibility of creating a guide.
d) It was discussed to start with the current report structure and identify the list of items to be added to the outline. Subsequently, the outline will be revised as a whole.
e) Matthew B. mentioned that Annex B has some related information to Sections 2.1 & 2.2 (History Section)
f) The Chair went through the existing report, and a list of volunteers to review various sections was created (task assignment).
g) Don L. recommend that all reviewers be Cognizant of the language to be used in creating this report. The suggestion was to use the same language as guide and PAR-related documents. There is a presentation on the knowledge-based section of the PSRC website with examples (https://www.pes-psrc.org/kb/PAR%20Word%20Use.pdf).
h) Reviewer to send their comments/revisions to officers by April 1, 2021.

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 15:30CT with 62 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 Vice Chair Meyer Kao moderated the Chat window.

The Working Group D44 attendees, included 19 out of 35 Voting Members present, so a quorum was established.

The Chair presented inquired about voting to approve the minute of the September 2020 meeting. The Mike Bloder moved to approve and James O'brien was second there was no opposition to approving the minutes.

The Chair then reviewed the assignment list and tentatively all were set with a may 2021 deadline.

The Chair then presented the 3 contributions that are posted on imeet.

- Yu liu and Yuan Liao provided review on the section 4 and 7 of the existing documents. Other reviewers were invited to add their comments to their comments.
- The next contribution was from Yuan Laio and was related a variation of the 2 ended method based on negative sequence quantities which did not require knowledge of the line impedance.
- The last contribution was also from Yuan Laio was related to microgrid and traveling wave fault location for one.

Both the later contribution generated discussion on whether they belonged in a guide: Several WG members, including Ritwik Chowdhury and Mohammad Zadeh, expressed that a guide should include methods that are applied or practiced in actual power systems. Karl Zimmerman suggested there may be a place for new or developing approaches under "other technologies" the consideration appeared to be accepted. The Chair left the discussion open ended for a later resolution.

There was a discussion involving using Fault Circuit Indicators and communications to identify a faulted section of a distribution line.

Karl Zimmerman presented a spreadsheet for processing the calculation of the 2 ended method.

Tony Seegers motioned to adjourn, he was seconded by Daniel Sabin, with no opposition the meeting was adjourned.

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

Chair: Bruce Mackie

Assignment: Make a recommendation to the D subcommittee whether to form a working group and if the recommendation is to proceed, to develop a recommended assignment for the D subcommittee to consider.

Task Force DTF45 met virtually on Tuesday, January 12, 2021 at 2:20pm CDT in a single session with 72 attendees. All attendees were considered members of this task force.

Minutes of the September meeting were approved upon motion of Jonathan Sykes and second by Jalal Gohari after one spelling correction. The presentations from the previous meeting were summarized.

A discussion ensued regarding IEEE agreement to perform a legal review of the document when a draft is completed.

Upon motion by Normann Fischer and second by Joe Xavier, the task force approved the recommendation to the subcommittee to form working group D45, Protection Methods to Reduce Wildfire Risks due to Transmission and Distribution Line. Upon motion by Mike Messinger and second by Normann Fischer, the task force approved the following proposed assignment for the working group: Prepare a technical report to the line protection subcommittee to document protection methods used to reduce wildfire risks due

to transmission and distribution lines. The chair of the task force stated two volunteers have been selected to lead the working group. The chair will be Jonathan Sykes and the vice chair will be Scott Hayes.

Jonathan Sykes and others discussed the benefits of the paper.

Based on the recommendation of the DTF45, a new working group is to be formed, with motion by Alla Deronja and seconded by Jorg Blumschein. The motion passed. The assignment of the working group will be "Prepare a technical report to the line protection subcommittee to document protection methods used to reduce wildfire risks due to transmission and distribution lines"

The new D45 working group will be chaired by Jonathan Sykes with Scott Hayes being the Vice Chair.

DTF46: Create a summary paper on C37.230 Guide for Protective Relay Applications to Distribution Lines
Chair: Brian Boysen
Vice Chair: TBD
Assignment: Make a recommendation to the D subcommittee whether to form a working group and if the recommendation is to proceed, to develop a recommended assignment for the D subcommittee to consider.

- The task force (TF) met via web meeting on Wednesday January 13, 2021 10:20 am CST.
- There were 22 people in attendance. Attendance list attached in a separate file.
- The Agenda was presented.
- The TF discussed the status of IEEE37.230-2021 which was approved in December and is currently going through technical revision by IEEE with a tentative issue date in Mid March 2021.
- The TF recommended forming a working group with an assignment to develop a Working Group (WG) to write a summary paper for IEEE 37.230-2021. The specific assignment recommended by the working group is "To develop a summary paper for IEEE C37.230-2021, "IEEE Guide for Protective Relay Applications to Distribution Lines". 11people volunteered to become members of the new working group.
- The TF reviewed the IEEEE 37.230-2007 summary paper which could be used as a starting point for the IEEE 37.230-2021 summary paper.
- The following people volunteered for writing sections for the new Summary Paper. Assignments are due 4/1/2021. Word format is fine.:
    - Brian Boysen: Section 1: Introduction
    - Patrick Carroll: Section 2 (Clause 4 from IEEE C37.230) : Fundamentals
    - Bruce Mackie: Section 3 (Clause 5 from IEEE C37.230) : System Configuration and Components
    - Juan Gers: Section 4 (Clause 6 from IEEE C37.230): Protective Schemes
    - Qun Qiu: Section 5 (Clause 7 from IEEE C37.230): Criteria and Examples
    - Josh Lamb and Brian Boysen: Section 6 (Clause 8 from IEEE C37.230): Special Applications
    - Brian Boysen will compile writing assignments into the proper Summary Paper Template which is believed to be the IEEE PES Technical Paper format which will be confirmed by Bruch Mackie.
- Assuming a Working Group is formed, the working group will meet for its first meeting at the May 2021 PSRC Meeting. Request is for a single session.

Based on the recommendation of the DTF46, a new working group is to be formed, with motion by Brian Boysen and seconded by Charlie Sufana. The motion passed. The assignment of the working group will be "Create a summary paper on C37.230 IEEE Guide for Protective Relay Applications to Distribution Lines"

The new D46 working group will be chaired by Brian Boysen.

DTF47: Investigate the need to revise C37.243 IEEE Guide for Application of Digital Line Current Differential Relays Using Digital Communication
Chair: Alla Deronja
Vice Chair: TBD
Assignment: To investigate a need for revision of the IEEE Guide C37.243 and make a recommendation to the D subcommittee.

The SC D Task Force 47 met with 55 participants on Wednesday, January 13, 2021, at the winter virtual PSRC meeting.

The chair explained the purpose of the task force and presented an agenda for the meeting. The original version of the guide considered for revision was published in 2015 and will become inactive in 2025.

The task force reviewed the guide's Scope and contents. There is presently no purpose in this guide.

The chair presented possible additions and revisions that may be considered in the future revision of the guide such as adding a line current differential (LCD) function based on the Travelling Wave method and restructuring Clause 6 Communication scheme design to make it more user-friendly for protection engineers with little or no experience in communications.

The TF participants brought additional topics such as PMU-based LCD protection schemes, expanding on a topic of non-conventional instrument transformers such as Rogowski coils used for LCD, and adding material on utilizing the current differential function for networked distribution lines.

Based on these ideas, the task force concluded a revision of the guide should be made. Then, the task force reviewed the title and the scope of the guide and, also, proposed a purpose that was crafted from the introduction to the guide and modified.

It appears there is a significant interest among the TF participants to support this project as members of the future working group. The task force agreed to meet again at the PSRC May 2021 meeting to finalize the revision guide's title, scope, and purpose.

The assignment of the future working group will be to revise C37.243 IEEE Guide for Application of Digital Line Current Differential Relays Using Digital Communication.

A PAR to initiate the project will be submitted to IEEE-SA after the TF meeting in May.

TF participants interested in continuing as future WG members are asked to review the present version of the guide and suggest additional new or revision topics to the TF chair.

We request a meeting at the PSRC May 2021 meeting. Please avoid conflicts with C31 and K22.

Liaison Reports
T&D Committee / Distribution Subcommittee

The T&D Committee / Distribution Subcommittee meeting was held virtually during JTCM, January 11 - 15, 2021. The next planned meeting will occur during the IEEE Virtual GM Meeting, 25 - 29 July 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 is available from: https://cmte.ieee.org/pes-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 has been approved with PSCC and PSRC as joint sponsors.

Volt-VAR Optimization Working Group https://site.ieee.org/pes-vvtf/
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 approved. The working group is working toward publication.
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 re-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 are two Task Forces in the Distributed Resources Integration Working Group working on Microgrid Design Considerations in collaboration with PSRC C38 working group and the Energy Storage task force.

Old Business: None

New Business: None

General Discussion: None

Adjournment Motioned by Jonathan Sykes, seconded by Greg Ryan

H: RELAYING COMMUNICATIONS SUBCOMMITTEE

Chair: Aaron Martin
Vice Chair: Hugo Monterubbio

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 May 6, 2021 via WebEx with 33 members and 50 guests present comprising a quorum.

A vote was taken electronically in advance to this meeting and completed during the meeting to approve the January minutes.

Announcements:

a. New items from September 2020 AdCom Meeting
    i. WG officers, please review Procedures/ Policies/ Vote requirement Summary provided by standards coordinator, Don Lukach. Further clarification of procedures to be shored 2021 up for live or video training.

b. New items from Awards and Recognition Meeting:

i. WG officers, please review Procedures/ Policies/ Vote requirement Summary provided by standards coordinator, Don Lukach. Further clarification of procedures to be shored 2021 up for live or video training.

c. New from Standards Coordination Meeting: No meeting

d. New items from SC and reminders carried from prior meetings:
   i. Formation of H WG for P1854
   ii. WG officers to attend Stds Coordination meeting
   iii. SC Members are required to Vote on Reports
   iv. iMeet space available for Non-PAR WGs. PSRC Officers have organized documents depository for non-PAR WGs
   v. WG presentations to be reviewed by SC Officers
   vi. Upon work completion, prepare a presentation to the MC

WG business:

H22 PC37.249 IEEE Guide for Categorizing Security Needs for Protection, Automation and Control (PAC) Related Data Files is moving forward with forming a balloting committee. If you are interested in joining the balloting committee please sign up to join the balloting group.

The below 3 motions were carried electronically proceeding the meeting. All three motions were approved electronically.

Motion: HTF52 motions to Revise: IEEE Standard PC37.232, Standard for Naming Time Sequence Data (TSD) Files, with the following Assignment, Scope, and Purpose.

Proposed Title: Standard for Naming Time Sequence Data (TSD) Files, with the following Assignment, Scope, and Purpose

Output: IEEE Standard, Project Number: PC37.232

WG Assignment: Revise : IEEE Standard PC37.232, Standard for Naming Time Sequence Data (TSD) Files, with the following Assignment, Scope, and Purpose.
Proposed Scope: This standard defines a procedure for naming time sequence data (TSD) files that originate from digital protection and measurement devices, such as transient data records, event sequences, and periodic data logs. The filename includes, among other features, key portions of the information contained in the file, including, but not limited to, the names of the circuit, substation, and recording device, and the date and time of event occurrence.

Proposed Purpose: The purpose of this standard is to define a procedure for naming TSD files, a procedure that is needed to resolve many problems that are associated with reporting, saving, exchanging, archiving, and retrieving large numbers of files. There is no other defined standard for naming such files at this time.

Chair: Amir Makki

Motion: Form WG H53 to support Joint Committee work in a non-lead role for the revision of IEEE Guide P1854 IEEE Trial-Use Guide for Smart

Distribution Applications

Proposed Title: Revision to IEEE Guide P1854 IEEE Trial-Use Guide for Smart Distribution Applications

Output: IEEE Guide, Project Number: P1854
WG Assignment: Support Joint Committee work in a non-lead role for the revision of IEEE Guide P1854 for IEEE Trial-Use Guide for Smart Distribution Applications

Proposed Scope: The lead committee has the PAR responsibility for the Scope. The following is provided for reference only based on information received from the Lead Committee.

This guide identifies and categorizes important smart distribution applications, develops descriptions of the critical functions involved, defines important components of these systems, and provides examples of the systems ; however, that it can does be not considered describe as in part detail of what distribution technologies management and systems communications or support what other smart distribution applications, systems. which This can guide be includes found discussion in on control, widely communications, available and published cybersecurity literature considerations (as when shown deploying in smart the distribution bibliography) applications .

Proposed Purpose: The lead committee has the PAR responsibility for the Purpose. The following is provided for reference only based on information received from the Lead Committee.
This document will not include a purpose clause.

Chair: Xiangyu Ding

Motion: Form HTF54 motions to investigate to revise: C37.111-2013/IEC 60255-24:2013 Standard for Common Format for Transient Data Exchange (COMTRADE) for Power Systems to expire in 2023

Proposed Title: C37.111-2013/IEC 60255-24:2013 Standard for Common Format for Transient Data Exchange (COMTRADE) for Power Systems

Output: IEEE Standard, Project Number: PC37.111/IEC 60255-24
TF Assignment: Investigate the Revision: C37.111-2013/IEC 60255-24:2013 Standard for Common Format for Transient Data Exchange (COMTRADE) for Power Systems to expire in 2023

TF Chair M. Admiak

Reports from the WG Chairs

H6: <u>IEC 61850 Application Testing</u>

Chair: C. Sufana
Vice Chair: B. Vandiver
Output: Summary Paper
Established: January 2021

Assignment: to write a summary paper of technical report: Application Testing of IEC 61850 Based Systems PES-TR84.

There were 7 voting members, 1 non-voting member, and 25 guests present.

The technical report Application Testing of IEC 61850 Based Systems PES-TR84 is now finished and has been published. It can be found at: http://www.pes-psrc.org/kb/published/reports/H6_17.6_Application_Testing_of_IEC_61850_Based_Systems.pdf and at Application Testing of IEC 61850 Based Systems (ieee-pes.org)

There were a few minutes of remembrance to honor Ralph Mackiewicz who passed away last month. He will be greatly missed.

The majority of the meeting was spent looking at the published technical report. There was discussion as to what sections could be extracted from the report and what could be ignored. The following have volunteered to help write the summary paper: Dinesh Gurusinghe, Sughosh Kuber, Tim Mathias, Mickey Schultz , Marcos Velazquez, Emmoji Vundekari, and Austin Wade. Vice Chair Benton Vandiver will also help.

Dinesh Gurusinghe, Sughosh Kuber, Tim Mathias, Mickey Schultz , Marcos Velazquez, Emmoji Vundekari, and Austin Wade will have their status changed from guest to voting member after this meeting.

The working group will meet at the next PSRC meeting to go over the summary paper.

H17: Establishing links between COMTRADE, IEC 61850 and CIM
Chair: C. Brunner
Vice Chair: A. Apostolov
Output: Report
Established: 2010
Expected completion date: May 2021
Assignment: Develop a standards approach to link IEC 61850, CIM and COMTRADE so that the COMTRADE channels can be associated to a node in the power network.

The WG met without the Chair of the WG. HSC Chair presented comments received from the vote circulated to HSC members after the January 2021 PSRC meeting. A. Apostolov asked that the comments be sent to him. He then confirmed that he received them. A. Apostolov agreed work with C. Brunner to resolve the comments prior to the September PSRC meeting.

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

Chair: Amir Makki
Vice Chair: Cesar Calix
Secretary: Hugo Monterrubio

I-Meet Administrator: T.W. Cease
Output: Guide - PC37.249
Established: January 2014
Expected Completion Date: December 2021
Expected Final Draft: 8.14

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.

The WG met on time with 6 colleagues in attendance. Quorum was not established (3 out of 12 voting members attended). The Chair informed the WG that approval to proceed with the balloting process has been granted. Malia Zaman, our IEEE SA guide, was in attendance and provided the WG with all of the needed support to initiate the balloting pool and the IEEE review process.

The WG plans to meet again during the September meeting to review and address the results of the balloting process.

H27: PC37.251 Standard for Common Protection and Control Settings or Configuration Data Format (COMSET)
Chair: Mario Capuozzo
Vice Chair: Benton Vandiver
Secretary: Daniel Sabin
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 chair opened the working group meeting with a short tribute to Ralph Mackiewicz, who passed suddenly since the last working group meeting. Ralph was a PC37.251 working group member and a long-term active participant in IEEE PES Power System Relaying & Control Committee.

To orient guests to the working group, the chair provided a short overview of the working group explaining that the new standard would define a file format compliant with IEC 61850 that would focus on settings. It would be based on the SCL model, which is used to define these existing file types:

- ICD (IED Capability Description)
- IID (Instantiated IED Description)
- SSD (System Specification Description)
- SCD (System Configuration Description)
- CID (Configured IED Description)
- SED (System Exchange Description)

IEEE PC37.251 will define a seventh SCL filetype: the .COMSET file. A COMSET file's central purpose is to store the user-configurable settings for a single IED. Inspired by existing filetypes, this file format is suitable for storing settings from any IED whether they comply with IEC 61850 or not.

The working group meeting focused on a review of the latest draft of IEEE PC37.251, which was posted to the working group's iMeet Central workspace at https://ieee-sa.imeetcentral.com/h27/.

The chair opened the technical discussion on clarifications related to the bitstring data object. Points of discussion included the issue of unused bits that can be used by vendors or certain implementations. A suggestion was offered to include an example in 6.2.1 when bitstring data objects would be used.

Discussion also focused on Float64. The attendees were in consensus that Float64 should be allowed.

The meeting included a discussion of SI units. The recommendation is that only those units in ISO 1000 ("SI Units And Recommendations For The Use Of Their Multiples And Of Certain Other Units") should be used. The standard will not allow custom definitions of units beyond those already in ISO 1000. The question was brought up on whether ISO 1000 should be listed as a normative reference in IEEE PC37.251.

The working group discussed the unresolved issues related to primary and secondary values. Thomas Rudolph took the action item to follow up with Michael Haecker.

The chair reported that the dictionary was removed in the latest version of IEEE PC37.251.

The working group discussion focused on case and consensus was that upper case and lower case should matter in IEEE PC37.251.

ACTION ITEMS

- Thomas Rudolph to follow up with Michael Haecker on primary and secondary settings.
- All working group members should review the draft and provide comments to the chair no later than June 4.

H30: <u>IEC 61850 User Feedback</u>

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.

Herb Falk gave a presentation describing the function and resources of UCA, and it's relationship with IEC61850ug, CIMug, and OpenFMB users group.

Ratan Das asked if the information is available publically. Herb Falk reported the information is in PAC World magazine. December 2020 issue.

There was a discussion of the merits of gap between version control between the conformance documents and version of the IED tested. Deepak and Dustin questioned if there was a need to mandate version control of IEDs that correlate with the conformance of the IEDs and the different versions of the IED including the firmware version. Alex, Herb, and Bruce said it is up the end users to do the compare ICDs when vendors update firmware. Conformance testing is only a snapshot in time. Alignment of conformance testing, UCA can not force vendors to provide updated ICD files.

Dustin Tessier – Deepak Maragal– suggested a call for participation/cooperation from vendors to provide the artifacts used during the UCA UEC 61850 conformance testing process (e.g. conformance statements, ICD file, etc.) in a publicly available forum such as the UCAiug site.

Thomas Rudolph brought the methodology of system setup described in 61850-4.

Deepak Maragal suggested that him and Dustin Tessier close the gap that the user can get version of certified product from the manufacturer.

Herb doesn't understand the overall issue – ICDs will change. Does not believe vendor will be willing to publicly share any ICD files on UCA's site.

Dustin Tessier described that the latest and greatest ICD file does not always work in 61850 configuration tool. There are cases where an "old" ICD file may be required for SCL tool interoperability, and having public access to the ICD files for devices/tools that have undergone conformance testing allows users to start with a trusted-source/baseline configuration that has passed conformance testing. Forcing users to use "new" ICD files creates SCL interop challenges, since not all SCL tools will be using the "latest/newest" edition of SCL.

SCL conforming testing is covered in UCA's IEC 61850 conformance testing program and is summarized below. Users are encouraged to place more emphasize on requesting vendors to supply their SICS statements and undergo SCL conformance testing:

a. IED Server Conformance Testing with increased emphasis on ICT conformance test;
b. SCT Conformance Testing (SICS - SCL Implementation Conformance Statement)

Herb suggested that UCA may develop a tool depending for evaluating ICD file and provide test reports or may adopt a tool that already exists if it is cheap enough.

Conforming testing of software tools may be a future option.

H31: <u>Common Protection & Control parameters for COMSET</u>

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 for protection & protection related parameters.

The group gaps and corrections in existing IEC 61850 7-4 Edition 2.1 and IEC 61850-7-3-2010+AMD1:2020.

1) Error in WYE Common Data Class (CDC) was discussed wherein the Ineutral and Iresidue connections were coming as parallel from WYE point. The group agreed on the correction and follow-up with Editor of 7-3 and also liaison with TC 95.
2) The polarity of the Current flow was found missing in WYE representation but, some members thought that polarity representation should not be part of the model but part of Engineering on where the CT exists and the associated polarity. Further, used cases need to be built before polarity attribute is put into the model.
3) Enumarations "CalcModeKind" "CalcIntervalKind" "CalcMethodKind" were reviewed which are used to represent the type of calculations performed. The group exists further clarity on the enumerations & usage and decided to follow-up with IEC TC 57, Working Group 10 to make best use of these enumerations.
4) Concerns related to Nesting of Logical node & duplication of attribute names "Blk" was discussed. It was made clear that Nesting of Logical node is not permitted in the model except nesting from Abstract Logical Nodes. Also, multiple inheritance is also not permitted for the same reason to avoid overlap & confusion.

H32: <u>Performance considerations for Ethernet circuits applied to teleprotection</u>

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.

The WG met on Wednesday, with 6 members and 9 guests in attendance.
The working met with no outstanding items. The meeting was short and no further work is required.

The group requests permission to disband.

H40: <u>Databases used in SAS</u>

Chair: T. Laughner
Vice Chair: M. Capuozzo
Output: Guide

Established: 2017
Expected completion date: December 2022
Draft: D2

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

Chair reviewed previous action item.
Dan Sabin completed his review and editing of the document.
Chair reviewed the PAR.

Chair reviewed the latest draft of the Guide, starting with the overall structure of the document. The following suggestions and proposals were made:
Fix formatting for 2 Paragraph in 4.9

- Chapter 7 - Database Characteristics
- Proposals -
    - Delete 5.0 paragraph 1.
    - Chapter 4.3 - need content
    - Chapter 4.4 - need content
    - Chapter 7.7.4 - Energy density discussion?
    - Battery -
    - Jack Wilson - Ameren - Battery upgrades
    - Chapter 7.7.7.x - Reduce to list
    - Chapter 7.8 - Review this / Dan will review.
    - Chapter 7.10 - look at Amir's wg (H22) output
    - Chapter 8 - Testing / Theo to do

Dan Sabin offered the following link as a reference for the guide:
https://en.wikipedia.org/wiki/Power_usage_effectiveness

Jayaprakash asked to join the working group.
Chair motioned to adjourn. Seconded. Meeting adjourned.For the next meeting: Reserve a room for 15 and a projector. Single session.

H41: <u>Revision of IEEE 1646 Communication Delivery Time Performance Requirements</u>

Chair: D. Holstein
Vice Chair: T.W. Cease
Output: Standard
Established: 2017
Completion Date: 2021
Draft: D4E2

Assignment: Revision to IEEE Standard 1646-2004

The WG met on Tuesday, with 8 members and 6 guests in attendance. A quorum was present. This was the 20th 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.
Those attending focused on the following topics:

1. Dennis Holstein gave an update on the status of the standard.
2. Dave Doleziek revised the description of the figure to better define the latencies marked on the figure. After he presented his revisions there was some discussions. As a result of the discussions revisions to the definition were made on line and will be included in the next version of the standard.
3. Dennis Holstein will check to determine if we can use or reference figure from another standard.
4. Dave Doleziek will put together thoughts on new latency tables.
5. Dennis will send out a Doodle pole to determine the best Monday in June for the next regular 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: Write a IEEE guide titled "Monitoring and Diagnostics of IEC 61850 GOOSE and Sampled Values Based Systems"
Scope: This guide provides information about what factors to consider when applying IEC 61850 GOOSE and Sampled Values to monitor and diagnose communication of automation systems.
Purpose: To provide guidance to protection & automation engineers when applying monitoring features IEC 61850 GOOSE messages and Sampled Values to support the implementation of condition-based maintenance, cyber security monitoring and improved commissioning of communications of automation systems.
The chair acknowledged the passing of Ralph Mackiewicz. Ralph was a big contributor to this working group, the WG will keep Ralph's name as the Vice Chair of record for this WG.
The WG is actively looking for a Secretary if you want to volunteer please reach out directly to the WG Chair
Call to order: Motion by Scott Mix, Second by Dean Ouellette
Quorum was met with 9 members in attendance
Approval of January and April 2021 Meeting Minutes: Motion by Jose Ruiz, Second by Eugenio Carvalheira. Meeting minutes were approved with 9 votes from WG members
Future WG Meetings
The WG discussed the following items

- Aaron will email the current draft of the document to Alex so he can review test and simulation section.
- Discussed Bharat Nalla Contribution - LCCH Physical Communication Channel Supervision and whether we should keep or remove the table format.

- Discussed contribution of David Dolezilek - Part of the contribution is related to the main topic of SV but not directly therefore the recommendation is to move the part of the time synchronization into the appendix.
- Jesse Silva asked if David's contribution included Red Boxes. The answer is no unless we want to expand the scope
- Alex Apostolov asked to re-read the WG scope/assignment. The Scope is: This guide provides information about what factors to consider when applying IEC 61850 GOOSE and Sampled Values to monitor and diagnose communication of automation systems. Discussion ensured about what all is or should be included, specifically monitoring and diagnosing? The Chair recommended adding a paragraph to discuss the ins and outs of network monitoring covering PRP, SHR, MMS, etc since this would greatly benefit the document. Jesse Silva (SCE) volunteered to write this new section
- Discussed Scott Mix contribution Section 7.5.7
- The Chair requested a volunteer to start a list of keywords and acronyms, Jose Ruiz volunteered

The WG will schedule one or two online meetings this summer to keep moving forward
Assignments:
Section 6.3 Intrusion Detection - Alex Apostolov volunteered and Eugenio Carvalheira will help
Karen Leggett Wyszczelski requested to become a member

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: December 2022
Draft: 4.0

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

The WG met on May 5, 2021 with 68 participants of which 30 were members. Chair presided over the meeting and Secretary recorded the minutes of the meeting. Quorum was achieved during the meeting. Chair started the meeting by discussing the IEEE patent policy and other guidelines for WG meetings. No additional comments were received for the minutes of April 2021 web meeting and minutes were approved.

Draft 4.0 of the guide was posted on March 09, 2021. A review team provided comments on most clauses of Draft 4.0. Few remaining reviewers committed to provide comments during May 2021. Chair will follow up on pending assignments.

Draft 5.0 will incorporate comments from the reviewing team and will be issued for individual working group member review. The project plan was reviewed and WG expects to meet the PAR deadline of publishing the guide by December 2022.

Chair provided a brief overview of the current Draft 4.0 for the benefit of guests. Chair requested interested guests to express their interest in the IEEE SA website for participating in IEEE balloting process, expected during Q3/Q4 of 2021, to provide comments/suggestions for improving the guide.

H46: <u>Recommended Practice for Human-Machine Interfaces (HMI) used in Substation Automation Systems (PC37.1.3)</u>
Chair: M. Black
Vice Chair: C. Preuss
Secretary: S. Haveron
Output: Recommended Practice
Draft: 0.4
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 5/5/21 at 13:10 CST. There were 27 attendees: 15 out of 22 voting members (including 2 new members, Michael Cunningham and Konstantin Gerasimov) and 13 guests, achieving a quorum. Minutes from the meeting in January '21 were approved with Charlie Sufana making the motion to approve and Tony Johnson seconding the motion.

After limited introductions, the agenda, patent and copyright slides were reviewed with no comments received. There were no presentations or old business items for this meeting and new business to discuss included a review of the restructured draft document, acknowledgement of writing contributions received, and a call for volunteers for writing assignments.

Vice chair is completing a reorganization of the document for better grouping of topics and logical flow and will be uploaded to iMeet Central as version 0.5 shortly. Contributions already received were reviewed are included in this revision.

Due to continuing difficulties with macros, the working group editors will maintain the live document and will add written contributions into the relevant sections with the required formatting. The document will use new templates as they are released.

There was a discussion on the use of color in IEEE standards related documents. Guidelines state that colors in figures shall not be required to convey meaning. This is of particular relevance to HMI screens where colors do have significance. Any figures used in this recommended practice will include text to explain the significance to facilitate printing the document in black and white.

The chair thanked the members who have submitted contributions and pointed out that many sections still require work. We have only addressed 20% of the content and we need to pick up pace to meet the expected timeframe. The members were asked to help anywhere they can and a list of sections that need additional content will be circulated with the meeting minutes.

Future meetings are:
- September 20-23, 2021
- Virtual (Tentative)
- January 9-12, 2022
- Garden Grove, LA

- May 9-12, 2022
- Reno, NV

Jackie Wilson made a motion to adjourn and was seconded by Jay Anderson. 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: 0.2

Assignment: In a digital substation Protection and Control (P&C) devices rely on Sampled Values (SV), GOOSE and time synchronization (using Precision Time Protocol, PTP) together over process bus communications. This WG 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.

Minutes not provided by WG Chair after multiple requests.

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

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

Assignment: To develop a report on application considerations and experiences on the use of packet-switched networks from a teleprotection application point of view for the benefit of relay engineers. Produce tutorial/summary presentation based on report.

Scope: Document fundamentals of packet-switched networks as they apply to protective relaying. Document teleprotection application requirements when using packet-switched networks; including latency, bandwidth, redundancy, switch-over, asymmetry, use of external time synchronization for 87L with dependence on GPS. Considerations for leased networks (Service Level Agreement). Document any industry experiences. Outage processes and procedures.

Minutes: The WG met on Wednesday 5/5/2021 via virtual meeting, with 30 attendees (10 members and 20 guests).

Attendee introductions were skipped. Attendance list was determined from WebEx Attendance records after the meeting.

- Ilia Voloh has volunteered to be Vice Chair of the committee.
- Slide covering Guidelines for IEEE WG meetings and Patent Claims were reviewed.
- January WG meeting minutes were reviewed. Motion to approve minutes as written – Ken Fodero. 9 votes to approve. No objections. Motion carries.
- Eric Udren presented a summary of the PSCC P6 WG report Application of Ethernet Networking Devices Used for Protection and Control Applications in Electric Power Substation. The working group members are encouraged to review the report. It is published on the PSRC website (https://www.pes-psrc.org/kb/published/reports.html).
- Eric Udren will provide copies of the slides presented at the meeting, as well as documentation discussing the development and testing of teleprotection with MPLS ethernet communications at SDG&E. Gary Stoedter to share these with the working group.
- The goal for the next meeting is to have discussion from any working group members with experience implementing packet-switched communications for teleprotection.
- For the next meeting: WebEx Virtual Meeting. Single session.
- Motion to adjourn – Tom Dahlin. Meeting adjourned.

H50: Requirements for Time Sources in Protection and Control Systems

Chair: Dean Ouellette
Vice Chair: Jay Anderson
Secretary: None
Output: Report
Established Date: May 2019
Expected Completion Date: 12/31/2021
Draft: 1.3b

Assignment: Presently there are IEEE and IEC standards around (accurate) time distribution systems (for example, IEEE 1588 and associated Profiles, IEEE/IEC 61850-9-3, etc.). The intent of this Report is to document requirements for Time Sources (Clocks) used in Protection and Control Systems.
Webex Meeting 05 May 2021, 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 30 in attendance of which 10 are members. Attendance will be recorded in 123Signup.

A quorum was achieved with 10 out of 20 members present.

Patent slides and Copyright policies were shown and all participants asked to speak up about any patent claims at this time. No claims were offered.

Minutes from the January meeting were approved following a motion by Nicholas Kraemer.

Presentations:
none

Old Business
The Scope and Assignment was reviewed.

New Business

Submissions to the Document were discussed.
Work was continued reviewing writing assignments. Sections on Applications and Calibration were discussed; contributors were reminded of their unfinished Assignments.
Dean Ouellette introduced a Clock Profile template to be used to compile and compare specifications on (primarily GPS) clocks. The template was discussed and modified to add or edit fields that the WG considered useful to assess clock features, including characteristics of inputs, outputs, internal holdover timekeeping, standards conformance, and security features. This template will continue to be edited for content and style.
The WG had a short discussion on security features in Clocks, noting that most of the present features were mainly concerned with the programming interface. It was noted that the Security issue in IEEE/IEC 1588 was mentioned in the 2009 Edition 2.0 in Informative Annex K (Experimental) and in the 2019 Edition (Informative Annex P), which references IEC 62351-6 and IEC 62351-9.
Action Items:

The following writing assignments are in progress (note: from last Minutes).

- Security: Tony Johnson
- Inputs to clocks: Jay Anderson - Submitted
- 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
- Jeff Dagle to contribute to Applications; Jack Wilson can support
- Yuchen Lu also offered to contribute as needed
- Can clocks communicate their own accuracy: Nick Kraemer
- Event Logging & Monitoring: Aaron Martin, Jay Anderson, Ya-Shian Li-Baboud
- Testing: Rich Hunt
  The Draft will be rev'd to 1.4a.
  Meeting was adjourned at the scheduled time. Motion to adjourn by Nicholas Kraemer; second by Jay Anderson.

Note: files for the H50 workgroup are stored in iMeet Central at:
https://ieee-sa.imeetcentral.com/psrcc-h50/folder/WzIwLDEyNTQ5NTk4XQ

H51: <u>Revision of C37.239-2010 Standard on a Common Format for Event Data Exchange (COMFEDE)</u>

Chair: Mark Adamiak
Vice Chair: Pierre Martin
Output: Standard Revision
Completion Date: December 2021
Current Revision: 2010

Assignment: Revise the current COMFEDE standard (C37.239-2010)

The PAR to revise C37.239-2010 has been approved. An I-Meet site has been created and the chairman will be adding member names to the site.

The WG met on Wednesday to start the revision task. The WG anticipates that minimal revisions will be made. The group was tasked with reading the standard and identifying the need for any potential revisions. A virtual meeting will be held in June to discuss any identified changes.

It was learned that there are several commercial implementations of COMFEDE.

A robust discussion was held on the topic of either migrating the standard to Java Script Object Notation (JSON - in contrast to XML) or creating a parallel version of the standard in JSON. While JSON is the predominant language being used in the industry, the WG did not see an overwhelming benefit in migrating the standard to JSON and benefits of keeping the XML format to maintain compatibility with IEC 61850 Substation Configuration Language - SCL. There was a WG consensus to maintain implementation in XML.

HTF52 – Common Format for Naming Time Sequence Data Files (IEEE Standard C37.232-2011, COMNAME)

Chair: Amir Makki
Output: Recommendation to the H Subcommittee
Established: May 2021
Expected Completion Date: September 2021

Assignment: The Standard will be expiring soon. Determine whether a PAR should be submitted to revise the Standard.

The Task Force met on time with 9 colleagues in attendance. The Chair provided a high level overview of the standard and asked each attendee to comment on whether or not the Standard should be revised. Each attendee was allocated up to 5 minutes to make their case. The resulting answer was a unanimous yes.

The Task Force completed its work. A motion to disband and submit a PAR to revise was recommended to the Subcommittee.

I: RELAYING PRACTICES SUBCOMMITTEE

Chair: Jim Niemera
Vice Chair: Robert Frye

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. Call to order: 8:20 AM CST
2. Welcome and Webex guidelines for meeting
3. Thank guests for attending
4. Many thanks to former members of the I-SC:
    a. (no new retirements)
5. Welcome to new members of the I-SC:
    a. (no new members)
6. Determine a Quorum (**34 members** total in I SC)
    a. Attendance: 22 members, (min 18 for quorum: YES XXXX or NO____.
7. Approval of Minutes of the January 14, 2021 on-line meeting
    a. Due to time constraints, January meeting minutes will be approved by email ballot
        i. Post meeting update: January 2021 Minutes were approved by email ballot – 22 ballots received: 22 Approve, 0 Disapprove, 0 Abstentions
8. Coordination & Advisory Committee Meetings Items of Interest
    a. Subcommittee Members' status and incoming Officers for May 2021
    b. Attendees information
        i. 428 Registered including 62 newcomers
    c. Future Meetings:
        i. Sept 2021 – TBD
        ii. Jan 2022 – JTCM – Garden Grove, CA
        iii. 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
    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 one of the PSRC Officers, Murty Yalla, Michael Thompson, or Gene Henneberg.
    h. Looking for presentations for future Main Committee meetings – please contact I-SC Chair 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 – 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

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 *September 2021* meeting that you include "do not conflict with I50, D87, …"**

e. As Chair or Vice-Chair of WG or TF, please contact I-SC Chair Jim Niemira and I-SC VC 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 and/or published on the PES Resource page.

g. All PAR related document (IEEE related) drafts **may not** 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 - **PLEASE HAVE THIS IN WITHIN 1 WEEK - USE THE MINUTES TEMPLATE FORMAT PROVIDED ON p. 7 OF THIS AGENDA** - confirm WG information is all correct and do not use special formatting or extra indents.

j. ***iMeet Central*** (formerly Central Desktop) is to be used for IEEE Guide/Recommended Practice/Standard documents with a PAR.

k. ***PSRC has a File Share facility for non-PAR documents. Contact Jim Niemira (I-SC Chair) if your group has need or interest. Need a list of participants with email addresses to allow write access - typically only a few people (WG Chair, VC, and/or secretary); view access can be granted to others. See instructional videos on PSRC Website***.

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
   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

10. Working Group Reports

WG/TF #	Name	Report Given By:
I2	Terminology Review	Fred Friend
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	Will Knapek
I33	Review of Relay Testing Terms	Scott Cooper
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	Ritwick Chowdhury
I40	Revision of IEEE C37.90.1 – Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus	Roger Whitaker
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
I44	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	Will Knapek
I45	Investigation of Grounding and Bonding Issues Associated with Substation Wiring Practices and Instrumentation.	Adrian Zvarych
ITF46	Review and determine need for revision: IEEE C57.13.3-2014 - IEEE Guide for Grounding of Instrument Transformer Secondary Circuits and Cases.	Brian Mugalian
ITF47	Review and determine need for revision: IEEE C37.231-2006 - IEEE Recommended Practice for Microprocessor-Based Protection Equipment Firmware Control.	Amir Makki

I2: 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 May 5, 2021 with Fred Friend, Vice-Chair recording minutes with 18 in attendance. Quorum was achieved with 9 of 11 members present. The minutes from January 2021 were reviewed with no corrections provided, Matt Black motioned for approval and was seconded by Claire Patti, and unanimous approval was given. The agenda was approved.

The working group discussed the definitions for the terms: self-excitation from C37.106. Blind spot, high-impedance scheme, network element, and over-tripping spot from C37.234. As time ran out, Mal will send additional business via email.

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 5:45 pm (Central Time)

I4: 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 Date: 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.

Chair Eric Udren called the virtual meeting to order at 9 AM CST on May 6, 2021 using PSRC WebEx platform. A total of 14 members and guests attended the meeting.

- USNC TAG member Allen Goldstein a subject matter expert and working group member of frequency measurement methods in JWG 12 a cooperation between TC 95 and TC 8 (IEC TS 62786), gave a presentation on the work done in this working group. USNC are invited to provide comments to the USNC chair, Eric Udren by the 15th May.
- The chair gave an update on the state of the following IEC standards that are in the process of being revised; IEC 60255-1, IEC 60255-26, IEC 60255-27. These standards are in CD state at present and comments can be given to the USNC chair Eric Udren by the 4th June.
- Two new AD hoc working groups have been created in TC 95, MT 4;
    - Traveling wave fault location,
    - Protection for HVDC systems

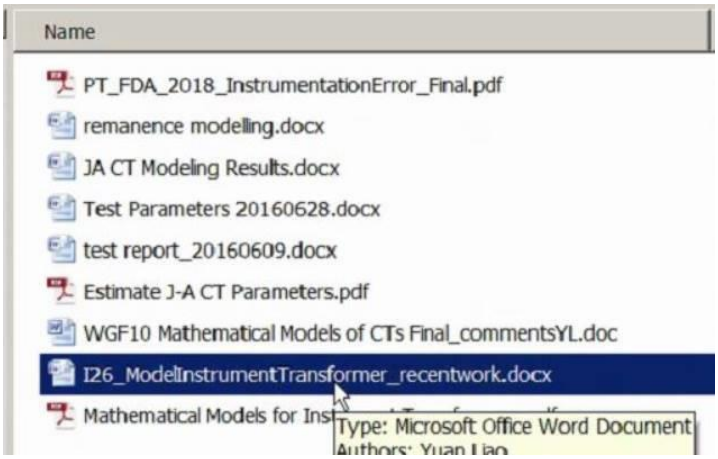
The USNC will provide members to participate in both of the above Ad hoc working groups.

I26: 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 – Not applicable
g) Approval of Minutes of previous meeting – Not applicable
h) Begin drafting the report.

i) Action Items:

Amir has sent the documents to Mike and Mike has placed them in a share file site on the IEEE PSRC website. Instructions are provided below how to access these documents.



Writing assignments have been tasked as follows:

- 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
- Instrumentation Error – Professor Sakis Meliopoulus
- Mathematical Models of CTs Final Comments -Steve Turner

Still to be assigned:

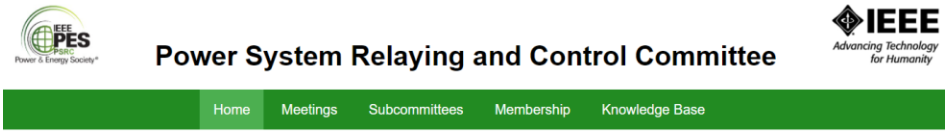
- Annexes -
- Test Parameters -

Steve Turner will reach out to past participants to see if they are willing to accept the two remaining writing tasks and contact those not present who have volunteered for writing assignments (names appear above in red).

HOW TO ACCESS DOCUMENTS

Go to IEEE PRSC website (https://www.pes-psrc.org/)

Go to Knowledge Base (top right of home page):



Scroll down to PSRC Sharefile Site and click on the link to the page:

There is a video about the Sharefile Page

Short video about the PSRC Sharefile

Scroll down to the link to the external PSRC Sharefile site:

Link to external PSRC Sharefile site

PSRC Sharefile Link

I29: Revision of C37.110 Guide for the Application of Current Transformers for Protective Relaying Purposes
Chair: Joseph Valenzuela
Vice Chair: Michael Higginson
Output: IEEE Guide
Established Date: January 2015
Expected Completion Date: December 2021
Draft: 20210503
Assignment: Revise C37.110-2007 Guide for the Applications of Current Transformers for Protective Relaying Purposes

Michael Higginson presided over this meeting and recorded the minutes. The meeting was called to order on Tuesday, May 4, 2021 at 9:10 AM CDT. The meeting was conducted via WebEx. The meeting had 22 attendees, including 5 members and 17 guests. The working group did achieve quorum. As quorum was not achieved at the beginning of the meeting, minutes were not approved. Minutes will be sent via email for approval by working group members.

The IEEE SA patent slides were reviewed and no items were raised.

Michael provided an update to the working group on the status of our work and planned next steps. Since the September 2020 meeting, Joseph has completed integrating everyone's technical ballot comment resolutions into a single revised draft. 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. Michael is now working on editorial comment resolutions.

The working group discussed several open items that needed resolution.

- On page 3, the working group agreed that we should remove the Saturation Factor definition as it is now obsolete. We will not include a definition of Saturation Ratio. It is discussed later in the guide to our satisfaction.
- On page 8, the figure needs to be updated to show only one V-I curve and to add saturation voltage.
  - **Action Item:** Prasad Shrawane volunteered to complete this.
- On page 12, "accuracy voltage rating" is used. This paragraph is context for the following example (example 2). The working group thought this usage was appropriate.
- On page 17, the figure needs updates based on the context.
  - **Action Item:** Andy Kunze volunteered to complete this.
- On page 21, there is a comment on the value used for the saturation voltage. The working group agreed a footnote is needed to comment on what value should be used and how it is applied in industry.
  - **Action Item:** Andy Kunze volunteered to complete this.
- Some comments requested that we update references to C57.13 sections to use the latest standard version.
  - **Action Item:** Andy Kunze volunteered to recommend updates to the references, which Michael Higginson will integrate.

The working group is planning to hold a meeting in June to review all updates and vote to approve submitting the revised standard for re-balloting.

The working group's PAR is valid through December 2021, but we plan to complete our work before then. In our September we may need to file for a PAR extension, depending on status of reballoting and comments received.
Will Knapek motioned to adjourn, and Alla Deronja seconded the motion. The working group adjourned at approximately 10:10 AM CDT.

I30: 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: 14
Assignment: Review and revise IEEE C37.235-2007 - IEEE Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes

Meeting Participants:

Name	Affiliation	Voting Status (voting member, non-voting member, guest)
Robert Frye	TVA	Voting Member (Chair)
Chase Lockhart	Leidos	Voting Member (Vice-Chair)
James Niemira	S&C Electric Company	Guest
Dragan Tabakovic	Hubbell	Voting Member
Ratan Das	GE	Voting Member
Malia Zaman	IEEE SA	Guest
Lynn Schroeder		Guest
Dervis Serhat Tekin	Hubbell	Guest
Joshua Watson	Burns & Mac	Guest
Jala Gohari	WSP	Guest
Joe Xavier	ABB	Guest
Mat Gasrver	Beckwith	Guest

Time called to Order and Chair's remarks: The meeting was called to order at 16:31.
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 3 members in attendance, quorum was not achieved.
Approve minutes of previous meeting: NA
Topics discussed:

- Chair to move Dragan Tabakovic to Voting Member status
- Chair moved Peter McClaren to Non-Voting Member status. The Chair also thanked Mr. McClaren for all of his dedicated service to C37.235.
- Frequency dependence/independence comment resolved at the suggestion of Ron, Mike, and Dragan; comment was rejected with justification that the exact wording and definition is used in IEC 61869-10 document.
- Symbol on Page 33, line 19 was corrected by Chase Lockhart.

Action items:

- Robert to send document out with meeting minutes to get any comments/final approval from WG before finalizing the document and sending for final ballot.

Times of any recesses and time of final adjournment: Meeting adjourned 17:22
Date, time, and location of next meeting: September, 2021 TBD

I31: IEEE 1613 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)
Meeting Date: May 4, 2021
Expected Completion Date: 31-Dec-2022 (PAR extension approved October 2020)
Draft: 1.22
Assignment: Revise 1613

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 16 members in attendance
f) Approval of Agenda: N/A
g) Approval of Minutes of previous meetings: Motion to approve June 16, 2020 meeting minutes from Fred Friend, second by Jerry Ramie, no objections, chair announced approval.

Motion to approve Sept 2020 meeting minutes from Mike Meisinger, second by Jerry Ramie, no objections, chair announced approval.
Motion to approve Jan 12, 2021 meeting minutes from Jerry Ramie, second by Mike Meisinger, no objections, chair announced approval.

h) Patent slides were shown, no claims were made.
i) Copyright slides were shown.
j) Draft 1.21 was reviewed and updated to draft 1.22.
k) No items reported out of executive session
l) Recesses and time of final adjournment, approximately 9 am central time.
m) Next meeting date and location, conference calls June 1 and August 3 from 3-4:30 pm.
n) Motion to adjourn from Jerry Ramie and second by Fred Friend, no objections, chair adjourned meeting.

Meeting Participants:

Name	**Affiliation**	**Voting Status (voting member, non-voting member, guest)**
Brian Mugalian	S&C Electric	Voting Member
Claire Patti	Portland General Electric	Voting Member
Craig Preuss	Black & Veatch	Voting Member
Dave McGuire	Hubbell Power Systems	Guest
Dervis Serhat Tekin	Meramec Instrument Transformer Co.	Guest
Hani Al-Yousef	Eaton	Guest
Jay Anderson	ComEd - Exelon Corp.	Voting Member
Jay Herman	EPRI	Guest
Jeffrey Pond	National Grid	Guest
Jerry Ramie	ARC Technical Resources, Inc.	Voting Member
Juan Placid	J J Power & Energy Inc.	Guest
Louis Garavaglia	G&W Electric Co.	Guest

Name	Affiliation	Voting Status (voting member, non-voting member, guest)
Malia Zaman	IEEE SA	Guest
Michael Cunningham	Power Grid Engineering	Guest
Michael Dood	Schweitzer Engineering Labs	Voting Member
Michael Meisinger	S&C Electric Co.	Voting Member
Roger Whitaker	Self	Guest
Thomas Rudolph	Schneider Electric GmbH	Voting Member
Travis Mooney	SEL	Guest
Zitao Wang	S&C Electric Co.	Guest
Fred Friend	AEP	Voting Member

I32: A Survey of Protective System Test Practices
Chair: Andre Uribe
Vice Chair: Will Knapek
Secretary:
Output: Report
Established: 05/2015
Expected Completion Date: 01/2023
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.
Draft: Ver 1.0

a) Officer presiding: Will Knapek, Vice Chair
b) Officer recording minutes: Will Knapek, Vice Chair
c) Call to order. 1:10pm No quorum was achieved.
d) Chair's remarks
e) Action items:
    a. Discussed status of survey. We are at a log jam in getting the survey out to participants. The plan was to send to select individuals at utilities. We have not had success in obtaining a list of emails to accomplish this.
    b. Jim Niemira and I will work on this action.
f) Recesses and time of final adjournment: 1:25pm Central
g) Next meeting date and location: TBD

I33: Review of Relay Testing Terms

Chair: Scott Cooper
Vice Chair: Hugo Monterrubio
Secretary: Scott Cooper
Output: Report
Established Date: 1/19
Expected Completion Date: 9/21
Draft: 2.0
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.

a) Officer presiding-Scott Cooper
b) Officer recording minutes-Scott Cooper
c) Call to order- 04/29/2031 12:30 EDT
d) Chair's remarks- Review of project status, draft complete
e) Results of call for quorum-No quorum
f) Approval of Agenda (motion and second)-NA
g) Approval of Minutes of previous meetings (motion and second)-NA
h) Brief summary of discussions and conclusions including any motions
    a. Discussed member roster
    b. Discussed procedure for submittal of the draft to the I-Subcommittee for approval
i) Action items
    a. Submit report final draft to members via email for approval
j) Items reported out of executive session (if such sessions have occurred)-NA
k) Recesses and time of final adjournment (if different from our published face-to-face meeting agenda) 04/29/2031 12:50 EDT
l) Next meeting date and location (if different from our published face-to-face meeting schedule) September 2021, TBD

I35: IEEE Std C37.2 - Standard for 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: 0.7
Assignment: To revise and update C37.2, Standard for Electrical Power System Device Function Numbers, Acronyms, and Contact Designations

The working group did not meet.

I36: C37.90.2 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
Recording Secretary (usually, the Vice Chair): Mat Garver
Output: Standard

Established (month/year): September 2017
Expected completion date (month/year): September 2021
Date and Location of Meeting: May 05, 2021, WebEx, The World Wide Web
Meeting Participants:

Name	**Affiliation**	**Voting Status (voting member, non-voting member, guest)**
Chase Lockhart	Leidos	Chair
Mat Garver	Beckwith Electric (Hubbell)	Vice-Chair
Gerald (Jerry) Ramie	ARC Technical Resources Inc.	Voting Member
Hani Al-Yousef	Eaton	Guest
Suresh Channarasappa		Guest
Tapan Manna		Guest
Mariyn Ramirez		Guest
Tony Bell		Voting Member
Andre Desrochers		Guest
Todd Martin	Basier Electric	Guest
David McGuire	Hubbell 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

The meeting was called to order at 12:30 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 4 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 Mat Garver Second by: Jerry Ramie. Approved by all, motion carried
Topics discussed:

- Reviewed final comments and bibliography
- The document was moved to ballot
- The Standard was approved by all Members present and moved to be approved by Main Committee.
- No Closing Remarks

Action items:

- Chase to submit standard for main committee review and balloting.

Motion to adjourn at 13:29 first by Jerry Ramie, 2nd by Mat Garver. Approved by all, meeting adjourned.

Date, time, and location of next meeting: Sept, 2021

I-37: C37.90, Standard for Relays, Relay System Associated with Electric Power Apparatus
Chair: Marilyn Ramirez
Vice Chair: TBD
Output: Standard
Established Date: 2018
Expected Completion Date: 2021
Draft: 2.0
Assignment: Revision of C37.90 Standard for withdrawn in 2021. PAR Expiration 31-Dec-2022

Meeting Participants:

Name	Affiliation	Voting Status
Marilyn Ramirez	Qualus Power Services	Chair
Todd Martin	Basler	Voting Member
Angelo Tempone	Duke Energy	Voting Member
Brian Mugalian	S&C Electric	Guest
Dave McGuire	Hubbell Power	Voting Member
Jim Niemira	S&C Electric	Guest
Robert Frye	TVA	Voting Member and Host
Craig Preus	B&V	Guest
Raymond Phillips	Westinghouse	Guest
Dervis Serhat Tekin	Hubell	Guest
Roger Whittaker		Guest
John Galanos	Jabil	Guest
Louis Garavaglia	G&W	Guest

- Officer presiding: Marilyn Ramirez
- Officer recording minutes: Marilyn Ramirez
- Call to order, approximately 9:10 am Central Time
- Chair's remarks, general welcome
- The meeting had 5 members and 8 guests in attendance. Quorum was met.
    - September 2020 & January 2021 Meeting Minutes will be sent via email for approval.
- Patent slides were shown, no claims were made. Copyright slides were shown.
- Approval of Agenda: N/A
- Proposed changes/updates to harmonize with IEC were reviewed as well as 3 sections that 1613 requested to Harmonize with C37.90 including: Environmental/climatic, Ingress and Mechanical.
    - Marilyn will revise the draft with these proposed updates and will send to the members for review
    - Dave will work on reformatting Table 4 of the Standard
- Final adjournment, approximately 10:10 am Central Time.
  Motion by: Angelo Tempone; Second by: Todd Martin
- Next meeting date and location, tentative virtual meetings before September PSRC Meeting.

I38: IEEE Standard C37.92 Standard for Analog Inputs to Protective Relays from Electronic Voltage and Current Transducers
Chair: Ritwik Chowdhury
Vice Chair: Eric A. Udren
Output: Standard
Established Date: January 2019
Expected Completion Date: September 2022
Draft: 3
Assignment: To revise and update C37.92

The working group meeting was called to order on May 5, 2021 at 8 AM CST via PSRC WebEx with 9 members and 21 guests. With 10 listed members, this comprised a quorum. The agenda was approved. Minutes from January were presented and approved – Rich moved; Mat seconded.

Long discussion of Class HZ input impedance 2 Mohms vs. 1 Mohm. Mat emphasized the importance of 1 Mohm in North American field applications and devices. It was stated that ubiquitous Lindsey sensors specify a 1 Mohm load. Jim Niemira suggested an MZ class with 1 Mohm burden. Eric suggested informational wording about vendor needs to make 1 Mohm easy to apply while keeping the 2 Mohm value that is compatible with IEC standards requirements. Wording is to be discussed among Eric, Mat Garver and Veselin Skendzic who oversees the IEC development WG.

Section 4.2 on signal isolation from ground needs modification to allow for the need of some sensors to have one signal lead grounded to function (e.g. passive dividers). Consuming devices should still have both inputs isolated from ground as described. We are to find the best words to describe case ground (check IEC 60255-27 relay safety standard for example) and try to avoid mention of the word 'safety'.

The Section 1.2 Purpose statement is long and needs to be replaced by a succinct purpose section. All the application examples and background there now should move to an informational annex. This task was assigned to Jim Niemira.

I40: Review of IEEE C37.90.1 – Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
Chair: Roger Whittaker
Vice Chair: Todd Martin
Established: September 2018
Output: Review for revision IEEE C37.90.1
Expected Completion date: Dec 31, 2022
Draft: 0
Assignment: Review and revise IEEE C37.90.1 – Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus.

Working Group I40 met on Wednesday, May 5th at 1:10 pm central time in a single session. A quorum was achieved with 10 of 13 voting members present. Additionally 5 non-voting members and 15 guests were in attendance.
After introductions, the IEEE patent slides were reviewed. No patent concerns were identified. There were no copyright issues identified.
Minutes from the January 2021 meeting were reviewed and approved. The motion was made by Jerry Ramie and seconded by Todd Martin.

The agenda was reviewed and approved. The motion was made Jerry Ramie and seconded by Brad Heilman
We identified a target of having writing assignments done prior to next meeting. Once completed with writing assignment get them to Roger and he will put them in the standard.
Roger has started draft zero on put it out in Imeet Central and put some definitions in it
Hani has done work on clauses 7, 8, 9, and 10. He will get that to Roger soon
David identified concern about reducing the cable from requirement from 5kV cable to 4kV cable in 7.3.3.2. Dave will confirm if he can find 5kV cable. If we cannot we will revisit.
EMC originally was suggesting to removing transverse mode. They no longer think we should.
David is going to looking at what commercially available decoupling modules are available

I41: Draft Standard for 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: January, 2022
Draft: 1
Assignment: Revise and update C37.90.3, IEEE Standard Electrostatic Discharge Tests for Protective Relays

No meeting was held due to technical difficulties with the on-line format.

I-43: Investigate Response to USA Executive Order Regarding EMP Protection
Chair: Angelo Tempone (Presiding)
Vice Chair: Art Buanno
Secretary: Dolly Villasmil
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 14:20 CST on Tuesday, May 4, 2021
The chair called the roll.
The meeting had 15 members and 43 guests
A quorum was obtained since 15 members were in attendance to the meeting (over 50%).
The minutes of the previous meeting were approved. (Art Buanno & Bill Radasky)
Began review of received contributions (sections 3-6).

- Started reading 3c contribution on History of HEMP effects on electronic equipment. Bill Radasky offered to review this section off-line and provide comments to the author, Tapan Manna.
- After a brief discussion among the members, it was decided that the following sections 4-6, were not ready for review yet. These sections should be ready for review for the September meeting, which will be followed by monthly or more frequent meetings to complete the review process. Status update or re-assign pending contributions (sections 1-3)

- In discussion on section 3, it was decided that 3a, Electromagnetic Waves, was part of 3b and could be covered there.
- A question regarding section 5.3.2 was asked if anyone had data on high frequency injection into CT/VT and if transfer functions had been written. EPRI has done some testing on this subject; however, it would need to be checked if the results could be released for the report.
- An inquiry was made if data from tests performed around 1993 on GIS equipment subjected to EMP would be of value. It was decided that it may be and it would be useful to collect.
- Art Buanno offered to develop a starter list of definitions and acronyms for section 2.

A discussion occurred on the use of figures from other material. For example, figure 5-1 was from an IEC document. Recent experience with the IEC is that it can take as little as a week to receive permission. It was decided that all figures that would require permission for use would be flagged and that the document owners would be contact before publishing.
The meeting was adjourned at 15:20 CST (Bill Radasky & Jim Campell).
Our next meeting will be TBD in September of 2021 (time TBD).

I44: Skills Required to Program, Commission, Test, and Maintain Ethernet Based PAC Systems
Chair: Will Knapek
Vice Chair: Andre Uribe
Secretary:
Output: Report
Established: 01/2020
Expected Completion Date: 01/2023
Assignment: Create report on Skills Required to Program, Commission, Test, and Maintain Ethernet Based PAC Systems
Draft: Ver 1.0
Assignment: Create report on Skills Beneficial to Program, Commission, Test, and Maintain IEC-61850 and other Ethernet Based Protection, Automation, and Control (PAC) Systems

a) Officer presiding: Will Knapek, Chair
b) Officer recording minutes: Will Knapek, Chair
c) Call to order
d) Chair's remarks
e) Action items:
   a. Discussed Outline of report. See below.
   b. Next meeting: 4 Jun 11am EDT.
   c. Requested Share Site for the Documents.
f) Recesses and time of final adjournment: 12:00pm Central
g) Next meeting date and location: 4 Jun 11am EDT

DRAFT OUTLINE

1. Intro
   a. Should mention not one person but team.
   b. Why the report
2. What are the pieces of a Digital Substation? Will Knapek-OMICRON/Marcos Velazquez-Doble
3. Comm systems covered David Dolezilek, SEL.

Time protocols

4. Tools needed. Will Knapek-OMICRON/Sughosh Kuber - Megger
    a. Documentation
    b. Cyber Security
    c.
5. System Integrator skills. May be contractor.
6. Protection Engineer skills Austin Wade-SEL
    a. Cyber Security
    b.
7. Network/Communications Engineer skills Tim Mathias-Basler Elec
    a. Cyber Security
8. Commissioning Engineer skills David Williams – First Energy
    a. System design understanding
    b. Proper transfer of documentation.
9. Maintenance Engineer/Tech Skills. Jonathan Sykes-SEL
10. How to get these skills, Training.
11.
12. Conclusion.

I45: Working Group: Grounding and Bonding Issues Associated with Substation Wiring Practices & Instrumentation

Chair: Adrian Zvarych
Vice Chair:
Secretary: Adrian Zvarych (recording of minutes)
Virtual Meeting PSRC Link: 5 May 2021, 11:20 AM – 12:20 PM EST
Output: Report
Established Date: May 2020
Expected Completion Date:
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.
IEEE PSRC ShareFile Link: https://psrc.sharefile.com/f/fo94e793-8d38-4c7c-ac18-7d7e8b536f1d

Meeting Notes – 5/5/2021 via Teams

a) Safety Brief -
b) Call to order – Adrian Zvarych 11:20 EDT

c) Chair's greeting & remarks
    a. Welcome to guests
    b. Review of the WG's activities so far this year
    c. What's still ahead of us
d) Discussions during this meeting
    a. A concern was raised regarding the use of the word "Safety" in the report, as well as "Best Practices". Perhaps "Proven Practices" might be a good alternative.
    b. An observation was made that one of the larger issues is the topic of grounding and bonding cables from the yard to the control house
    c. Advantages-disadvantages of various cable shield types and methodologies – to be included in the Report (Josh W and Jack W to tag team and develop initial content for this new report section). A 'short list' was recommended:
        i. Helically applied copper tape (no drain wire)
        ii. Longitudinally applied corrugated copper tape (no drain wire)
        iii. Corrugated steel (BX or Flex, cable armor, etc.)
        iv. Corrugated aluminum (cable armor)
        v. Longitudinally applied corrugated aluminum, seam-welded shield
        vi. Aluminum foil shield with drain wire
        vii. Other types exist which reflect customizations, which may not be as commonly applied.
    d. Use of exothermic vs mechanical ground/bond connection vs swage connection – add to the Report
    e. Comment-question regarding adopting relevant telecom grounding-bonding practices to the control house environment… Telecom has had multiple thousand amp-hour DC systems which are hard tied from DC (+) to ground. As a result, grounding and bonding cables are sized to handle AC and DC fault currents as well as specifically engineered to mitigate and manage transients.
e) Updates since last meeting & meeting notes
    a. Review content contributions & edits
    b. Review Gap Analysis PPTX (PRELIMINARY)
f) Action items
    a. Z to add a section per d..c.. above. Next Steps
g) If you'd like to be a part of this WG, please email the Chair: azvarych@powergridmail.com
h) Round Table
i) Next meeting date and location: 5/12 via Teams, 1130-1230 EDT
j) Motion to Adjourn – 1st Jalal, 2nd Angelo, 12:21 EDT

ITF46: Guide for Grounding of Instrument Transformer Secondary Circuits and Cases

Chair: Brian Mugalian
Vice Chair:
Secretary: Brian Mugalian (recording of minutes)
Virtual Meeting/WebEx: 5 May 2021, 2:20 – 3:20 PM CDT
Output: Report and Motion to Subcommittee on IEEE C57.13.3-2014 to open PAR for revision
Established Date: May 2021
Expected Completion Date: May 2021
Draft:
Assignment: Review and determine the need to revise IEEE C57.13.3-2014

a) IEEE Housekeeping & Moderators: Jim Niemira and Robert Frye
b) Call to order – Brian Mugalian, 2:20 PM CDT
c) Chair's greeting & remarks, 19 attendees were present
d) Agenda was presented and reviewed
e) Patent slides were reviewed. The attendees did not present any patents requiring further action.
f) Copyright slides were presented. No comments from the attendees.
g) The Task Force reviewed the 2014 edition of C57.13.3. Comments from the attendees are summarized below:
    a. Review the word "safety" and how it is used in the Guide
    b. Coordinate with I45 as they are writing a report where our Guide will be referenced
    c. General review of figures in the Guide
    d. NEC versus NESC in the text of the Guide needs review
    e. Annex B needs update to convert the IEC 60044 standards to the new IEC 61869 standards
    f. Add new examples to Annex C
h) Motion to ask the I Subcommittee to create a working group to open a PAR was presented, motion by Don Ware, seconded by Robert Frye
i) Motion had no objections or abstentions and was passed by unanimous acclamation
j) Brian Mugalian will present the motion at the I Subcommittee meeting on May 6, 2021
k) Working group's first meeting date: September 20 – 23, 2021, location TBD
l) Motion to Adjourn – Robert Frye, seconded by Don Ware. 3:15 PM CDT

ITF47: Recommended Practice for Microprocessor-Based Protection Equipment Firmware Control (IEEE Standard C37.231-2006)

Chair: Amir Makki
Output: Recommendation to the Relay Practices Subcommittee
Established: May 2021
Expected Completion Date: May 2021
Assignment: The Standard will be expiring soon. Determine whether a PAR should be submitted to revise the Standard.

May 2021, Meeting Minutes:
The Task Force met on time with 16 colleagues in attendance. The Chair provided a high level overview of the standard and asked each attendee to comment on whether or not the Standard should be revised. Each attendee was allocated up to 2 minutes to make their case. The resulting answer was a unanimous yes.
The Task Force completed its work. A motion to disband and submit a PAR to revise was recommended to the Subcommittee.

Respectfully Submitted,
Amir Makki

Liaison Reports

a. Transformers Committee – Will Knapek

The Transformer Committee met the week of April 26th, 2021 virtually.

Highlights of interest:

Instrument Transformer Subcommittee

The following is the plan for the standards being developed/maintained by the Transformer Subcommittee.

Viewing Thomas Sizemore's...

Status of C57.13 Standards

Standard	Title	Status
C57.13	Standard Requirements for Instrument Transformers	Published 2016 rev due 12/31/2025
C57.13.2	Standard Conformance Test Procedures for Instrument Transformers	PAR exp 12/31/2021 Ballot pool is forming
C57.13.5	Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above	Published 2019 rev due 12/31/2028
C57.13.6	Standard for High Accuracy Instrument Transformers	reaffirmed 2010 rev due 12/31/2020
C57.13.7	Standard for Instrument Transformers with max output of 250 mA	Published 2018 rev due 12/31/2028
IEC-IEEE 63253-5713-8	Standard Requirements for Station Service Voltage Transformers	PAR to be extended Exp 12/31/2021
C57.13.9	Standard for Power-line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers	PAR to be extended exp 12/31/2021

A working group for the C57.13 standard is being started soon. They have been investigating if this standard could be a constantly updated standard. This would make it more of a living document than the WG adjourned then restarted.

There is a TF open that are looking into IT Accuracy. This TF is not considering relaying applications.

In the Power Subcommittee, a WG is forming to update the Volts/Hz information

Next meeting of the Main Transformer Committee meeting is scheduled to meet in Milwaukee, WI the week of October 18th, 2021.

11. Old Business
    a. IEEE P1854 - Guide for Smart Distribution Applications - PSRC is Co-Sponsor. WG should be formed in H-SC. Participate in that WG if you are interested.

12. New Business
    a. Motion to form TF to review IEEE C37.103.

       Motion 1 (Motion and Second required from the floor): Form Task Force to review IEEE C37.103-2015 - IEEE Guide for Differential and Polarizing Relay Circuit Testing. The Guide will be expiring soon (2025) so the I-SC should form a Task Force to review and determine whether a PAR should be opened for revision or reaffirmation of the Guide. Mohit Sharma participated in the last revision of the Guide has agreed to Chair the TF for this review.

Motion by: Mike Dood, Second by: Robert Frye

Motion passed by unanimous acclamation.

b. Motion to form Working Group I46 for C57.13.3 (Mugalian)

Motion 2, Motion by Mugalian: Task Force ITF46 moves to proceed with the creation of a Working Group to open a PAR for revision of IEEE C57.13.3-2014 - IEEE Guide for Grounding of Instrument Transformer Secondary Circuits and Cases.

WG Assignment: Revise IEEE C57.13.3-2014

Output: IEEE Standard, Project Number: PC57.13.3

Title: Guide for Grounding of Instrument Transformer Secondary Circuits and Cases

Scope: This guide contains general and specific recommendations for grounding current and voltage transformer secondary circuits and cases of connected equipment. The practices recommended apply to all transformers of this type, including capacitive voltage transformers and linear couplers, irrespective of primary voltage or whether the primary windings are connected to, or are in, power circuits or are connected in the secondary circuits of other transformers as auxiliary current transformers or voltage transformers. Although most diagrams included in this guide show relaying applications, the recommended practices apply equally to metering and other areas where instrument transformers are used.

Exceptions to grounding are permissible or sometimes required where advantages obtained by not grounding, in certain instances or in certain types of installations, are considered to outweigh the advantages obtained by grounding.

The scope of the guide includes grounding practices presently used and practices that were not previously reported. Specifically, a review of other than North American grounding practices is included.

Purpose: This guide provides information on the grounding of the following:

- Secondary circuits of electromagnetic CT and VT circuits

- Cases of relays, CTs, and VTs

- Secondary circuits of optoelectronic CTs and VTs

The primary emphases of this guide are personnel safety and proper performance of relays at electric power frequencies.

Motion by: Brian Mugalian, Second by Robert Frye

Motion passed by unanimous acclamation.

c. Motion to Form Balloting Body in IEEE SA (Lockhart)

Motion 3, (motion by Lockhart, requires second):

Working Group I36 Moves to proceed with IEEE SA Ballot for IEEE Standard C37.90.2 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

WG Assignment: Revision to IEEE Standard C37.90.2-2004

Output: IEEE Standard, Project Number: PC37.90.2

Title: 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

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.

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.

Motion by: Chase Lockhart, Second by: Robert Frye

Motion passed by unanimous acclamation.

d. Motion to form Working Group I47 for C37.231 (Makki)

Motion 4, Motion by Makki: Task Force ITF47 moves to proceed with the creation of a Working Group to open a PAR for revision of IEEE C37.231-2006(R2012) - IEEE Recommended Practice for Microprocessor-Based Protection Equipment Firmware Control.

WG Assignment: Revise IEEE C37.231-2006

Output: IEEE Standard, Project Number: PC37.231

Title: Recommended Practice for Microprocessor-Based Protection Equipment Firmware Control

Scope: The scope of this Recommended Practice will be to identify the means for timely and efficient exchange of information between manufacturers and users of protection related equipment with respect to (i) changes in device firmware and (ii) the impact of those changes. It will also include an examination of the technical and operational ramifications resulting from changes in the device firmware. Only hardware changes that impact firmware changes will be included..

Purpose: The purpose of the proposed project will be to develop a Recommended Practice that would facilitate the exchange of information, between manufacturers and users of microprocessor based protection equipment, on the changes in the firmware and the impact those changes will have in the performance of the devices.

Motion by Amir Makki, Second by Jeff Pond

Motion passed by unanimous acclamation.

13. Other announcements? Thanks to all participants, WG leadership, and PSRC Officers!
14. Motion to Adjourn, by Amir Makki, second by Adrian Zvarych

Meeting Adjourned at 8:58 AM CST

See you live or on-line, TBD, in September 2021!

J Rotating Machinery Protection Subcommittee

Chair: Gary Kobet
Vice Chair: Will English

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 Thursday May 6, 2021 at 10:20 AM CST with 24 out of 33 members and 40 guests, reaching quorum. A motion to approve the January 2021 J SC meeting minutes was made by Wayne Hartman and seconded by Ratan Das. The minutes were approved.

Liaison Reports:

Electric Machinery Committee – M. Yalla – Revisions to C50.12 include the shape of the capability curve in the underexcited region and a clarification of the zero-field current region of the curve. Also the section on total harmonic distortion will include a reference to IEEE 519.

Industry Applications Society (IAS) / Industrial & Commercial Power Systems (I&CPS) - M Donolo - No report

Nuclear 1E WG - Prem Kumar - IEEE 741 is scheduled to go for balloting very soon

Old Business:

Synchronous Condenser Protection Task Force – A motion to create a task force to investigate the need for a Working Group to develop a report on protection of Synchronous Condensers was made by Normann Fischer and seconded by Ritwik Chowdhury. The motion was approved with 21 hands in favor and none against. Jason Eruneo has agreed to chair the task force which will be JTF25. He requested a room for 20 attendees.

J5 Disband – Working Group J5 report was completed in July, 2020. A motion to disband Working Group J5 was made by Manish Das and seconded by Phil Tatro. The motion was approved with 20 hands in favor and none against.

New Business:

New J Sub Member – Ryan Carlson was announced as a new J Subcommittee member.

Technical Committee Overlap – The IEEE PES Technical Council has asked Subcommittee Chairs to review potential overlap of activities between PSRC and other PES technical committees. Scope of the Excitation Systems and Controls and the Station Design, Operations and Controls subcommittees of the Energy Development and Power Generations committee were displayed at the J Subcommittee meeting. Member were asked to be aware of the overlap.

Adjournment:
Motion to adjourn was made by Phil Tatro and seconded by Jason Eruneo. Meeting was adjourned at 11:22 AM CST.

The following J SC WGs met

J13: Modeling of Generator Controls for Coordinating Generator Relays
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 virtual session on Tuesday May 4th with 12 members and 24 guests present. A quorum was achieved.

The working group approved minutes of the January 12, 2021 meeting.

Juan Gers suggested to review the comments that Mike Thompson presented by email. The first comments were read by Juan Gers and the fixes proposed.

Taking into account that the time of the meeting was not enough to go in detail through all of the comments, it was approved to analyze Mike's reasons about them and then get a consensus of the group. To help on this, Mike made a quick summary of the comments that he had presented which were related mainly to the consideration of single blinder versus double blinder in out of step relays and the use of transient analysis to set the relays. The group agreed to add to the paper a paragraph to introduce both types of characteristics and to soften the words regarding transient analysis studies which are not always required.

Charlie Henville suggested to avoid the word **recommended** and similar ones, since the paper does not correspond to a standard of the IEEE. The group agreed with this suggestion which should then be implemented.

Juan Gers and Phil Tatro will revise the report to address the comments presented by Mike Thompson based on the consensus of the group. Once the fixes are ready, a new version will be circulated for approval of the members. If a WebEx session before the PSRC meeting of September is deemed necessary, the respective invitation will be circulated in due time.

The contributors to prepare a power point presentation summarizing the work of the group and the corresponding methodology, will be discussed in the next meeting.

Next Meeting:
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: 17th Meeting
Assignment*:* Investigate and report to the J Subcommittee on plant protection issues associated with black start.

WG Report

This Working Group did not meet. Subcommittee Chair requested status update on addressing PSRC Officer comments. Those comments have not yet been addressed.

J15: Investigation of the Criteria for the Transfer of Motor Buses
Chair: Wayne Hartmann
Secretary / Vice Chair: Doug Weisz
Established 2015 (1/15)
Output: Report (Draft 6)
Status: 19th Meeting (5-4-21)

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

1. The Working Group (WG) met May 4, 2021, with 14 members and 8 guests.
2. A motion to approve prior meeting minutes (Jan 2021) was made by Dale Finney and seconded by Dr. Yalla.
3. Chair reviewed WG assignment was reviewed as well as a brief history of WG activities.
4. The WG reviewed Draft Report 6 where several comments, edits and additions were discussed and resolved by the WG.
5. Accepted changes to sync scope where Pickup and Dropout lines were added.
6. Reviewed and resolved several comments from Doug Weisz and JC Theron for the Modeling A section.
7. Modeling B section comments were reviewed:
   - Dale Finney offered to re-run simulation model (and Derrick Haas offered to help) using revised H value and will provide text for parameter section. The software manufacturer's specific name in Fig 1 to be genericized per Dr. Yalla's comments.
   - Discussion on Fig 8 on why certain cases dip at some angles which did not match the trending of other cases. Derrick offered to investigate and provide explanation.
8. Dale Finney, Derrick Haas, and JC Theron volunteered to review Section 7 "MBT Field Data from MV Buses"
9. Section 3 was submitted by Tom Beckwith to compare and contrast ANSI C50.41, NEMA MG-1, and IEEE 666 to each other modern research. Bracy Nesbit and Zeeky Buhkala offered to review this section.
10. Chair reviewed next steps for WG.
11. Discussed how to square conclusions in final report i.e. conclusions per section vs overall conclusions.
12. If this was the first meeting for any attendees, please email Wayne (wghartm@aol.com) and he will add you to the mailing list.
13. 2nd session was cancelled as it was not needed; Meeting was adjourned.

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: 11th Meeting

Assignment: Revise C37.101 Guide for Generator Ground Protection

WG Report

The WG met with 13 out of the 22 voting members present. A total of 42 participants joined the Webex meeting. As quorum was achieved, **Ryan** asked if someone would like to make a motion to accept the Jan meeting minutes. **Dale** made a motion to accept Jan meeting minutes and **Zeeky** seconded so previous meeting minutes were accepted.

Ryan reviewed the patent slides required for IEEE PAR WGs. The C37.101 format change was reviewed and the working group decided to have three primary sections for the guide:

1) Grounding Methods
2) High Impedance / Resonant / Ungrounded Generators
3) Low Impedance / Solidly / Hybrid Grounded Generators

Next, assignments were reviewed:

- Grounding Methods – **Sudarshan Byreddy** previously volunteered for this section and still plans to complete it.
- High Impedance Grounding
    - 3rd harmonic schemes section is complete.
    - Resonant Grounding section – **JC Theron** completed his review of **Dale'**s write-up and **Ryan** provided JC's comments to Dale.
    - The working group briefly reviewed and had a discussion about the injection schemes write-up that **Nader** provided. Due to the highly technical nature of the write-up **Ryan** proposed adding the write-up as an Annex to the guide and providing a summary in the body of the guide that refers to the new Annex for further information. The working group and **Nader** reached a consensus that this section should become a new Annex. **Charlie Henville** asked what exactly is meant by "64S" in the title of this section, which resulted in finding that 64S is not presently included in the definitions/IEEE device numbers section so we need to add that. We also agreed to modify the title of the write-up to include both subharmonic and super-harmonic injection schemes i.e. it could be entitled just "injection schemes" so as not to disregard any schemes that are available.
    - The summary of the acceleration schemes outlined in the J12 improved grounding protection schemes report (**Jason & Ritwik** will draft this section for inclusion). Ritwik inquired if we want to include all voltage and current (i.e. V2, I2, etc) acceleration schemes and the discussion centered on including at least what is in the J12 report.
    - **Dale** will review 3Vo section vs latest draft of C37.234, J12 report, etc.
- Low impedance grounding –
    - Overcurrent and Diff schemes - **Ryan, Omar, & Steve M** will work to complete this section.
    - Hybrid Grounding – **Derrick Haas** previously volunteered for this section. **Ryan** will follow up with Derrick.
    - System Provides 3Io –**Vinod** emailed Ryan and stated that he is still planning to help with this section.
- Legacy Schemes – **Ryan** initiated a discussion about potentially moving a couple of schemes to the "legacy schemes section." Schemes that were discussed included the following existing schemes:
    - Scheme 19 – Alternate stator winding protection with high-impedance relays. The working group discussed that this is most commonly known as high resistance restricted earth fault scheme. Also discussed was that this scheme is still applied today, especially overseas. As a result the working group will leave the scheme in the low impedance grounding section.
    - Scheme 20 – Generator neutral overcurrent protection for an accidental solid ground fault. Several working group members stated that this scheme is applied on their units. As a result, the working group agreed that this scheme should stay in the guide.
    - At this time no schemes have been officially designated to be moved to the legacy schemes section. Discussions will continue if a legacy schemes section is needed.
- Annex A, example calculations – A preliminary review of Annex A is complete. This Annex may need to be reviewed further once the new guide format takes shape.
- Annex B, Ground Protection example to determine the percentage coverage of a high-impedance differential relay – **Ryan** asked for volunteers to review this section during the meeting. There were no

volunteers during the meeting however, **Joe Simpson** & **Swagata Das** contacted Ryan and Doug after the meeting and volunteered to assist and they will be added as WG members.

The working group also had a discussion about providing fuses in the secondary circuit for the 59N relay on the secondary of a grounding transformer. There appears to be a variety of strategies (fused, not fused, etc.) used across the industry. The working group concluded that the use of fuses at the neutral grounding resistor may help to protect against a fault on the control cable between the neutral grounding resistor and the 59N relay. Further discussion on this topic would be a useful addition to the guide. This topic will be revisited once the draft of the guide is further along.

Ryan stated that the PAR for this working group is set to expire at the end of 2021. A motion to extend the PAR will be made at the J Subcommittee meeting. The goal is to have all assignments completed in 1st half of 2021 and then start to pull the guide together in the 2nd half.

Ryan made motion to adjourn meeting and **Dale** seconded.

As a result of this session, we have updated the voting member list to include 2 new voting members and they have been added to the J16 working group. They are as follows:

- Joe Simpson
- Swagata Das

In the J Subcommittee meeting the following motion was made by Ryan Carlson, and seconded by Steven Conrad. The motion was approved with 19 hands in favor and none against.
Motion: Working Group J16 motions to extend the PAR for IEEE Standard C37.101, IEEE Guide for Generator Ground Protection, for 3 years.

Next Meeting:
The WG requests a single WebEx session for 60 people the September 2021 meeting. If the working group meets in person please provide a room for 40 people and a projector. The WG also request no conflict with other J meetings, especially J17 (C37.102) & J19 (C37.106).

J17 - Revision of C37.102 Guide for AC Generator Protection
Chair: Manish Das
Vice Chair: Gary Kobet
Output: IEEE Guide
Draft: 3.0
Established: May 2017
Status: 13th meeting, May 2021 (virtual)
Expected completion date: -
PAR Expiration: Dec 2021

Assignment: Revise C37.102 Guide for AC Generator Protection

WG Report

WG met on May 3, 2021 virtually via Webex in a single session with attendance recorded from 22 members and 31 guests. Quorum was achieved. The January 2021 minutes were approved (motion by Carlson, second by Conrad).

The Chair presented the patent slides, no claims were made.

The Chair shared that WG ballot is in progress and ballots are due May 21. Ballot forms went out to voting membership based on contributions and attendance in the last 12 meetings. Chair encouraged participants to reach out to WG Chair or Vice Chair if they were expecting the ballot form and did not receive it.

Items in the agenda were discussed:

- New subclause 4.3.3.1.2 on Improved Stator Ground Fault Protection schemes, **J12**.
- Some discussion about a statement in 4.5.3.1 about the minimum MVA size machine that requires out of step. It was decided no new MVA would be added; the existing statement was reworded slightly.
- Incorporating **J13** material into new subclause,
  - Suggestion made to replace "transient" with "dynamic" simulation
  - Steven Mueller commented on chat *the transient simulation section is worth mentioning in the guide and it would be helpful to provide guidance for consistent simulations, such as how many outlet lines prior to the event?, how long to run? etc*"
  - Dale Finney to check the present wording in Transient Simulation along with Juan Gers and provide updated verbiage, which will be moved to the end of Clause 5.
- Some discussion about application of single blinder/double-blinder schemes and new references to the **J5** report. Both schemes will be kept in the document.
- Some discussion on 4.5.3.2 on a previous comment by Jason Eruneo on why it is important to trip the breaker at 90 degrees or less. Dale Finney mentioned the need for overcurrent supervision to be considered to avoid locking out the OOS function on low current swings. He will provide some background material that could be considered as addition.
- Discussion about swapping Annex B content (Deriving SSSL) with Annex C (Bibliography) to avoid having to renumber the references to Bxx. Malia Zaman from IEEE checked and confirmed it should be first informative Annex, or the last, and "[BX]" has nothing to do with the Annex letter. Decided to make Bibliography be the last Annex; letters can still be [B#].
- New volunteers to review:
  - Bibliography references - Jason Eruneo, JC Theron
  - Check IEEE device numbers – Wayne Hartmann
  - Check/reword "shall", "should", "must" per IEEE style manual – Steve Conrad, Jason Eruneo, Malia Zaman

Chair mentioned that a PAR extension request will be motioned during the J subcommittee meeting.

After the meeting, Chair sent out a follow up note to members about a cleaner draft, Draft 3.0, (without tracking and updated from this meeting) that's available for everyone's convenience and should be used for ballot.

Webex meeting(s) may be scheduled before the Sep meeting to review ballot comments.

In the J Subcommittee meeting the following motion was made by Manish Das, and seconded by Ratan Das. The motion was approved with 17 hands in favor and none against.
Motion: Working Group J17 motions to extend the PAR for IEEE Standard C37.102, IEEE Guide for AC Generator Protection, for 1 year.

Next Meeting:
Request a single session for September 2021 with space for 40 people and 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

Assignment:
Write a report that describe the different types of sub-synchronous phenomena, their causes, and effects on the power system. Investigate the potential Impact on existing rotating machinery protection. Investigate how to detect these events and what mitigation techniques can be applied.

WG Report

- No comments provided on January minutes
- The chair noted that the first draft of the report is available on sharefile
- Password/link for sharefile will be sent to the group (provided first by Gary Kobet)
    - Added three new members
        - Tapan Mana
        - Nader Safari-Shad
        - Fernando Colero
    - Added three more guests
        - Juan Placid
        - LingLing Fan
        - Lalitha Devarakonda

- Presentation by Aboutaleb Haddadi and Bruno Leonardi (EPRI) "Inverter-Based Resources Sub-Synchronous Oscillation"
    - Various SSO modes for Type III and IV turbines
        - Series capacitor SSO
        - Weak grid SSO
    - Overview of SSO events in Minnesota (2007) and West China (2015)
    - IBR SSO Study Methods
        - Frequency Scan
        - Small-Signal Stability
        - EMT Simulations
    - Pros and Cons of each study approach
    - Overview of ERCOT screening method for SSCI
    - Overview of challenges associated with SSCI screening studies
- Copy of presentation will be made available to group via sharefile after final copy is provided by Aboutaleb
- PES TR80 Report is the basis for the presentation

Next meeting:
For the next meeting, if it is not held virtually, J18 will need a room for 60 and an overhead projector.

<u>J19 PC37.106 Guide for Abnormal Frequency Protection for Power Generating Units</u>
Chair: Ritwik Chowdhury
Vice Chair: Jason Eruneo
Output: Guide
Draft: 8.1
Established: January 2019
Status: 12th WG meeting, Virtual – May 4, 2021

Expected Completion Date: December 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

- WG ballot form was explained. An electronic ballot request will go out this month (May 2021).
- 10 members in attendance, we met quorum
- Jay Mearns motioned to approve meeting minutes, Ryan Carlson seconded motion
- WG elected not to remove paragraph selling dual relative to definite time scheme from section 4.4.2.1
- We are waiting to hear back from IEEE SA on access to IEC 61869-3 2011. We want to review this document to make sure our changes align with the document
    - **Action Item: Zeeky has access to the standard, will provide modifications**
- WG disapproved addition of language in section 5.2 on protection scheme modification for a frequency excursion event
- WG elected to modify "excess temperature after turbine" too "excess exhaust hood temperature."
- WG elected to approve cleanup/modifications to Section 6.3.2 for frequency protection guidance on new generators.
- WG decided not to add guidance about how to configure an 81ACC scheme to Section 6.1.3.
- Elected not to add text to Annex B for 81U settings that are dictated by utility for islanding situations where there is too much load relative to generation.
- WG decided to modify language in section 5.5 for bucket design turbines; we replaced the term "bucket" with "turbine."
- WG approved definition of the term "self-excitation"; we used the reactive absorption capability definition.
- WG reviewed section entirety of section 5.5
- WG addressed Vinod's comment about 81U margin
- WG addressed Will's question about typical setting for torsional I2 setting

Next meeting:
Double session. If virtual, capacity for 40. If physical, a room for 25 and a projector.
Request no conflict with I38, J20 and C45.

J20 Practices for Generator Synchronizing Systems
CHAIR: Jason Eruneo
VICE-CHAIR: Luis Polanco
Output: Report
Established: January 2019
Status: 6th WG Meeting, Virtual May 5, 2021

Assignment: This report will discuss all aspects related to implementation of a generator synchronization system. This includes design, settings, testing, commissioning practices, monitoring, and protective schemes for generator synchronizing systems. The report will include a range of common system configurations.

WG Report

- 17 members present with 19 guests, quorum was met
- Ritwik motioned to approve January meeting minutes; Steve Conrad seconded. Meeting minutes were approved

- The following sections received additional support for completion:
  - Section 1.2.2 Electrical Torque Stress
    - Action Item: Jay Mearns will add language to section to bring section to completion.
  - Section 1.2.3 Mechanical Torque Stress
    - Action Item: Jay Mearns will add language to section to bring section to completion.
  - Section 2.1.3 Excessive Frequency Difference
    - Action Item: Tom Beckwith and Jay Mearns will review and add language to section to bring section to completion.
  - Section 2.2.3 Voltage Matching System
    - Action Item: Tom Beckwith and Jay Mearns will add language to section to bring it to completion.
  - Section 3 Generator Control Systems
    - Action Item: Zeeky Bukhala and Geno Stewart will assist Randy Hamilton complete this section
  - Section 7 Synchronization Failure Protection Schemes
    - Action Item: JC Theron will help Kelvin Barner and Luis complete this section.
  - Section 8 Out of Phase Closure Remedial Action
    - Action Item: Jay Mearns and Zeeky Bukhala will review and add language to section to bring it to completion.
- Chair has requested for assignments to be completed and submitted by July 18 for inclusion in the report.
- WG addressed the following comments in the report draft:
  - Section 2.1 Point of Synchronization: location where two independently rotating systems will be electrically joined together. Perhaps definition is too wide (includes microgrid sync as written). Clarify language to limit application to rotating machinery. Remove term and clarify where sync may typically occur.
  - Section 2.1.3 slip frequency impact on turbine loss of life: WG discussed how the speed transient during synchronization breaker closure can create a longer stress cycle on the machine turbine. A difference in voltage phase angle creates more of a singular/momentary stress cycle. This longer stress cycle has a more profound effect on turbine loss-of-life, especially if a mechanical resonant frequency is excited during this speed transient. WG is not aware of a situation in which a high slip during synchronization can cause a system disturbance or loss of stability. Thus, the language has been removed from the report.
- Zeeky Bukhala motion to adjourn, Mike Thompson second.

Next meeting:

-

J21 - <u>Motor Protection Tutorial</u>
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 (3rd meeting 20210505)

WG report

- 9 members and 20 guests were in attendance.
- Chair reviewed previous meeting minutes.

- Outstanding assignments were reviewed:
    - Raju suggested section 5.7 be added (with section 5.8) to "Other Considerations" portion of tutorial.
    - Remaining outstanding assignments were requested to be completed by the next meeting.
- Coordination with J22 (revision of C37.96) discussed
    - JC Theron reviewing section on ASD's for guide revision and tutorial.
    - Tom B reviewing MBT section for both guide and tutorial
    - Will English is reviewing Equipment Description section for both guide and tutorial
    - Kelvin to coordinate with J22 Chair, Zeeky, who was attending this WG meeting.
- Chair to coordinate setup of file sharing site with Gary Kobet and distribute link to WG members.
- Interim Webex Meeting in July to assess completed and outstanding assignments.
- Further discussion about some additions to Motor Bus Transfer section by Tom B.
- Chair to send out means for obtaining contact information to the WG for collaboration.

Next meeting:
A single session is requested with room for 30 and a projector for the September 2021 meeting. Also request no conflict with J15 and J22.

J22: Revision of C37.96 Guide for AC Motor Protection
Chair: Zeeky Bukhala
Vice Chair: TBD
Secretary: --
Output: Guide
Draft: -
Established Date: May 2021
Status: WG Meeting 1
Expected Completion Date: TBD
PAR Expiration Date:

Assignment: To revise and update C37.96, Guide for AC Motor Protection

WG Report

The Working Group held its first meeting on Wednesday, May 5th with 14 members and 12 guests in attendance.

I. Welcome / Introduction
    a. Chair kicked off meeting at 9:10am CDT and welcomed members and guests to the working group's first meeting.
    b. Chair reviewed the meeting agenda.
II. IEEE Patent/Copyright Slide – There were no objections raised.
III. Working Group Membership
    a. Chair shared a list of 17 attendees from JTF3 who had volunteered to be voting members of J22.
    b. An additional 8 attendees volunteered to join the working group bring the total membership to 25.
    c. Chair thanks Jason Buneo for volunteering to be Vice Chair of the working group and taking notes for the meeting. Chair will formalize his appointment be seeking approval from the subcommittee.
IV. Draft PAR for approval
    a. Chair presented drafts to substantive sections of the PAR for discussion. Draft was based on previous draft and changes were based on potential material identified by the JTF3.
    b. Section 5.2 – Scope.

i. Modified to include motor health monitoring
ii. There was some discussion on what monitoring would include and some of the examples raised included, stator bar condition, motor vibration, applying current monitoring to measure driven pump flow.
iii. Had discussion on keeping protection requirement for adjustable speed drives, which was affirmed. Language was adjusted to clarify that the protection is associated with the motors and not the ASDs.

c. Section 5.4 – Purpose.
i. Chair reminded that the working group that this section would be incorporated verbatim as Section 1.2 in the guide per IEEE-SA requirements. It was previously not included.
ii. Chair's proposed language was accepted without comment.

d. Section 5.5 – Need for the Project
i. Chair's proposed language captured the main themes of the JTF3 recommendations at a high level.
ii. Hasnain Ashrafi raised the point that the guide should include a discussion on the protection of synchronous motors during startup. It was agreed to investigate this during the guide's revision.
iii. Section was accepted with minor editorial changes.

e. Section 5.6 - Stakeholders for the Standard
i. Chair proposed adding consultants and manufacturers to the list.
ii. Murty Yalla suggested modifying manufacturers to motor manufacturers.
iii. Clause was accepted with the amendment

f. A motion was moved, seconded and carried to approve the PAR language with the agreed on changes.

V. Discussion on review/revision
a. The following sections were assigned for review:
i. Section 2 - Open
ii. Section 3 - Open
iii. Section 4 – Will English, Jalar Gohari
iv. Section 5
- 5.1-5.5 – Derrick Haas, Jason Eruneo
- 5.6-5.8 – Nabil El-Halabi
- 5.9 – Hasnain Ashrafi

v. Section 6
- 6.1-6.2, 6.5 – Andy Kunze
- 6.3 – JC Theron
- 6.4 – JC Theron, Tom Beckwith

vi. Section 7 – Jason Buneo, Nabil El-Halab
vii. Section 8 – Zeeky Bukhala
viii. Annex A – Open
ix. Annex B

b. Working Group will use iMeet Central, Chair will set up the C37.96 folder and communicate once done.

VI. Adjourn
a. Next meeting will be a virtual meeting in June
b. Meeting adjourned at 10:12am CDT.

In the J Subcommittee meeting the following motion was made by Zeeky Bukhala, and seconded by Jason Eruneo. The motion was approved with 19 hands in favor and none against.

Motion: Working Group J22 motions to Revise IEEE Standard C37.96, IEEE Guide for AC Motor Protection, with the following Assignment, Scope, and Purpose.
WG Assignment: Revise IEEE Std C37.96-2012, IEEE Guide for AC Motor Protection
Proposed Scope: This application guide presents generally accepted methods of protection ~~for~~ and monitoring of ac motors. It identifies and summarizes the functions necessary for adequate protection of motors based on type, size, and application. The ~~recommendations~~ methods discussed in this guide are based on typical installations. Information relating to protection requirements, including microprocessor-based protection systems, applications, and setting philosophy is provided to enable the reader to determine required protective functions for motor installations. Relay protection of squirrel-cage, wound-rotor induction motors, and synchronous motors is presented herein. This guide also summarizes the uses of relays and devices, individually and in combination, so the user may select the necessary equipment, to obtain adequate motor protection. This guide is concerned primarily with the protection of three-phase, integral horsepower motors and motors associated with adjustable-speed drives ~~where specifically indicated~~. This guide does not purport to detail the protective requirements of all motors in every situation. What it does provide is enough information and guidance to implement adequate protection for most applications.
Proposed Purpose: This guide provides users with methods and configurations (schemes) for ~~implementing protection of AC~~ protecting ac motors~~. Initiating this revision, is need to cover new technology, applications,~~ from faults and abnormal operating conditions ~~explain further the AC motor characteristics used in setting protective relays~~.

The Proposed Scope was modified by the J Subcommittee. Submittal of the PAR is pending Working Group approval of the modified scope.

Next meeting:
Single session with accommodations for 40 people is requested.
Also request no conflict with all J meetings, especially J15 and J21.

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:

WG report

Scope was presented to members and guests.

There was a brief follow up presentation on monitoring rotor ground fault resistance.

Task to develop report as working group will be presented at subcommittee meeting.

In the J Subcommittee meeting a motion to approve the following Working Group assignement was made by Steve Turner and seconded by Zeeky Bukhala. The motion was approved with 19 hands in favor and none against.

- **Proposed WG Assignment:** Develop a report that covers the following aspects of condition-based monitoring for synchronous machines:

- Describe and develop guidelines for online condition monitoring of large synchronous machines, including salient-pole rotors as well as cylindrical rotors.
- Use online machine condition-based monitoring to detect potential problems before an actual fault develops and schedule maintenance.
- Provides information on online condition monitoring techniques as well as proposing typical thresholds to trigger alarms and initiate remedial or compensating action.
- Demonstrate how to use specific the protection functions to monitor machines.
- Describe mechanisms of degradation and applicable monitoring devices.
- Some relays can monitor RTDs and other transducer-based signals. Some relays monitor field voltage and current. Some relays also include thermal models for the stator and rotor.
- Pilot projects to explore this technology.
- Work with other technical committees as necessary.

The Working Group will be designated J23.

JTF2: Investigate the Need for a Disturbance Recording WG
Chair: Dennis Tierney
Vice Chair: Shane Haveron
Secretary: open
Output: Proposed assignment of working group under J-SC
Established Date: 9-22-2020
Expected Completion Date: September 2023
Draft: -
Assignment: Investigate the need for a working group to develop a document on disturbance recording as applied to rotating machinery

WG Report

The task force met on 05/04/2021@2:20pm CDT with 30 people in attendance.

In the absence of the Chair, the J-SC Chair ran the meeting with the assistance of the TF Vice-Chair Shane Haveron.

Regarding the 2006 PSRC C5 report "Considerations for Use of Disturbance Recorders", the J-SC Chair noted the recommendation from the Main Committee officers was to open create a new document specific to generators and only refer to the C5 document.

The J-SC Chair assigned to all attendees interested in this topic to thoroughly read the C5 document which is available on the PSRC website at https://www.pes-psrc.org/kb/published/reports/C5-Final%20Report.pdf. As they read they should think of how the material in that document may apply or not apply to generator disturbance monitoring.

The J-SC Chair has setup a folder for JTF2 on the PSRC Sharefile site, and files can be added to this document by the JTF2 Chair as needed. The site is at https://psrc.sharefile.com/home/shared/fo6be30c-453a-4e15-a84c-500b1c1cf436.

The J-SC Chair led a discussion on developing an assignment, the result of which is given below. The expectation is that the task force officers will work on the assignment over coming months with the goal of finalizing it at the September task force meeting, for the purpose of presenting it to the J-SC for approval at its September meeting.

Initial rough draft of assignment: Establish a working group to publish a document on the use of disturbance recording for synchronous generators (rotating machinery?) which will include:

- Tools and methods used for analyzing data from Fault Recording and Disturbance Recording devices
- Need to understand how each data file was produced when comparing data from different files
- Methods of correcting time stamps to help synchronize fault data from different device with incorrect time stamps
- Recognizing CT saturation and VT transients
- Data file type and data file naming
- Sample rate, record length, short term or continuous monitoring
- Reference NERC PRC-002 requirements
- Oscillation source location(?)
- For model validation (NERC MOD requirements?)
- Speed sensors, torsional sensors
- Exciter current
- Overexcitation (overfluxing), reverse power flow, etc
- Digital inputs from AVR, governor (e.g., gate limiter)
- Use of IEC 61850
- Synchronous/induction motor and/or synchronous condenser considerations?

Next meeting:
Single session with accommodations for 30 people is requested

K Substation Protection Subcommittee
Meeting Minutes, January 14, 2021, 11:30 – 12:30 CST - Webex
Chair: Jeff Barsch
Vice-Chair: Adi Mulawarman

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 that 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;** Webex Virtual PSRC - January, 2021) – motion by Brandon Davis, second by Stephen Conrad, unanimous approval.
- **Approval of agenda** – motion by Paul Elkin second by Sebastien Billaut, unanimous approval.
- **Advisory Committee items of interest**
  Please have working group meeting minutes to K SC chair by May 14 2021, 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 428 PSRCC Attendees for this meeting, including 61 first time attendees.
  PSRC Sharefile site for non-PAR related Working Groups will be available.

- **Working Group Reports:**

K10: SCC21 Distributed Resources Standard Coordination

Chair: R. Benjamin Kazimier
Vice Chair: Wayne Stec
Secretary : Matt Garver
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.

Time called to Order and Chair's remarks: The meeting was called to order at 12:30 Eastern Time.
Approve minutes of previous meeting:

NA

Approve the meeting Agenda:

NA

Topics discussed:

- There were 30 participants
- Wayne Stec gave update on 1547.2
- Tony Johnson gave update on 1547.3
- Tony Johnson gave update on 2030
- The upcoming IEEE P1547.2, .3 & .9 working group meetings. The meetings are scheduled as follows:
  - P1547.9 – June 7th 10:30am – 5:30pm EDT & June 8th 10:30am & 1:30pm EDT
  - P1547.3 – June 8th 2:30pm – 5:30pm EDT & June 9th 10:30am – 5:30pm EDT
  - P1547.2 – June 10th & 11th – 10:30am – 5:30pm both days

Action items:

- None

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 met virtually on Wednesday, May 5, 2021 at 10:20 AM CDT with 5 members and 6 guests.

i) The WG is meeting virtually on Wednesday of every other week with Substations WG I9 WG. The I9/K12 Meeting minutes from the most recent meeting of April 28 were reviewed.

j) At the April 28 meeting, the I9 WG asked K12 to review the ground fault protection discussion and table in Section 7.6.1 of the draft on Discussion of Faults. The WG reviewed Section 7.6.1 and provided comments, which will be forwarded to the I9 WG.

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 WG did not meet in May 2021.
PC37.91 was approved as a revised standard by the IEEE SA Standards Board on 25 March 2021. The document is currently under review by an editor in the Standards Publications Department.
The WG will remain active to facilitate addressing comments from the editor if any could impact technical content of the guide.

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: D2.23
Assignment: Revise the Guide for the Protection of Secondary Network Systems

WG work is complete. The revised guide has been published and available from IEEE Xplore.
Chair propose to disband WG. Motion made by Mike Thompson, second by Jeff Barsch.
Chair propose to create a new TF to write presentation and summary paper to the PSRC main committee made by Adi Mulawarman,second by Abu Bapary
KTF30 chair Adi, vice chair position open. TF Assignment: To provide recommendation to K SC whether to form WG to create summary paper and presentation.

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: 9
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 23 voting members, 3 non-voting members and 40 guests. A motion was made by Steve Conrad to approve the minutes from the January 11 PSRC and WebEx meetings (March 25 WebEx #24, April 8 WebEx #25, and April 22 WebEx #26 meeting minutes). The motion was seconded by Jay Anderson. There was a correction to April 22 WebEx #26 minutes. The minutes were approved with the correction.

The meeting agenda was reviewed, and no revisions were made to it. A motion was made to approve the agenda by Greg Ryan and seconded by Sebastian Billaut.
IEEE-SA initial ballot conducted in Feb-March 2021.The ballot response rate was 82% (the minimum response rate is 75%). The guide's approval rate is 93% (minimum is 75%). We received 6 negative ballots and 220 comments that we are currently resolving. The goal is to resolve the ballot comments by July 1 and recirculate the guide.
Technical topics:
1.) There was a question from a guest concerning the inclusion of non-conventional current sources to bus protection relays such as optical current sensors and sample values as part of the IEC-61850. There is a mentioning of optical current sensors and a sub-clause describing the centralized and decentralized bus protection. The WG agreed with the comment but thought that the presently included material is sufficient. Any additions will have to wait until the future revision of the guide.

2.) The WG completed addressing the comments for Clause 6 Relay input sources and started addressing the comments for Clause 7 Bus protection methods.

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 5/5/2021 from 2:20 to 3:20 PM CDT.
- Officer presiding – Meyer Kao
- Officer recording minutes – Rick Gamble
- The meeting was called to order by the Chair, who then showed the patent/copyright slides.
- The Webex Meeting was attended by 11 members out of 29 and several guests. Quorum was not met.
- Minutes of previous meetings was not approved due to quorum not being met

Meeting Summary:

The chair discussed the use of the calculation tables in sections 8.4-8.6. Last meeting, it was decided that a different method of calculation can be adequate for the end purpose of those sections. An equation was derived based on the 1990 version of the guide. The chair proposed the WG eliminate the tables and revisit the equations based on the derived method to be used in each section (8.4 through 8.6). WG was in general agreement in proceeding in this direction, with some further discussion. Some members feel that there is value in the equations in the table, but less so the resultant calculations in the table. An integrated approach was suggested, in which the existing equations from the tables and the proposed method would be presented together. The difference is that the original tables present calculations for operating quantities, where the new proposed method provides end-point setting calculations. The Chair invited Bogdan Kasztenny to present his findings on the table-based calculations in the guide. He recommends simplifying the approach and cleaning up those tables. Bogdan wrote a paper with recommendations that will be distributed to the WG.

K26: C37.109 IEEE Guide for the protection of Shunt Reactors
Chair: Kamal Garg
Vice Chair: Ilia Voloh
Output: Guide
Established Date: Aug 2019
Expected Completion Date: 2023
Draft: V 1.3, Sep 22 2020

Date: Tuesday, May 4, 2021
Time: 3.30 – 4.30 PM (CDT)
Venue: WEB Meeting

1. Introduction and agenda (39 participants and 11 members). Reached Quorum. (Total WG members 20).
2. Approved previous meetings-March 18, 2021.
3. Patent and copyright slides were presented.
4. Kamal gave progress update. Discussed the outline for line reactor, tertiary reactors, and Annex with informative.
5. Many review contributions received online reactor protection and WG is working to resolve comments. WG is planning to arrange one additional meeting before May meeting. WG now working on tertiary reactor protection.
6. Ilia presented the updates on resonance section.
7. Paul from Xcel energy presented the events on the resonance. Dean has some follow up questions regarding open reactors online faults. Further discussion will be required.
8. Reactor BF section was discussed briefly. Section is limited to the challenges of the BF protection for reactors.
9. VSR section and protection was discussed. Saudi Aramco has a VSR for submarine cables. Nabil from Saudi Aramco discussed VSR application and protection.
10. Adjourn

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

1. Welcome
2. Patent Slides - https://mentor.ieee.org/myproject/Public/mytools/mob/slideset.pdf
3. Call for Membership (Quorum met with 10/20 members)
    - Several participants expressed interest in joining the working group. Hillmon will follow-up with interested individuals.
4. Approval of Agenda
    - Motion to Approve: Brandon Davies
    - Second: Steve Conrad
    - Opposed: None.

5. Approve January 2021 Virtual Meeting Minutes
    - Motion to Approve: Lubomir S.
    - Second: Abu Zahid
    - Opposed: None.
6. WG Administrative Update
    - iMeet Central Discussion
    - Goals
        - Have all Assignments received by September 2021 Meeting
        - All contributions will be merged into a single document after the meeting.
        - Work on editing between September and January Meetings, with Web meetings.
        - Have it ready for WG vote May 2023 Meeting
7. Assignment Updates
    - Figures
        - Steve Conrad – Uploaded Original Figures to iMeet Central
        - Steve Klecker – Figure Manager
            - Edit proposals received, Steve will translate into VISIO
    - Section 4 –
        - Daniel Lebeau's discussion left pending from last meeting's chat:
            - Section 4.3.11, but also applicable to section 8. Transformer Connections focus on Delta – Wye. Some utilities prefer Yg High side connections. Can the guide be made more general to account for different connections?
            - We decided to modify. We have two assignments based on the discussion. See extended discussion section below. New assignments for Daniel Lebau and Steve Miller.
        - Steve Conrad (Discussed)
        - Paukl Elkin (Discussed)
        - Koustubh Banerjee
    - Section 5 –
        - Paul Elkin (Discussed)
    - Section 6 –
        - Brandon Davies (Discussed)
        - Paul Elkin (Discussed)
        - Abu Zahid – Microprocessor Relaying Discussion (Discussed during meeting)
        - Ted Warren – Microprocessor Relaying Discussion (Discussed during meeting)
        - Lalitha Devarakonda – Section 6.1.2 Backup or redundant protection (Not Received)
    - Section 7 –
        - Mohammad Zadeh (Not Received)
        - Gopal Gajjar (Not Received)
    - Section 8 –
        - Hillmon Ladner (Discussed)
        - Paul Elkin (Discussed)
        - Jeff Barsch (Discussed during meeting)
        - Onur Usmen (Discussed during meeting)
        - Wayne Stec (Not Received)
        - We've discussed adding a section on renewable resources. We need to select where on this section to add the discussion and assign an author.
    - Section 9 –
        - Paul Elkin (Received Pending Discussion)
        - Lubomir Sevov – (Not Received)
    - The WG will postpone the review following:

- Annex A
- Normative References and Definitions

8. Schedule Next Meeting
    - Proposal: 7/13/2021 11:30am Eastern Time
9. Adjourn
    - Motion: Steve Conrad
    - Second: Ted Warren
    - Opposed: None.
    - Thanks to all!

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.

IEEE Transactions can only accept paper that has not been published. Since the report has been accepted and published in PES TR, it cannot be submitted as transaction paper. So the title and assignment will be updated to indicate summary paper instead of transaction paper.
Motion by Qun Qiu, second by Sebastien Billaut.

K29 WG: Write PES technical report based on K3 report entitled 'Reducing outage durations through improved protection and autorestoration in distribution substations'.
Chair: Sebastien Billaut
Vice Chair: Mohamed Zedh
Secretary: Lalitha Devarakonda
Established: 2019
Output: Recommendation to K SC
Expected Completion Date: 2020
Assignment: Create a PES technical report based on the K3 report entitled 'Reducing outage durations through improved protection and auto restoration in distribution substations'.

K29 **met Monday May 3rd at 15:30CT with 53 attendees,** via the virtual online Webex.
Chair, Sebastien Billaut presided over the meeting. He brought the meeting to order and showed the agenda.
The Chair and K Subcommittee Vice Chair and Host of the session recorded the minutes. The host moderated the Chat window.
5 of the 10 voting members were present.
28 attendees were new to the group.
18 requested to become voting members.
The group reviewed the list of additions created during the KTF29 meeting in January 2021.
Volunteers were assigned to work in groups on each of the items.
We created groups to review different sections of the existing document.

Liaison Reports:

T&D Committee, Capacitor Subcommittee, **Pratap Mysore,**

http://grouper.ieee.org/groups/td/cap/

Nothing to report

Transformers Committee, **Will Knapek**

http://www.transformerscommittee.org/

___ The Transformer Committee met the week of April 26th, 2021 virtually.

Highlights of interest:

Instrument Transformer Subcommittee

Here is the plan of standards being developed/maintained by the Subcommittee.

Standard	Title	Status
C57.13	Standard Requirements for Instrument Transformers	Published 2016 rev due 12/31/2025
C57.13.2	Standard Conformance Test Procedures for Instrument Transformers	PAR exp 12/31/2021 Ballot pool is forming
C57.13.5	Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above	Published 2019 rev due 12/31/2028
C57.13.6	Standard for High Accuracy Instrument Transformers	reaffirmed 2010 rev due 12/31/2020
C57.13.7	Standard for Instrument Transformers with max output of 250 mA	Published 2018 rev due 12/31/2028
IEC-IEEE 63253-5713-8	Standard Requirements for Station Service Voltage Transformers	PAR to be extended Exp 12/31/2021
C57.13.9	Standard for Power-line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers	PAR to be extended exp 12/31/2021

A working group for the C57.13 standard is being started soon. They have been investigating if this standard could be a constantly updated standard. This would make it more of a living document than the WG adjourned then restarted.

There is a TF open that are looking into IT Accuracy. This TF is not considering relaying applications.

In the Power Subcommittee, a WG is forming to update the Volts/Hz information

Next meeting of the Main Transformer Committee meeting is scheduled to meet in Milwaukee, WI the week of October 18th, 2021.

Old Business

None

New Business

Creation of new TF for C37.119 Bkr Failure Protection Guide

Proposal made by K SC chair (Jeff), motion by Adi , second by Charlie Sufana

Chair of KTF31 Jeff Barsch

Items of General Interest

Adjourn motion by Adi Mulawarman. Second by Kamal Garg. Unanimously approve.