POWER SYSTEM RELAYING AND CONTROL COMMITTEE
OF THE IEEE POWER AND ENERGY SOCIETY
MINUTES OF THE MEETING
January 12-16, 2020, Jacksonville, FL

I. Call to order / Introductions: Russ Patterson

Vice-Chair Murty Yalla, called the meeting to order at 8:00 am on Thursday, January 16, 2020. The chair, Russ Patterson had to leave the meeting early. There were 89 members and 86 guests for a total attendance of 175.

All attendees introduced themselves. First time attendees were asked to stand and reintroduce themselves. A quorum check was conducted, and it was verified that quorum was met with 89 voting members in attendance out of a total membership of 132 voting members. An attendance sheet was routed.

II. Sponsors

The JTCM meeting was organized by the PES so there were no sponsors for coffee breaks from the PSRC Committee.

III. Approval of Minutes / Financial Report: Michael Thompson

A motion to approve the minutes of the September meeting of the PSRC Committee in Denver, CO was made by P. Winston. The motion was seconded by P. Mysore. There was no further discussion. The motion was approved unanimously.

The PSRC committee financial status is fine. Attendance was good for the September meeting in Denver, so we were able to cover the costs of the meeting from registration and the support of our sponsors.

IV. Chairman's Report: Russ Patterson

We had 244 attendees for our January 2020 meeting in Jacksonville, FL including 27 newcomers.

We have a large amount of work on our plate (including with Inverter Based Resources) and it will remain that way for the foreseeable future. I am encouraged to see us tackle the new technical challenges as well as maintaining our long standing standards with new developments and improvements.

Thank you to all PSRC attendees for making our January 2020 joint meeting a successful meeting. I look forward to seeing you all in Nashville, TN for our May 2020 meeting.

Sincerely,

Russ Patterson

V. Reports of Interest

A. Technical Paper Coordinator's Report: Murty Yalla

T&D 2020 (Chicago, IL April 20-23, 2020)

- 13 papers submitted and 9 were accepted, 7 papers will be in the forum and 2 papers will be in

poster session.

- PSRCC will also have 2 panel sessions.

GM 2020 is in Montreal, Canada (Aug 2-7, 2020)

- Papers are under review. Total 38 papers received. Expected to accept around 20 papers.
- PSRCC will also have 3 panel sessions.

B. Future Meetings: Murty Yalla

- May 2020 Meeting; Sheraton Music City, Nashville, TN; May 4-7, 2020.
- September 2020 Meeting, Peppermill Casino, Reno, NV; September 21-24, 2020.
- January 2020 JTCM Meeting, Sheraton New Orleans, New Orleans, LA, January, 10 – 14, 2021

Details are posted on the PSRC website.

C. 123Signup Update: Michael Thompson

The 123signup system is an integrated system that handles all membership management tasks. Within the system, all members manage their own personal information. The system provides GDPR compliance. The system handles all registration and credit card payments.

Status report:

- We are now fully using the system to manage our committee membership. We have only a few administrators not managing their rosters using the system.
- We are working with 123signup and the IEEE PES to make improvements to the system.
  - There will be a new user interface for participants rolled out soon.
  - There will be a directory function so that active participants and members can contact others for the purpose of conducting PSRC committee business. An announcement will be made when this is ready.
  - The PSRC Committee is working on providing collaboration tools for working groups.
- Rosters, Sign in Sheets, and Attendance Records:
  - The sign-in sheet provided by IEEE SA with the IEEE permission blurb allowing you to collect contact information in an open form is OBSOLETE. This was necessary before we implemented 123signup for keeping participant's records. Please do not use it going forward.
  - The preformatted meeting attendance sign-up sheets generated by 123signup leave much to be desired. It is recommended to download roster reports for your group in csv format. Once in that format, it is easy to use spreadsheet software to create useful sign-in sheets. You can sort the names alphabetically, and list members and guests in separate groupings. You can include individual's roles and affiliation in addition to first and last names. You can provide empty cells for people to initial and/or request membership, etc. Please do not include fields for contact information.
  - Please do not use blank sign in sheets if possible. Using the roster from the database provides people with information on their role and makes it easier for you to record attendance. In general, the only names you have to find are the people who have to hand write their name because you don't already have them in your roster. This should be a relatively small number after each meeting.
- There is a 2MB limit for attachments when using the listserv function. If necessary, email using the bcc line when sending an email with an attachment larger than 2MB.

D. CIGRE B5 Activities Report: Rich Hunt

New Working Groups

No new Working Groups have been formed since the September PSRCC meeting.

New Publications

B5.66

2019 CIGRE Grid of the Future Conference, Atlanta, GA.

The 2019 CIGRE Grid of the Future Conference was held in Atlanta, GA, November 3-6. 81 papers over 5 CIGRE Study Committees. The Conference also includes a NGN (next generation engineer) paper contest.

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

2020 CIGRE General Session, Paris, France, August 2020

Synopses have been submitted and approved. Final papers are being reviewed now.

Preferential Subjects:

PS 1 Human Aspects In Protection, Automation And Control Systems (Pacs)

PS 2 Communications Networks In Protection, Automation And Control Systems (Pacs) : Experience And Challenges

Tutorial Topics:

- Distribution Protection
    - Grounding (including the impact on protection for fire mitigation)
    - Reverse Power flow
    - Abnormal operating conditions
- Metering in Substations
    - What is metering (types and challenges of metering)
    - Coordination of accuracy requirements in the measuring chain (comparison of traditional vs digital)
    - Data security/privacy
    - Challenges of metering distributed energy resources

CIGRE 2021 B5 Colloquium

The 2021 B5 Colloquium will be hosted by CIGRE India in New Delhi. More details to follow. Preferential subjects will be:

- Interoperability for IEDs of different manufacturers integrated in one PACS
- Fast Transient based protection
- Mitigation Strategies and Methodologies to Manage the Impact of Low-Inertia and Low Fault Level Networks On PACM

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

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

E. PES Report: Vijay Vittal and Shana Pepin

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Shana Pepin (s.pepin@ieee.org), IEEE PES Technical Activities Program Manager, provided updates on IEEE PES Technical Activities related to:

a) PES Technical Activities Content Calendar & PES Resource Center

Shana generates and maintains a PES Technical Committee content calendar based on the areas/topics identified by PES Technical Committees for the year and seeks content in the form of technical reports, webinars, roadmaps, white papers, etc. for posting in the PES Resource Center. You can reach out to Shana at any time to plan for new content from your committee to be published in the PES Resource Center and Shana can provide guidance.

b) Promotional Efforts for PES Technical Activities/Committees

Shana reviewed available options for promotion of committee activities including, PES ebulletin, Technical Committee spotlights each month, social media, etc.

c) New WordPress Template for Committee Websites

Webmaster resources posted to PES website here:https://www.ieee-pes.org/about-pes/webmaster-resources but, awaiting announcement to full IEEE PES Tech Council until dummy site is available to view as a sample for Technical Committee webmasters looking to update their current websites.

d) Ensuring Operational Consistency among all IEEE PES Technical Committees

This includes (but is not limited to): collection/maintenance of PES Committee O&P Manuals, communication of upcoming PES committee meetings via the PES calendar, PES templates & processes (i.e. annual reports, technical reports, webinars/tutorials, IEEE copyright forms, etc.) Rosters/meeting attendance/participant directory currently via 123Signup system as mandate by PES Technical Council

F. IEC Report: Eric Udren

TC 95, Measuring Relays and Protection Systems

IEC TC 95 creates IEC 60255 series protection system standards – electrical and physical environment type testing, design, safety, and functional behavior. Technical work is carried out by Maintenance Teams (MTs) and by Working Groups led by Convenors. Dr. Murty Yalla of PSRC is Chair of TC 95 internationally.

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

TC 95 MTs last met in Glasgow, Scotland, October 7-11. The next MT meeting is a joint meeting with TC 38 (Instrument Transformers) on 25-29 May 2020 in Dubrovnik, Croatia. The next TC 95 plenary meeting is planned for November 2-6 in a Korea or India location to be determined.

The US recently and enthusiastically supported the reappointment of Thierry Bardou as Secretary of TC 95, serving with Chair Murty Yalla.

The TC 95 Secretary solicited issues and ideas for updating of the TC 95 strategic business plan – get current plan at https://www.iec.ch/dyn/www/f?p=103:7:4126643276659::::FSP_ORG_ID,FSP_LANG_ID:1291,25 or contact the author of this report. The US TAG as WG I4 added to the list of issues:

- Traveling wave applications in T&D.
- Synchrophasor WAMPAC applications and functional requirements.
- Functional requirements for protection systems in local or wide-area clouds – includes digital I/O but there are issues for protection cloud. Local cloud refers to what is sometimes called centralized protection and control.
- Protection requirements with inverter-based resources (IBR); requirements for IBR performance or response in power system events and conditions.
- Application of self-monitoring for devices and systems.
- Relays as sources of data for SCADA, EMS, WAMS, and fault or disturbance data in integrated utility control and protection systems.
- Cybersecurity of relays, configuration, communications, responses.
- Fault recording
- Fault location capability.
- EMP protection.

Some of these are already in consideration and some may be out of scope - the TC 95 leadership will sort through these and topics from other national committees to prepare for their discussions with other TCs at the scope-coordinating Advisory Committee on Electricity Transmission and Distribution (ACTAD) to make the final decision for the updated scope and strategic business plan for TC 95. Actual standards work is limited by availability of participants to carry out projects on schedule.

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

- WG2 supplied a pre-CD draft for requirements for relay digital inputs and outputs (e.g. via merging unit data exchange) along with an explanatory technical article, per request from TA author. The goal is to coordinate with and guide the work of PSRC H47 now getting underway on the same topic.
- The WG got a preview of work on 60255-132 on functional requirements for directional and other power relays. The CD is not ready for official commenting review yet.
- 60255-167 – Directional relays – to be developed after completion of 60255-132 listed above.
- 60255-1 Ed.2, Common requirements – US and other NC comments to the late 2019 CD have been circulated and the MT is working on revisions.
- 60255-26 Ed. 4, EMC requirements – continuing with revisions since last CD and commenting.
- 60255-27 Ed. 3, Safety - US and other NC comments to the late 2019 CD have been circulated and the MT is working on revisions.
- TC 95 leadership had requested Joint Working Group (JWG) participation in response to a new work item proposal (NP) on travelling wave fault locators used on high voltage transmission lines, from TC

85 Measuring Equipment for Electrical and Electromagnetic Quantities. TC 85 was interested in protection applications and product standards but had gotten little international support for this expansion of its scope. A JWG for a functional standard is now under discussion between the TCs.

Other previously-reported standards development projects continue:

- 60255-187-1: Functional requirements for restrained and unrestrained differential protection of motors, generators and transformers – going to final draft international standard (FDIS) for international vote of acceptance.
- IEC 60255-187-2: Functional requirements for busbar differential protection - Still in draft review, with recent changes in CT sections inherited from 187-1.
- IEC 60255-187-3: Functional requirements for biased (percentage) differential relays for transmission lines –being drafted with help of Normann Fischer from USNC and PSRC. CD expected in July 2020.

G. P2800 Report: Bob Cummings

- The P2800 Working Group met in September 2019 at the WECC offices in Salt Lake City, and three virtual meetings by WebEx in December 2019.
- An informal half-day meeting of Sub-Groups 7, 8, & 9 was held on January 13, 2020 in conjunction with the JTCM/PSRC meetings in Jacksonville, FL.
- Ten of the eleven Sub-team scopes have been meeting by WebEx every weekly or bi-weekly.
- A second draft of the standard is targeted for March 1, 2020.
- The P2800 WG will be meeting on April 7-9, 2020 in Tempe, AZ at the FirstSolar office.

H. NERC Report: Bob Cummings

Summary of Activities: BPS-Connected Inverter-Based Resources and Distributed Energy Resources

https://www.nerc.com/comm/PC/Documents/Summary_of_Activities_BPS-Connected_IBR_and_DER.pdf

Summarizes the various activities

System Planning Impacts of Distributed Energy Resources (SPIDER WG):

The NERC Planning Committee established to address impacts of DER on the Bulk Power System from a transmission planning and system analysis perspective, including:

- Modeling
- Verification
- Studies
- Coordination

Continuing to Monitor and Analyze Disturbances involving Inverter Based Resources

- Four disturbances analyzed thus far
- Two NERC Alerts issued

NERC Reliability Guideline: BPS-Connected Inverter-Based Resource Performance

Guide for performance for IBRs connected to the BPS.

NERC Reliability Guideline: Improvements to Interconnection Requirements for BPS-

Guide on technical considerations for BPS-connected IBR interconnection agreements – stopgap until P2800 Standard is in place.

Inverter-Based Resource Performance Task Force (IRPTF)

- White Paper: Fast Frequency Response Fundamentals and BPS Reliability Needs

  Short white paper to provide recommended terminology and definitions for discussing fast frequency response, low inertia systems, and other relevant concepts. In coordination with other NERC groups and CIGRE/IEEE activities.

  PC Reviewers assigned December 2019

  Target Publish March 2020

- White Paper: Coordinated Review of NERC Reliability Standards, and Applicability and Clarity of Standards to Inverter-Based Resources

  A cursory review and documentation of potential standards that could be improved or strengthened to add clarity and consistency for inverter-based resources.

  PC Reviewers assigned December 2019

  Target Publish March 2020

- NERC ALERT II Follow-up – WECC Solar Model Advisory Group (SMAG)

  Working with WECC entities to ensure accurate modeling of solar resources in WECC master database

- Modeling and Simulations Technical Report

  Findings, recommendations, and experiences modeling and studying inverter-based resources; information from NERC Alert data collection; generation interconnection studies; IRPTF stability studies

  Target Completion Q2 2020

- Technical Report: Energy Transition to Higher Penetrations of Inverter-Based Resources

  Develop a technical report outlining a roadmap to ensuring BPS reliability under Increasing penetrations of inverter-based resources; discussion of issues and possible solutions to these issues.

  Target Completion Q4 2020

- Reliability Guideline: Battery Energy Storage and Hybrid Plant Performance and Modeling

  Battery storage systems are increasing in size and number. Further, use of hybrid resources is increasing. There is lack of guidance and expertise on how to model and simulate these types of new resources in interconnection studies and planning assessments. The IRPTF will develop a reliability guideline that outlines recommended practices.

  Target Completion Q4 2020

Working with IEEE

- IEEE 1547-2018 Standard applies to inverters connected to distribution systems
- IEEE P2800 Inverter Based Resource Performance Standard – for inverters connected above distribution voltage (including transmission voltages)
- IEEE DER Managements System Guideline (P2030.11)
- Regulator education workshops – IEEE Standards are not enforceable unless:
  - Adopted by regulators

- Included in interconnection agreements (SGIA and LGIA)

Relevant Links:

- Summary of Activities: BPS-Connected Inverter-Based Resources and Distributed Energy Resources

https://www.nerc.com/comm/PC/Documents/Summary_of_Activities_BPS-Connected_IBR_and_DER.pdf

- Blue Cut Fire Disturbance Report:

http://www.nerc.com/pa/rrm/ea/Pages/1200-MW-Fault-Induced-Solar-Photovoltaic-Resource-Interruption-Disturbance-Report.aspx

- Canyon 2 Fire Disturbance Report:

http://www.nerc.com/pa/rrm/ea/Pages/1200-MW-Fault-Induced-Solar-Photovoltaic-Resource-Interruption-Disturbance-Report.aspx

- Webinar on Both Disturbances:

http://www.nerc.com/pa/rrm/ea/Pages/1200-MW-Fault-Induced-Solar-Photovoltaic-Resource-Interruption-Disturbance-Report.aspx

- NERC Events Analysis:

http://www.nerc.com/pa/rrm/ea/Pages/default.aspx

- NERC Alerts:

http://www.nerc.com/pa/rrm/bpsa/Pages/Alerts.aspx

- NERC IRPTF Page:

http://www.nerc.com/comm/PC/Pages/Inverter-Based-Resource-Performance-Task-Force.aspx

NERC Standards Activities

1. System Protection Coordination (Project 2007-06)

- PRC-001-1.1(ii) replaced by two new standards
  - PRC-027-1 – Coordination of Protection Systems for Performance During Faults
  - PER-006-1 – Specific Training for Personnel
  - FERC approved both on 8/13/2018
  - Both become mandatory and enforceable on 10/1/2020
- PRC-027-1
  - Requires an initial baseline Protection System Coordination Study
  - Requires new coordination study when fault current levels change by 15%
- PER-006-1 (Becomes enforceable October 1, 2020)
  - Requires the Generator Operator to conduct protection system training
  - Training on “operational functionality” of protection systems

2. Remedial Action Schemes (Project 2010-05.3)

- PRC-012-2 – Remedial Action Schemes
  - Intended to ensure that Remedial Action Schemes (RAS) do not introduce unintentional or unacceptable reliability risks to the Bulk Electric System (BES)

- Effective 1/1/2021

3. Response to Stable Power Swings (Project 2010-13.3)

- PRC-026-1 – Relay Performance during Stable Power Swings
  - Ensure that load-responsive protective relays are expected to not trip in response to stable power swings during non-Fault conditions
  - Becomes enforceable on 1/1/2020
- Specific to certain locations:
  - Angular stability constraint at generators
  - Element that is a monitored system operating limit based on an angular constraint
  - Element that forms the boundary of an island only if the island is formed by tripping the element due to angular instability
  - Where relay tripping occurs due to a stable or unstable power swing during a simulated disturbance
  - Any location that trips in response to a stable or unstable swing

4. Generator Relay Loadability (Project 2016-04)

- PRC-025-2 – Generator Relay Loadability (Eff: 7/1/2018)
  - Certain additions have a specific implementation period
- Revised to address:
  - Physical limitations of inverter-based resource (IBR) protection
    - e.g., allow calculations could have required an increase in frame size
    - Revisions the load curve to "not infringe" on the pick-up setting
  - Inclusion of the IEEE 50 instantaneous element
  - Generation (i.e., weak) remote to transmission (e.g., >40 miles)
- Relationship to PRC-023 (Transmission Relay Loadability)
  - Entities must continue to comply with Requirement R1, Criterion 6 through implementation of PRC-025
- IBR considerations for arc flash
  - Directional relaying must be used for lower setting(s) looking into plant, which is not subject to relay loadability.

5. Modifications to PRC-005-6 Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance (Project 2019-04)

- The North American Generator Forum (NAGF) developed SAR proposing to revise Reliability Standard PRC-005-6 – Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance by:
  - clarifying the applicability of PRC-005-6 to the protective functions within an Automatic Voltage Regulator (AVR) that open a breaker directly or via lockout, or auxiliary trip relays
  - providing the prescribed maintenance activities
  - updating the PRC-005-6 Supplementary Reference and FAQ

- The SAR was posted for comments between 07/30/19 – 08/28/19 and drafting team was selected. The first meeting is scheduled forJanuary 22-23, 2020 at the NERC Offices in Atlanta.

I. PSCC Committee Report: James Formea

On behalf of the members and guests of the PSCCC, as always I want to extend our thanks to the PSRCC, your secretary Michael Thompson, and of course this week to the JTCM staff for your assistance in planning and hosting another successful joint meeting

PSCCC held around 27 meetings of working groups, task forces, and study groups of the P, S, and C subcommittees this week -- the committee continues to grow in participation, and we have a number of exciting projects being taken up

The PSCCC has recently installed new officers in three of our subcommittees

- Craig Palmer is now the chair of the Power Line Carrier subcommittee, assisted by vice chair Tony Bell
- Del Khomarlou has been installed as the chair of the Fiber Optic subcommittee, assisted by vice chair Corrie Dimnik
- Benton Vandiver is the new chair of our Protocols and Architecture subcommittee, assisted by vice-chair Tom Dahlin

Some Additional Highlights From This Week:

- The joint project between PSCCC and SCC-21 on the revision of IEEE 1547.3, Guide for Cybersecurity of DERs Interfaced with Electric Power Systems, will be officially starting with the first joint working group meeting in February. Final meeting details will be circulated when available; the group will meet in Austin, TX with a teleconference option for attendance.
- As a result of a roadmapping project driven by an industry survey, the S subcommittee approved 3 new Study Groups to consider PAR submission for new work:
- S14 will investigate potential work around Application of HTTPS and TLS on Devices for Electric Power Systems
- S15 will investigate potential work related to Implementing Security for IEC 61850 GOOSE and Sampled Values Messaging
- S16 will consider the Application of Intrusion Detection and Prevention Systems for Security in Electric Power Systems
- And finally, the P subcommittee approved a request to go to our main committee later today to work jointly with SCC-21 on the preparation of a PAR to revise P2030-2011.

Thank you again for the opportunity to meet with you and share participants this week, and we look forward to joining you in Nashville.

J. Standards Coordinators Report: Don Lukach

This report summarizes the status of PAR related projects as of the January, 2020 meeting.

IEEE SA topics of interest:

- SA editorial staff presented an overview of SA updates at the Standard's Coordinator's meeting including new Copyright rules.
- Training was given by the SC Chair on SA Word Usage
- All presentations were posted to the PSRC website.
- Future trading with SA is planned at upcoming meetings.

Main Committee PAR Submissions:

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

Published PAR projects since May 2019:

None

RevCom/ NesCom approval or acceptance of projects since May, 2019:

None

Projects currently in Balloting

PAR Number	Title	Status
PC37.250	Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes	RevCom Agenda 04-Mar-2020
PC37.108	Guide for the Protection of Secondary Network Systems	Sponsor Ballot: Comment Resolution
PC37.110	Guide for the Application of Current Transformers Used for Protective Relaying Purposes	Sponsor Ballot: Comment Resolution
PC37.230	Guide for Protective Relay Applications to Distribution Lines	Sponsor Ballot: Comment Resolution
PC37.235	Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes	Sponsor Ballot: Comment Resolution
PC37.91	Guide for Protecting Power Transformers	Sponsor Ballot: Comment Resolution
PC37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	Sponsor Ballot: Comment Resolution
PC37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control	Sponsor Ballot: PreBallot

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

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

Submittal dates for the remainder of 2020.

24 JAN 2020

23 APR 2020

14 AUG 2020

13 OCT 2020

PAR Expiration dates and their Status:

PAR	Title	Expiration	Status
PC37.250	Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes	12/31/2020	RevCom Agenda 04-Mar-2020
PC37.108	Guide for the Protection of Secondary Network Systems	12/31/2020	Sponsor Ballot:

			Comment Resolution
PC37.230	Guide for Protective Relay Applications to Distribution Lines	12/31/2020	Sponsor Ballot: Comment Resolution
PC37.91	Guide for Protecting Power Transformers	12/31/2020	Sponsor Ballot: Comment Resolution
PC37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control	12/31/2020	Sponsor Ballot: PreBallot
P1613	Standard for Environmental and Testing Requirements for Intelligent Electronic Devices (IEDs) Installed in Transmission and Distribution Facilities	12/31/2020	WG Draft Development
PC37.1.2	Recommended Practice for Databases Used in Utility Automation Systems	12/31/2020	WG Draft Development
PC37.2	Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations	12/31/2020	WG Draft Development
PC37.249	Guide for Categorizing Security Needs for Protection and Automation Related Data Files	12/31/2020	WG Draft Development
PC37.251	Standard for Common Protection and Control Settings or Configuration Data Format (COMSET)	12/31/2020	WG Draft Development
PC37.110	Guide for the Application of Current Transformers Used for Protective Relaying Purposes	12/31/2021	Sponsor Ballot: Comment Resolution
PC37.235	Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes	12/31/2021	Sponsor Ballot: Comment Resolution
P1646	Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation	12/31/2021	WG Draft Development
PC37.101	Guide for Generator Ground Protection	12/31/2021	WG Draft Development
PC37.102	Guide for AC Generator Protection	12/31/2021	WG Draft Development
PC37.120	Protection System Redundancy for Power System Reliability	12/31/2021	WG Draft Development
PC37.233	Guide for Power System Protection Testing	12/31/2021	WG Draft Development
PC37.234	Guide for Protective Relay Applications to Power System Buses	12/31/2021	WG Draft Development
PC37.90.2	Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers	12/31/2021	WG Draft Development
PC37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	12/31/2022	Sponsor Ballot:

			Comment Resolution
P2030.100.1	Monitoring and Diagnostics of IEC 61850 Generic Object Oriented Status Event (GOOSE) and Sampled Values Based Systems	12/31/2022	WG Draft Development
P2030.12	Guide for the Design of Microgrid Protection Systems	12/31/2022	WG Draft Development
PC37.104	Guide for Automatic Reclosing on AC Distribution and Transmission Lines	12/31/2022	WG Draft Development
PC37.106	Guide for Abnormal Frequency Protection for Power Generating Plants	12/31/2022	WG Draft Development
PC37.300	Guide for Centralized Protection and Control (CPC) Systems within a Substation	12/31/2022	WG Draft Development
PC37.90	Standard for Relays and Relay Systems Associated with Electric Power Apparatus	12/31/2022	WG Draft Development
PC37.1.3	Recommended Practice for Human Machine Interfaces (HMIs) used with Electric Utility Automation Systems	12/31/2023	WG Draft Development
PC37.109	Guide for the Protection of Shunt Reactors	12/31/2023	WG Draft Development
PC37.252	Guide for Testing Automatic Voltage Control Systems in Regional Power Grids	12/31/2023	WG Draft Development
PC37.99	Guide for the Protection of Shunt Capacitor Banks	12/31/2023	WG Draft Development

All PSRCC Par-Related Projects:

PAR Number	Title	Status
1613	Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Electric Power Substations	Complete
P1613	Standard for Environmental and Testing Requirements for Intelligent Electronic Devices (IEDs) Installed in Transmission and Distribution Facilities	WG Draft Development
1613.1	Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Transmission and Distribution Facilities	Complete
1613a	IEEE Standard Environmental and Testing Requirements for Communications Networking Devices Installed in Electric Power Substations Amendment: Adding of one definition, DC power supply requirements (5.1), and Annex E- History	Complete
1646	Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation	Complete
P1646	Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation	WG Draft Development
P2030.12	Guide for the Design of Microgrid Protection Systems	WG Draft Development
2030.1	Recommended Practice for Implementing an IEC 61850 Based Substation Communications, Protection, Monitoring and Control System	Complete
P2030.100.1	Monitoring and Diagnostics of IEC 61850 Generic Object Oriented Status Event (GOOSE) and Sampled Values Based Systems	WG Draft Development
2030.101	Guide for Designing a Time Synchronization System for Power Substations	Complete
60255-118-1	Measuring Relays and Protection Equipment - Part 118-1: Synchrophasor for Power System - Measurements	Complete
C37.1	Standard for SCADA and Automation Systems	Complete
PC37.1.2	Recommended Practice for Databases Used in Utility Automation Systems	WG Draft Development

PC37.1.3	Recommended Practice for Human Machine Interfaces (HMIs) used with Electric Utility Automation Systems	WG Draft Development
C37.2	Standard Electrical Power System Device Function Numbers, Acronyms and Contact Designations	Complete
PC37.2	Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations	WG Draft Development
C37.90	Standard for Relays and Relay Systems Associated with Electric Power Apparatus	Complete
PC37.90	Standard for Relays and Relay Systems Associated with Electric Power Apparatus	WG Draft Development
C37.90.1	Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus	Complete
C37.90.2	Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers	Complete
PC37.90.2	Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers	WG Draft Development
C37.90.3	Standard for Electrostatic Discharge Tests for Protective Relays	Complete
C37.91	Guide for Protecting Power Transformers	Complete
PC37.91	Guide for Protecting Power Transformers	Sponsor Ballot: Comment Resolution
C37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	Complete
PC37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	Sponsor Ballot: Comment Resolution
C37.95	Guide for Protective Relaying of Utility-Consumer Interconnections	Complete
C37.96	Guide for AC Motor Protection	Complete
C37.99	Guide for the Protection of Shunt Capacitor Banks	Complete
PC37.99	Guide for the Protection of Shunt Capacitor Banks	WG Draft Development
C37.101	Guide for Generator Ground Protection	Complete
PC37.101	Guide for Generator Ground Protection	WG Draft Development
C37.101-2006/Cor 1	Guide for Generator Ground Protection - Corrigendum 1: Annex A.2 Phasor Analysis (Informative)	Complete
C37.102	Guide for AC Generator Protection	Complete
PC37.102	Guide for AC Generator Protection	WG Draft Development
C37.103	Guide for Differential and Polarizing Relay Circuit Testing	Complete
C37.104	Guide for Automatic Reclosing of Circuit Breakers for AC Distribution and Transmission Lines	Complete
PC37.104	Guide for Automatic Reclosing on AC Distribution and Transmission Lines	WG Draft Development
C37.106	Guide for Abnormal Frequency Protection for Power Generating Plants	Complete
PC37.106	Guide for Abnormal Frequency Protection for Power Generating Plants	WG Draft Development
C37.108	Guide for the Protection of Network Transformers	Complete
PC37.108	Guide for the Protection of Secondary Network Systems	Sponsor Ballot: Comment Resolution
C37.109	Guide for the Protection of Shunt Reactors	Complete

PC37.109	Guide for the Protection of Shunt Reactors	WG Draft Development
C37.110	Guide for the Application of Current Transformers used for Protective Relaying Purpose	Complete
PC37.110	Guide for the Application of Current Transformers Used for Protective Relaying Purposes	Sponsor Ballot: Comment Resolution
C37.110-2007/Cor 1	IEEE Guide for the Application of Current Transformers Used for Protective Relaying Purposes - Corrigendum 1: Corrections to Equation 18 and Equation 19	Complete
C37.111	Standard for Common Format for Transient Data Exchange (COMTRADE) for Power Systems	Complete
C37.112	Standard Inverse-Time Characteristic Equations for Overcurrent Relays	Complete
C37.113	Guide for Protective Relay Applications to Transmission Lines	Complete
C37.114	Guide for Determining Fault Location on AC Transmission and Distribution Lines	Complete
C37.116	Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks	Complete
C37.117	Guide for the Application of Protective Relays Used for Abnormal Frequency Load Shedding and Restoration	Complete
C37.119	Guide for Breaker Failure Protection of Power Circuit Breakers	Complete
PC37.120	Protection System Redundancy for Power System Reliability	WG Draft Development
C37.230	Guide for Protective Relay Applications to Distribution Lines	Complete
PC37.230	Guide for Protective Relay Applications to Distribution Lines	Sponsor Ballot: Comment Resolution
C37.231	Recommended Practice for Microprocessor-based Protection Equipment Firmware Control	Complete
C37.232	Standard for Common Format for Naming Time Sequence Data Files (COMNAME)	Complete
C37.233	Guide For Power System Protection Testing	Complete
PC37.233	Guide for Power System Protection Testing	WG Draft Development
C37.234	Guide for Protective Relay Applications to Power System Buses	Complete
PC37.234	Guide for Protective Relay Applications to Power System Buses	WG Draft Development
C37.235	Guide for the Application of Rogowski Coils used for Protective Relaying Purposes	Complete
PC37.235	Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes	Sponsor Ballot: Comment Resolution
C37.237	Standard Requirements for Time Tags Created by Intelligent Electronic Devices - COMTAG(TM)	Complete
C37.239	Standard for Common Format for Event Data Exchange (COMFEDE) for Power Systems	Complete
C37.241	Guide for Application of Optical Instrument Transformers for Protective Relaying	Complete
C37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMU) for Power System Protection and Control	Complete
PC37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control	Sponsor Ballot: PreBallot
C37.243	Guide for Application of Digital Line Current Differential Relays Using Digital Communication	Complete
C37.245	Guide for the Application of Protective Relaying for Phase Shifting Transformers	Complete
C37.246	Guide for Protection Systems of Transmission to Generation Interconnections	Complete
C37.247	Standard for Phasor Data Concentrators for Power Systems	Complete
C37.248	Guide for Common Format for Naming Intelligent Electronic Devices (COMDEV)	Complete

PC37.249	Guide for Categorizing Security Needs for Protection and Automation Related Data Files	WG Draft Development
PC37.250	Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes	RevCom Agenda 04-Mar-2020
PC37.251	Standard for Common Protection and Control Settings or Configuration Data Format (COMSET)	WG Draft Development
PC37.252	Guide for Testing Automatic Voltage Control Systems in Regional Power Grids	WG Draft Development
PC37.300	Guide for Centralized Protection and Control (CPC) Systems within a Substation	WG Draft Development
C57.13.1	Guide for Field Testing of Relaying Current Transformers	Complete
C57.13.3	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases	Complete

VI. B: Advisory Subcommittee Reports

Chair: Russ Patterson
Vice Chair: Murty Yalla

A. B1: Awards and Technical Paper Recognition Working Group

Chair: Hugo Monterrubio
Vice Chair: Mal Swanson

The B1 Working Group met on Monday January 13, 2019 in Jacksonville, FL with 14 members. The September 2019 meeting minutes were discussed and approved.

The following items were discussed during this meeting:

Note: Names of nominees are kept confidential until the award is publicly announced.

1. WG Matrix Activity Review
    a. Completed WG's
    b. Title, Chair, VC
2. PSRC Individual Awards
    a. DSA – 2020 Distinguished Service Award
    b. Career Service – 2020 PSRC Career Service Award
3. IEEE & PES Individual Award Nomination Activity
    a. Awards Spotlight Update – Where are we with the current nominations
    b. Discussion/Selection and nomination of candidates for IEEE/PES or SA Individual Awards
    c. Assignments and Deadlines
4. IEEE Nomination Process & Tools
    a. Instructions on Submitting an IEEE Nomination
    b. IEEE Awards: Preparing a Successful Nomination
    c. IEEE PES Reference Manual for Preparing Effective Nomination
5. The following awards were announced or issued during the PSRC Main Committee Meeting on Thursday January 16, 2020
    a. IEEE Fellows (Announcement)
        i. Class of 2019
            1. **Jonathan Sykes**
            For Leadership in the Application and Management of Reliable Protection Systems for Electric Power Networks
        ii. Class of 2020
            1. **Walter Mark Carpenter**

For Leadership in Standards Development for Power System Protection

2. **Sukumar Brahma**
   For Contributions to Power System Protection with Distributed and Renewable Generation

b. IEEE SA (Announcement)
   i. Standards Medallion Award 2019
      - **Pratap Mysore**
        For Contributions to the Development of Standards in the Field of Power System Protection

c. PSRC – Main Committee New Members – Class of 2020 (Announcement)

Lubomir Sevov	**Vasudev Gharpure**
Qun Qiu	**Mahendra Patel**
Brandon Davies	**Tony Bell**
Mike Kockott	**Robert Frye**

d. PSRC Individual Awards
   i. 2019 PSRC Young Professional Award
      1. **Richard D. Gamble**
         In recognition for his contributions, active engagement and services provided to this Committee
   ii. 2019 PSRC Career Service Award
      1. **Steve Conrad**
         In recognition for his many years of outstanding and dedicated services to this committee
         a. PSRC active member since 1982
         b. Past J & K SC Chair

6. Awards Ceremony Changes

Starting this May 2020 during all future 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.

B. B3: Membership Working Group

Chair: Mal Swanson

Vice-Chair: Cathy Dalton

Attendance during the Jacksonville meeting was 244, which is a solid growth in attendance for us.

19 new attendees were in our Newcomers Orientation meeting on Tuesday. Cathy Dalton sent pre-meeting welcoming emails to each newcomer, as well as follow up emails to each newcomer, to support our retention program. In that way we are encouraging each of the newcomers to continue attendance and participation in May, September, and thereafter.

Mal Swanson sent two management support letters. If any attendee or potential attendee needs stronger management support for PSRC participation, we encourage them to let us know..

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

Chair: Phil Winston

Phil Winston made a motion to the main committee meeting to approve making the changes to the existing PSRCC Policies and Procedure (P&P) which would allow the Officers, with concurrence of the Administrative Committee (AdCom), to allow certain changes to PARS to be delegated to the responsible

subcommittee. The motion was seconded by G. Henneberg. There was some discussion. The vote carried unanimously.

D. B5: Publicity Working Group

Chair: Cathy Dalton
Vice Chair: Mal Swanson
Assignment:

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

Cathy thanked the subcommittee chairs for contributing information for our regularly published PACWorld article.

PACWorld Update: Cathy Dalton submitted information to include in PSRC update for the next issue issue of PACWorld, based on information discussed at our September 2019 meeting in Denver, CO, and our January 2020 meeting in Jacksonville, FL. Additional updates from subcommittee chairs were included. The subcommittee chairs were asked to send a brief summary of their activities for inclusion in this article. Also included was technical presentation information that was presented at the Main Committee meeting.

Encouraging membership: At the September 2019 meeting, Cathy and Amir Makki discussed how to further encourage PSRC membership through publicity at non-IEEE events, such as well -known relay conferences. Cathy will work with Amir to develop a formal set of slides (one to three) to share with the entire PSRC, so as each member makes technical presentations at some of these events, he or she can tag on some slides at the end of slide decks (if they choose to do so) to encourage PSRC membership. Amir is already doing this, and suggested that we make it a formal request and process among the committee's members. These slides will include the top ten reasons why someone should participate in PSRC.

Cathy will work with Dr. Yalla and Mal Swanson to update the Newcomer Orientation slide deck with the names of the new committee chairpeople. This deck is publicized on our PSRC website as a resource for newcomers and website visitors who have an interest in joining PSRC.

Cathy continues to work with IEEE contact, Shana Pepin, as needed.

B8: Long Range Planning Working Group

Chair: Pratap Mysore

No report.

E. B9: Web Site Working Group

Chair: Rick Gamble

No report.

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

A. Motions:

The chair of the C subcommittee, F. Friend, made a motion, "Mr. Chair, the System Protection Subcommittee, C, requests approval for transmittal of the "Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and

Control", PC37.242 to the IEEE SA for balloting." The motion was seconded by G. Henneberg. There was no discussion. The motion was voted on by the main committee members and the motion carried.

The chair of H subcommittee, G. Antonova, made a motion to change the output of WG H40, PC37.1.2, Recommended Practice for Databases Used in Utility Automation Systems, from a recommended practice to a guide. The motion was seconded by T. Laughner. There was no discussion. The motion was voted on by the main committee members and the motion carried.

B. Presentations:

Presentation, WG C19 Report, C37.247 Standard for Phasor Data Concentrators, Dr Vasudev Gharpure and Dr Mital Kanabr

Presentation, Sub-synchronous Currents Damage 500 kV Shunt Reactor, Dr Mukesh Nagpal

C. Relay Committee Musical Jam:

An announcement was made by Mark Adamiak that there will be a musical jam after the Monday evening welcome reception and awards ceremony. All players + singers are invited. Contact Mark Adamiak if you are interested in playing/singing.

VIII. Subcommittee Reports

C: System Protection Subcommittee

Chair: Fred Friend
Vice Chair: Michael Higginson

System Protection Subcommittee Scope

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

Meeting Minutes

The System Protection Subcommittee of the PSRC met on January 15, 2020 in Jacksonville, FL. The participants introduced themselves, a quorum was achieved (39 of 55 members and 32 guests), and the September 2020 minutes were approved without objection (Mike Meisinger made motion, Gene Henneberg seconded).

Advisory Committee and other Items of Interest

- WG agendas are required to be posted at least two weeks prior to the meeting.
- WG meeting minutes due to Mike and Fred by next Thursday, January 23.
- A PSRC 123 Signup account is required by each participant before working group attendance can be recorded.
- IEEE standard documents are only for distribution to WG members. The WG chair may provide paper copies at meetings, but a guest may not keep the paper copy of the draft. A public review period is available for IEEE standard documents.
- WGs that complete their work are encouraged to present it to the IEEE community through a WEBEX. Contact PSRC officers or Cathy Dalton (Publicity chair) for further information.
- WG Reports should follow the IEEE Style Manual for word usage (Clause 10.2).
- WG officers should request certificates for their members upon completion of their work.
- A new IEEE copyright policy has been posted on the PSRC web site.
- The Awards Ceremony will take place during the Monday night reception for the May and September meetings

Old Business

There was no old business.

New Business

The CTF-42 task force was formed to write a paper summarizing C37.250. It will be chaired by Yi Hu with an assignment to develop a summary paper with presentation slides describing the new C37.250 standard for presentation at various Protection conferences.

The CTF-43 task force was formed to investigate interest in the use of Artificial Intelligence and Machine Learning for Protection and Control Applications. It will be chaired by Yi Hu with an assignment to investigate interest in the use of Artificial Intelligence and Machine Learning for Protection and Control Applications.

Working Group Reports

C-21: Guide for Engineering, Implementation and Management of System Integrity Protection Schemes (PC37.250)

Chair: Yi Hu

Vice Chair: Gene Henneberg

Output: IEEE Guide C37.250

Draft: Last

Assignment: Develop an IEEE Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes

Established: **September 2013**

Completion: **December 2020**

The WG met in single session at the JTCM meeting in Jacksonville, Florida on January 15, 2020 with 6 members and one guest.

Following introductions, the WG did not achieve a quorum, so the minutes from the September meeting will be circulated for approval via email.

The IEEE patent and copyright slide were not shown.

The recirculation ballot for the new standard has been approved by 100% of balloters, with a total of 19 comments between the original and recirculation ballots.

Yi and Gene will now schedule consideration by Rev Com and work with the IEEE SA editors for final edits before publishing the standard.

We did discuss whether to form another WG to develop a conference paper, and decided togo ahead with that. A proposed assignment for this new work group is

Proposed Working Group Assignment
Develop a summary paper with presentation slides describing the new C37.250 standard for presentation at various Protection conferences.

This will be the last meeting of the C-21 WG. The WG will continue to exist until the standard is published. Submitted by Yi Hu and Gene Henneberg.

C-23: Coordination of Synchrophasor Related Activities

Chair: Allen Goldstein
Vice Chair: TBD
Output: Ongoing Liaison
Draft: N/A
Completion: Ongoing

Assignment: The ongoing working group will provide three main functions:

- Liason with NASPI (North American Synchrophasor Initiative) (specifically the PRSVTT (Performance Requirements, Standards and Verification Task Team)) to keep the PSRCC 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 PSRCC including making recommendations which PRSVTT activities should be transferred to IEEE reports, guides and standards.
- Make recommendations to PSRCC for assignments that would require the creation of working groups in PSRCC 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.

Convened with 7 members and 7 guests. A quorum was not in attendance. Introductions were made.

Patent Slides are not required since this WG has no PAR.

Previous meetings minutes were reviewed and approved.

Previous chairman, Mahendra Patel has resigned and requested that the vice chair, Allen Goldstein take the position of Chair. Allen accepted and asked for volunteers to take the vice-chair position. Since no-one volunteered, Allen will ask at the next NASPI working group meeting.

A discussion on Goodness of Fit was continued from the September meeting. A suggestion for NASPI to investigate estimation of point-on-wave data without high-speed sampling was made by Mark Adamiak. Since Mark was not attending, we requested a clarification on this proposal. The discussion was a suggestion to NASPI to discuss so we will bring the topic up at the next NASPI meeting. This may have something to do with data from rotor angle encoders…

The new C subcommittee task force on requirements of distribution meeting time was announced and members of this WG invited to participate.

A suggestion came from IEEE Conformity Assessment Synchrophasor Steering Committee ICAP SCASC for IEEE (or NASPI) to produce a data set (possibly in COMTRADE FORMAT) of point-on-wave test signal input to PMU data along with the ideal synchrophasor output to the test signals.
Discussion:
Would these only be for the test signals described by equations in the PMU standard? Yes, that was the suggestion. This may have little value for experts who already know how to code the equations to give the input and expected output data.. True, but this could be of use for people who are not experts or who desire to have validation that their implementation is correct.
Do we need both integer and float values? What about the accuracy (integer quantization error or floating-point error).
Is this in response to something in the standard that is difficult to understand? Should a recommendation be made to clarify the standard? (Generally it is not believed that the standard in unclear on this).
Action: Mark Adamiak volunteered to draft a proposal.

Should the data set include test signals and ideal responses for signals not required by the standard?
This may be a good task for NASPI to work on, or else ICAP can provide.
Note, that the open-source PMU Application Requirements Test Framework already generates the signals and the ideal PMU response.

A discussion on PMU latency was held: how is latency defined on Sampled Values. It was pointed out that there is an annex in the PMU standard addressing many aspects of sampled values and their use in estimating synchrophasor. The Annex addresses latency.
The IEC standards for Electronic Instrumentation Transformers (including stand-alone merging units) does not set performance l9imits on latency but requires manufacturers to disclose information in certain ratings such as combined accuracy.

A question was asked about the role of PMUs combined with distributed energyresources (DER). Are PMUs required in DERMS systems (No, not yet at least). However the NERC requirements for model validation may imply that PMUs might would be very useful at the point of interconnections. Also mentioned that a NERC PRC is requiring that some PMU data be stored by utilities (not necessarily associated with DER.

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

Chair: Sukumar Brahma (Clemson University)
Vice Chair: Evangelos Farantatos (EPRI)
Output: PSRC Report
Draft: 4.0
Established: 2014
Completion: TBD

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

Chair: Sukumar Brahma (New Mexico State University)
Vice Chair: Evangelos Farantatos (EPRI)

Agenda
1. Introductions
2. Approval of minutes of the May 2017 meeting.
3. Review draft report and assign/reassign contributors and reviewers
4. Adjourn

The meeting started with introductions, and then the September 2019 minutes were approved.

First the status of the report was discussed. In particular:

i) After the September 2019 meeting the report was revised to address comments received during that meeting
ii) The contribution from GE with Type III WTG data was provided by Ratan Das and was included in the report
iii) The final report was sent to the WG voting members in November for approval. 2 members approved without comments, 9 approved with comments, and 1 abstained due to heavy workload.
iv) The report was revised by Sukumar and Evangelos to address the comments received by the voting members. The updated report along with a corresponding spreadsheet with the response on how the

comments were addressed was sent individually to all voting-members in late December. All of them approved.

v) As a next step, the report will be sent to C subcommittee officers to initiate the balloting process. The report will also be sent to the entire WG roster. Non-voting members and guests of the WG who are members of C subcommittee, will be able to provide comments as part of the balloting.

Finally, there was a discussion on future efforts to further test, benchmark and improve the models. The consensus was that the work of this WG is foundational, and further testing of the software vendor models presented in the report on actual utility systems and for grid scenarios with high-levels of renewable sources, as well as model updates as the fault response of WTGs is better understood and standardized by grid codes and/or industry standards (e.g. IEEE P2800), constitutes continuing work for PSRC committee and the industry in general.

There were total 27 attendees in the meeting, 8 members and 19 guests.

C-25: Protection of Wind Electric Plants

Chair: Martin Best (Pike Engineering, LLC)
Vice Chair: Amin Zamani (GE Renewable Energy)
Output: PSRC Report
Draft: 6.1
Established: September 2013
Completion: December 2020

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.

The meeting started with introductions and, then, the September 2019 minutes were reviewed (and approved).

The status of the report was discussed first. It was described to the WG members and guest that the voting members have sent their final comments to the chair, and Martin has revised the report to address comments; thus, this draft (6.2) is considered as almost complete. Then, the working group reviewed the revisions made by Martine (based on the final comments received by members).

i) The WG reviewed the list of abbreviations and acronyms. Amin was tasked to do a final check and ensure all abbreviations and acronyms are listed.

ii) To ensure consistency, it was decided that a range of synchronous speed be provided for each type of wind turbine generator, rather than maximum control capability of slip for each turbine (Section 2.3).

iii) It was agreed that “transformer situation” will be removed as a source of sub- harmonic (Section 2.7).

iv) It was decided to remove Figure 24, as it is the same as Figure 2. Also, the WG decided to keep Figure 3 (not to remove it)

v) The WG discussed the addition to Section 3.6 and agreed to keep it as is.

vi) As a next step, the report will be sent to voting members for their vote and approval.

There were total of 20 attendees in the meeting, 9 members and 11 guests.

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

Chair: D. Ware
Secretary: M. Black
Secretary: Zach Zaitz (Mark Siira standing-in)
Output: IEEE Guide, C37.233
Draft: 2.39
Established: January 2016
Completion: December 2020
Assignment: Revise C37.233 Power System Protection Testing Guide

The C26 working group met on Tuesday, Jan. 14, 2020 with 21 attendees, 8 members and 13 Guests. Membership quorum met; therefore, Sept. meeting minutes were reviewed. Rafael Garcia motioned and Scott Cooper second; minutes were approved; same with approval of meeting agenda.

Don reviewed the IEEE Patent Policy and Copyright Policy slides, language and word usage guidelines were introduced related to safety and the use of word "should" and a list of others.

Don stated that since all contributions have now been received and once Matt Black enters them into the C26 document a request for review will begin. He will then send the updated draft to all members for review.

Don mentioned the need for the paragraphs on transformer sudden pressure testing should have its own subsection within transformer relay testing. And this new sub-section be updated within the contents pages.

Don mentioned he added information to his load check / in-service readings section about including relay screen shot data from the relay's HMI from the relays being load checked. And that this information to be included with the in- service readings to the client. Matt to enter in to document. Also, may include example of in-service sheet.

On question about "internal winding compensation" within transformer differential testing section Jun Verzosa spoke up and stated that his new contribution covered and answered the concern.

Scott Cooper spoke on his contribution of reviewing line current differential testing. As a group we reviewed his contribution line by line and with much discussion improving wording to only half of contribution until time expired. We plan to pick up where we left off.

Action Items:

1. Matt Black to enter new submissions to document and then set up WebEx meetings for review.
2. Mark Siira to re-draw Power Line Carrier wavetrap impedance drawing for Jeff Brown, Jeff to provide details.
3. Scott Short to review section on sudden pressure relay testing and may add some more information.
4. Alex Apostolov and Eugenio Carvalheira to review all sections of IEC-61850.

New Business:

Be aware of upcoming WebEx meeting for review sessions.

The draft version of the Guide C37.233 is ver. 2.39 as of Jan. 15, 2020. Our next meeting will need a double session with room for 35. We please request conflict avoidance with C31, C38, and H46.

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

Chair: Allen Goldstein
Secretary: Harold Kirkham
Output: IEEE Guide, C37.242
Draft: 2

Established: September 2015
Completion: November 2019

Assignment: Revision of the IEEE guide which provides guidance for synchronization, calibration, testing, and installation of phasor measurement units (PMUs) applied in power system protection and control.

Convened with 5 members and 5 guests. A quorum was not in attendance.
Introductions
Patent Slides (no response)
Copyright Slides (no response)

Draft has unanimous committee approval to send to sponsor ballot. Chair requested that C committee chairman request Main committee to vote to send to sponsor ballot. Main Committee has approved. Balloting pool has been formed Draft was returned from mandatory editorial review. All MER comments have been resolved

Reviewed all Mandatory Editorial Review comments and the responses. Made a few edits to the draft for balloting.

The draft was posted on iMeet Central and an email went out to the working group membership to review and comment. Comment period closes on January 31 after which draft will be submitted to sponsor ballot.

Motion to Adjourn, seconded and carried.

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

Chair: Kevin W. Jones
Vice Chair: Mike Kockott
Output: PSRC Report
Draft: 1.03
Established: January 2016
Completion: TBD

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.

Attendance: 13 total, with 10 members (of which 2 were new members) and 3 guests.

General Items:

WG C29 met in single session on January 14, 2020 in Jacksonville, FL. Welcome to Kevin Jones who has now taken over the chairmanship of the WG. After introductions, minutes from the September, 2019 meeting in Denver, CO, were approved.

Next, Kevin led a discussion on the latest document and writing assignments. The following assignments were made:

- Gene will write the section 1.4 and send to Kevin and Mike Kockott by March 31, 2020.
- At this time, the updated report draft will be made available, whereupon Rob Fowler, Jun Verzosa and Benton Vandiver will review the complete section 1. Rob will update section 1 with the reviewers' comments, and send to Kevin and Mike Kockott by April 30, 2020.
- Sections 2 and 3:

- Mike Benitez will send the introduction paragraph and summary, respectively, for sections 2 and 3 to Kevin by January 17, 2020. Kevin will make this available to the writing teams.
- Mike Benitez will lead the writing teams for both sections 2 and 3 (coordinate activities both with respect to outline and content). The writing team members for sections 2 and 3 will otherwise remain unchanged, other than for Rob Fowler who will become a reviewer. Jared Candelaria joins Rob as a reviewer.
- The targets for both sections 2 and 3 are the same:
- Mike Benitez will send the completed sections 2 and 3 to Kevin and Mike Kockott by March 31, 2020.
- At this time the updated report draft will be made available (same action as 2nd bullet above) by April 3, 2020, whereupon Rob and Jared will review the complete sections 2 and 3, and send their comments to Mike Benitez by April 17, 2020.
- Mike Benitez will update sections 2 and 3 with the reviewers' comments, and send to Kevin and Mike Kockott by April 30, 2020.

To end the meeting, Kevin made the proposal that a possible deliverable from the WG could be a collation of the test programs some utilities have developed for their own testing and evaluation, as these could provide a benefit to all. The WG felt this was a good idea, and will be taken further in future meetings of the WG.

C31: C37.120 IEEE Guide for Protection System Redundancy for Power System Reliability

Chair: Solveig Ward (sward@quanta-technology.com)
Secretary: Alla Deronja (aderonja@atcllc.com)
Output: Guide C37.120
Established: September 2017
Expected Completion Date: December 2021

Assignment: Development of a guide for protection system redundancy

Scope: This guide provides information about what factors to consider when determining the impact of protection system redundancy on power system reliability.

WG C31 met on Tuesday, January 14, 2020, in a single session with 14 voting members, 7 non-voting members, and 15 guests attending. One voting member asked to become a non-voting member and one non-voting member asked to become a voting member.

The quorum was met so the WG voted to approve September 17 PSRC, Oct 7, Oct 21, Nov 4, Nov 18, Dec 2, and Dec 16 webex meeting minutes. Motion: Ian Tualla, 2nd: Angelo Tempone.

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 meeting agenda was approved. Motion: Ian Tualla, 2nd: David Morrissey. There were no objections. The chair reviewed the status of all assignments.
Outstanding action items:

1. **Jim O'Brien, Nathan Gulczynski, and Don Ware** to revise sub-clause 6.6 *Capacitor bank protection* to only focus on cap bank protection redundancy, not its protection aspects, and add a figure(s) illustrating cap bank redundant protection. Status: reviewed by Alla and Nathan. Don contributed as well. Complete. Nathan to create a figure sketch.

2. **Eric Udren (with help of Solveig Ward)** will work on 5.2.3 *Non-conventional instrument transformers*, 5.X *Merging units*, and the revisions of 5.8 *Local area network redundancy*. Status: Alla to convert email text to the report.
3. **Jay Anderson** will revise Figure 9 in sub-clause 5.6.4.2 *Voting schemes*. Status: will remove Figure 9 and the paragraph describing it.
4. **Tony Bell** will redraw Figure 12 *Basic PLC system* in Visio**.** Status: reassigned to FM Robin Buyn.
5. **Solveig Ward** will write a paragraph for 5.10 *Timing system redundancy* to be placed at the end of it to note the effect of timing or lack of thereof on protective relaying functionality. Status: complete; will be incorporated.
6. **Gary Stoedter** and **Roger Whittaker** will combine sub-clauses 6.8.2 *Combining protection functions in a single physical device* and 6.8.3 *Redundancy considerations in breaker failure protection scheme designs* such as to discuss two methods of breaker failure protection implementation: in a dedicated relay with its pros/cons and integrated in the redundant primary protection with its pros/cons. Status: pending; due March 1, 2020.

A new IEEE-SA requirement is to not utilize verb "should" because it may be equivalent to "recommend" and the standard in a form of a guide is not allowed to do any type of recommendations. There are at least 80 instances of "should" in the present guide that will need to be replaced. The WG will have a few webinars to fix this.

At the last webex, the WG members present at that meeting revised the guide's definitions. The rest of the WG will have a chance to comment on them during the upcoming WG ballot.

Sub-clause 6.10 *System Integrity Protection Schemes* was transferred to the present guide from Annex B of completed by WG C21 C37.250 *IEEE Guide for Engineering, Implementation and Management of System Integrity Protection Schemes*.

Previously, the team updated and approved sub-clause 6.10.1 *SIPS redundancy considerations* as relevant to the present guide. The rest of the material representing various schemes for SIPS redundancy design implementation did not appear appropriate to keep in this guide.

At this meeting, a suggestion was made to keep 6.10.1 and delete the rest of 6.10.

Sub-clause 6.11 *Mixed use redundant systems* will be moved to become 6.10.2 as relevant to the topic of SIPS.

Annex A *Northeast Power Coordinating Council Bulk Power System Protection Criteria* will be removed.

Modified sub-clause 6.5 *Reactor protection* is complete and will be reviewed during the WG ballot. Alla contacted Gary Kobet to revise figures 28 and 29 to show redundant lockout relays; presently, there is only one is shown.

The WG will continue bi-weekly webex meetings to review and edit the guide. A more convenient time is 2:00 – 4:00 PM EST on Mondays with a 5-minute midway break. A series of meeting will be set up accordingly. If needed, some meetings will be cancelled.

A decision to conduct a WG ballot is delayed until the meeting in May.

C-32: Protection Challenges and Practices for interconnecting solar or other inverter based generation to utility transmission systems

Chair: Mukesh Nagpal
Vice Chair: Mike Jensen
Secretary: Michael Higginson

Output: PSRC Report
Draft: 7
Established: January 2017
Expected Completion Date: TBD

Assignment: Write a report that addresses protection challenges and practices for the interconnection of inverter based generation to utility transmission systems.

1. The working met on 15 January, 2020 with 52 attendees, including 32 guests and 20 members. The meeting was called to order at 8:00. Quorum was not met.
2. The chair updated the working group on the status of the report. The draft report has been completed, and was approved by the working group. All members approved except two, who abstained because of time.
3. Because the working group did not meet quorum, email approval of the minutes will be requested.
4. Alla Deronja made a presentation on a relay misoperation caused by lack of negative sequence current supplied by a converter.
5. Mukesh Nagpal made a presentation on a recent event in the BC Hydro system.
6. The chair indicated that the next step is to send the report to the subcommittee for their approval.
7. The chair requested some volunteers email him to support subcommittee ballot comments. The following individuals volunteered:
    A. Jim van de Ligt
    B. Alla Deronja
    C. Steve Miller
    D. Mohammad Zadeh
    E. Jean-Francois Hache
    F. Arun Shrestha
    G. David Morrissey
8. The meeting was adjourned at 9:00.

C-33: IEEE P2004 Working Group and IEEE PSRC CTF-33 Task Force Joint Meeting

Chair: D. Ouellette
Vice Chair: S. Meliopoulos
Secretary: A. Findley
Output: Report
Draft: D1
Established: 2017
Expected Completion Date: 2022

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

WG met on January 14 at 09:20 AM with 2 members and 9 guests.

We hosted a web meeting during the meeting so chapter leads from P2004 could join us.

The submitted writing assignment for transformer protection was reviewed and some minor edits were completed. Three new volunteers committed to writing assignments that currently un- assigned.

CTF-34: Inverter-Based Short Circuit Current Impacts

Chair: Kevin W. Jones
Vice Chair: Gary Kobet

Output: Ongoing
Draft: N/A
Established: 2017
Expected Completion Date: TBD

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.

ATTENDANCE
44 Total with 6 members and 38 Guests.

GENERAL ITEMS
WG CTF34 met in single session on January 14, 2020 in Jacksonville, FL with 6 members and 38 guests. Introductions were made.

The minutes from the September 17, 2019 meeting in Denver, CO were reviewed and approved.

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

- C24 Modification of Commercial Fault Calculation Programs with Wind Turbine Generators - Evangelos Farantatos: WG report balloting in process, comments being resolved, hope to send to subcommittee soon.
- C25 Protection of Wind Electric Plants - Dean Miller: WG report balloting in process, comments being resolved, hope to send to subcommittee soon.
- C32 Impact of Inverter Based Resources on Utility Transmission System Protection - Ritwik Chowdhury: WG report balloting in process, comments being resolved, hope to send to subcommittee soon. The report does address negative sequence current injection. Paragraph added regarding single-pole tripping.
- C38 P2030.12, Investigate the need to create a Guide for the Design of Microgrid Protection Systems: Work ongoing. Goal to finish in two years.
- D29 Tutorial on Setting Impedance-Based Power Swing Blocking and Out-of-Step Tripping Functions on Transmission Lines - Kevin Jones: Up to 40% IBR penetration results in slightly more unstable system but could not prove slip rate increased. Hoping for more progress by May.
- D38 Impact of High SIR on Distance Relaying - Christopher Walker: Writing first draft, including a section of impact of system topology on SIR and the associated impact of IBR.
- D41 Engagement with Industry Activities Related to Line Protection Due to Increasing Penetration of Inverter-based Sources - Evangelos Farantatos: Name of WG changed. Two presentations expected during this meeting.
- J18 Investigate the effect sub-synchronous oscillations due to inverter based resources (IBR) on rotating machinery protection and control- Ritwik Chowdury: Still getting underway, will have a presentation at this meeting concerning different issues seen by the industry. No writing assignments yet.
- NERC - Rich Bauer: Nothing to report.
- P2800/P2800.1 - Rich Bauer: Work ongoing. Struggling with negative sequence injection, aka unbalanced current production - may not be “silver bullet” most are expecting. Other solutions will need to be explored. Synchronous condensers are expected to be part of the solution. Ratan Das suggested C37.113 be revised to include IBR impacts on transmission line relaying.

Rich Bauer reported CEATI is requesting webinar in impact of IBR on protective relaying. Steve Miller along with his colleagues Koustubh Banerjee and Looja Tuladhar volunteered to handle. Gary Kobet will forward Rich's email along with slides from April 2019 IEEE/PES Webinar.

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

Chair: R. Benjamin Kazimier
Vice Chair: Steve Klecker
Output: Paper
Draft: 4.1
Established: 2018
Expected Completion Date: May 2020

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

C36 met Tuesday in City Terrace 9 from 5:00 to 6:10PM. There were 7 voting members, 1 non-voting member, and 12 non-members present.

Draft 4.0 was sent to the working group prior to this meeting but enough responses were not received in time to finalize a vote on the content of the body of the work prior to this meeting.

At this meeting the draft was reviewed. Very minor edits were made.

It is expected that the work for this report is essentially complete. The final draft will be sent to the working group giving adequate time to review the final draft and complete a vote prior to the May meeting for submittal to the subcommittee.

Writing Assignments:
Yuan Liao volunteered to put together the keywords section. Taylor Raffield volunteered to complete the abstract section.

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

The working group is currently on Draft 4.1

C-38: 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: 0.4
Established: 2018
Expected Completion Date: February 2022

Assignment: Develop an IEEE Guide for the Design of Microgrid Protection Systems.

This meeting was an in-person face-to-face meeting, in a double session. There were 60 attendees, with 22 voting members, 2 non-voting members, and 36 non-members. The working group did not meet quorum.

The working group began with introductions, followed by reviewing our assignment. The patent slides were reviewed and no concerns or comments were raised.

Minutes have previously been sent out to the working group for approval. They will be re-sent for approval. Working group leaders request that all voting members please vote on these minutes.

The working group reviewed the agenda for this meeting. Sukumar Brahma motioned to approve the agenda, with a second by Mukesh Nagpal and unanimous approve of the working group.

The chairperson reviewed the action items spreadsheet, to show what assignments are still incomplete.
The working group reviewed progress on the draft guide. Updates and discussion were as follows:

- Section 4
  - The working group reviewed recent contributions from Ward Bower.
  - Action Item: Ben Kazimier volunteered to review these contributions.
- Section 5
  - The team discussed whether to discuss a mixed or transitional mode in this guide.
  - Action Item: The chairperson asked that the authors of this section add a citation to Sandia report and additional explanation on transitional mode.
  - Ben Kazimier raised that the heading could use an update after the section is complete to more clearly describe what is contained in the section.
- Section 6
  - This section has a complete draft and is ready for review.
  - Action Item: Sukumar Brahma volunteered to review section 6.2.
  - Action Item: The group agreed to review their contributions integrated into the newest draft.

The working group took a ten minute break between 2:10 and 2:20 PM.

- Section 7
  - This section has a complete draft and is ready for review.
  - Matt Reno gave an overview of section and what has been written.
  - Action Item: A comment was raised about modes of operation. Matt Reno volunteered to edit the mode names based on our discussion on section 5 today.
  - Action Item: Mukesh Nagpal volunteered to review section 7.
  - Action Item: The chairperson mentioned that Sukumar had some comments on section 7.3, and will ask him to review this section.
  - The working group discussed that the guide should address what protection schemes should be used in presence of inverters. Ratan Das mentioned that this is covered in section 8.
  - Matt Reno asked for support in adding to section 7.4 on interoperability.
  - Action Item: Mani will contribute to the interoperability section (7.4).
  - Matt Reno asked for support in adding to section 7.6 on fault location.
  - Action Item: Mani will contribute to the fault location section (7.6).
- Section 8
  - Ratan Das gave an overview of this contribution and what has been written.
  - Action Item: It was raised that we should be consistent about using POI, PCC, POC, etc. This change will be made when we have a complete draft.
  - There is a subsection that refers to Diesel and CHP generators. This section covers synchronous rotating machines applied in microgrids.
  - It was raised that busbar protection may be a useful addition to this section.
  - It was raised that a separate section on the black start process would be useful. There is currently a placeholder for such a section, but it has not yet been written.

- The chairperson indicated that some items in the Annex may belong in the body because they are very significant.
- Action Item: Mani asked that the authors of this section review it one more time, re-arranging the content considering the discussions this meeting.

The working group did not have time to discuss the contributions in later sections. We will start with section 9 in our next meeting.

Our next meeting will be planned in March 2020 via a web meeting. The working group agreed to set up a poll on dates and locations.

Please complete all action items from this meeting prior to the web meeting in March 2020.

Finally, the meeting was adjourned.

C-39: Guide for Testing Auto Voltage Control Systems in Regional Power Grids

Chair: Yufei Teng
Secretary: TBD
Output: IEEE Guide (C37.252)

Scope: This guide describes the application philosophy, limitations, and testing methods for the automatic voltage control (AVC) system of the regional power grid. This guide applies to the testing for reactive-power-control-based AVC systems in the regional grid.

Purpose: The purpose of this guide is to describe the methods of testing the functions and technical performance of the regional AVC systems, with a view to finding the potential defects of AVC systems and improving the operational performance of AVC systems.

The working did not meet at the JTCM this year.

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

Chair: Vasudev Gharpure
Vice Chair: Mital Kanabar
Output: Paper
Draft: 0.1
Established: 2019
Expected Completion Date: TBD

Assignment: Develop a publication (transaction, or conference, or IEEE resource enter), based on C37.247-2019: the standard for Phasor Data Concentrators for power systems.

5 Attendees.
The following items were discussed:

- Patent/IP related IEEE slides were shown
- The group should consider the IEEE resource center for publication. VG to contact IEEE.
- A possible outline for the publication was presented.
- The publication will not be just a short version of the standard, although a short summary will be included.

- The publication will include the reasoning for what was included, and for what was left out of the standard. It will also include recommendations for how the standard should be used.
- VG will set up join-me meetings and calls

Subsequent to the task force meeting, the C subcommittee approved the formation of the working group C40. At the next meeting in Nashville, the WG requests a meeting room with 20 attendees and a projector.

CTF-41 Investigate performance requirements for Distribution PMUs

Chair: K. Martin
Vice Chair: N. Perera
Secretary: D. Gurusinghe
Output: TBD
Established: 2019
Expected Completion Date: TBD

Assignment: Establish a task force to examine the measurement performance requirements for PMUs that are intended for use in distribution system applications. The output of the task force will be a summary of findings and a recommendation as to whether distribution PMU requirements should be incorporated into the existing synchrophasor performance standard, established as a separate standard, or if they are adequately covered by the existing standard.

Task force CTF41 met on Wednesday, January 15, 2020 at 9:20am in a single session with 7 members and 19 guests (4 guests remotely connected via WebEx). This was the first meeting after forming the TF. Introductions were done after a welcome by Chair Ken Martin. The patent and copyright slides were presented.

The Chair (Ken) began with the TF assignment and explained the objectives. Allen Goldstein understood that the scope had been expanded when the TF was approved at the subcommittee. Ken did not receive any modified scope from the subcommittee. Fred Friend (Subcommittee chair) said we could modify our scope to suit. After discussion, it was decided to keep the scope as it is for this meeting since the agenda is set and it is not clear what changes can be made. This will be clarified at the SC meeting. It needs to be resolved how long the TF has to do its work. The distribution PMU issue will take some time, and the resulting recommendations may not be the same as for the proposed frequency and sample value issues that Allen has brought up.

Ken Martin, Harold Kirkham and David Laverty delivered presentations to highlight salient features of distribution system and specific requirements of distribution PMUs. Ken's presentation highlighted the differences between transmission focused and distribution focused PMUs as reported by the literature, the current PMU requirements, and the particular limitations of PMU measurements. Harold discussed the metrology aspects of specifying measurement requirements, particularly the difference between representational and operational measurement. His conclusion is that distribution PMUs need a different type of standard that what we currently have. David brought up some of the operational challenges to installation and the lack of very clean, well-defined signals. Due to technical problems, the WG had no further time for discussion. The Chair asked everyone in attendance to forward any articles, papers, or other information they might have on the characteristics or application needs of distribution systems, that could be used for developing PMU requirements.

For the next meeting, the taskforce requests one session for 30 people with a projector. Please avoid scheduling conflicts with C23, C28, and PSCC P9, P10, P0 (SC).

D: Line Protection Subcommittee

Chair: Bruce Mackie

Vice Chair: Meyer Kao

Line Protection Subcommittee Scope

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

The Subcommittee meeting was called to order on Wednesday, January 15, 2020 from 13:00 to 14:30. Following introductions, a count of D-Subcommittee membership was made, and it was determined a quorum was present (28 out of 45 members present). Ilia Voloh is introduced as a new member of D-Subcommittee. Final attendance count was 33 members and 54 guests.

Minutes from the September 2019 meeting in Denver were approved after motion made by Jon Sykes and seconded by Fred Friend.

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)

The Chair discussed the Awards and Technical Paper Recognition for WG. IEEE SA Working Group Awards has new procedure to request certificates of appreciation for completed (Approved Standard) work; the Awards must be requested by WG Chair or VC directly from the IEEE SA. Also going forward starting in May 2020 meeting, they will be presented on Mondays during the reception dinner for the May and September meetings.

Working groups gave reports on their activity.

Reports from the WG Chairs:

D28: (PC37.230): Guide for Protective Relay Applications to Distribution Lines
Chairman: Brian Boysen
Vice Chair: Claire Patti
Established: 2013
Output: C37.230 – Guide for Protective Relay Applications to Distribution Lines
Draft: 2.6
Expected Completion Date: 2020

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

The working group met via web meeting on Tuesday, January 14, 2020, 2:20 pm EST.

There were 15 voting members and 9 guests in attendance. Quorum was achieved. Attendance has been recorded in 123Signup.

The patent slides were presented. No concerns were voiced.

The IEEE SA Copyright Policy slides were presented.

The Agenda was presented.

The September meeting minutes were presented. Mike Meisinger motioned to approve, and Pat Carroll seconded the motion. The motion carried.

The WG reviewed and discussed the comments from the second recirculation ballot. Comment responses were documented in the comment spreadsheet available to all members on iMeet Central.

Mat Garver joined the working group as a non-voting member.

Greg Ryan, Mat Garver, and Juan Gers agreed to review and revise Section 9**. – Due March 1st.**

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

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

ATTENDANCE: Total of 28 with 6 Members and 22 Guests.

GENERAL ITEMS:

1.) The Chair gave an update on the IEEE PSRC D29 test system and compared the critical clearing time (CCT) of the test system with no IBR's on the system against test systems with 25% and 40% IBR penetration. As expected, the CCT was reduced as the percentage of IBR penetration increased. The chair noted that if the penetration of IBR's exceeded 40% the test system model was having convergence issues.
2.) The Chair stated that the test system is being modelled using CAPE TS-Link (Siemens) which links the detailed protective relay models in CAPE with the load-flow and dynamic stability models in PSS/E. He also mentioned that an Xcel Energy engineering intern will be modeling the test system in PSCAD. Additional studies will be performed and results will be presented at the May, 2020 PSRC meeting.
3.) The Chair will provide an updated document to Gene Henneberg, Joerg Bloemschein, Mike Kockott and Normann Fischer by January 30, 2020, for feedback with respect to outline content completeness and organization. The reviewers will provide their feedback back to the chair by February 29, 2020.
4.) The chair will add additional content to an updated document that will be circulated D29 membership by March, 31 2020. D29 membership will review the circulated draft and will send edits back to the chair by April 30, 2020, so that he can compile all edits and comments into a new document draft in time for the May 2020 meeting.

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

Chair: Karl Zimmerman, Schweitzer Engineering Labs
Vice Chair: Ted Warren, Southern Companies
Output: Tutorial
Established: January 2014
Expected Completion Date: Jan 2020
Draft: 4.0
Working Group Assignment: Write a tutorial on factors affecting the application and setting of ground mho and quadrilateral distance elements on transmission lines

Working group D30 met in a single session with 10 voting members and 23 guests.
After introductions, the WG Chair reviewed edits to the Tutorial.

These edits included:

- Eliminating redundant figure 10 on mho expansion, revising figure on polarizing voltage
- Adding place holder for section on impact of polarizing quantities on Quadrilateral (assignment: K.Zimmerman)
- Suggested edits to 6.3 on impact of CVT transient, CT saturation, and transformer inrush, to reduce this section and refer to previous technical reports (D. Lebeau)
- Edits to move part of section 6.2 on weak source to Annex
- Adding detail to Section 7.1 on considerations for setting ground distance for direct tripping Zone 1 and Zone 2, especially criteria for setting quadrilateral elements (K.Zimmerman)
- Review of Section 7.2 on considerations for setting pilot zones (T. Warren)
- Completion of Section 7.3, table to Summarize Tutorial

Existing Draft 5.1 will be posted on PES-PSRC web site by weeks end. All WG members and guests are invited to review and comment leading up to May meeting.

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

Chair: Normann Fischer, Schweitzer Engineering Labs
Working Group Assignment: Coordinate with IEC 60255-187-3 (functional specification on line current differential requirements) and provide feedback

The working group did not meet in January.

D35: Evaluation of Transmission Line Pilot Protection Schemes

Chair: Rick Gamble
Vice Chair: Brandon Lewey
Output: Technical report to the Line Protection Subcommittee
Established: January 2017
Expected Completion date: 9/2020
Draft: 9
Assignment: Prepare a technical report to the line protection subcommittee to evaluate advantages and disadvantages of common transmission line pilot protection schemes, including POTT, DCB, DCUB, and line current differential. The schemes will be evaluated in terms of speed, sensitivity, dependability and security based on the design and configuration of transmission lines and system topology. A limited number of example systems will be evaluated.

Working Group D35 met on Tuesday, January 14, 2020 at 8:00am in a single session with 17 members and 19 guests.

The WG reviewed several technical comments in the document. More specific information regarding the fiber section needs to be added and figures within the report needs to be revised to follow PSRC Standard symbols. The WG also discussed how to represent a summary table and agreed to develop four tables, one for each pilot scheme. Auto-sectionalizers will be added to Section 1 of the report.

Several assignments were made, some new and some old.

Draft 9 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.

Action Items:

- Jeff Brown – write-up on POTT/DCUB relationship when using PLC

- Brandon Janssen – follow-up on Section 3.5 with new document reference
- Ted Warren – send write-up of echo considerations for later use in Section 4.2
- Rick Gamble & Brandon Lewey – clean up Section 4.8 & develop summary tables
- Brandon Armstrong – clean up Section 4.9 for better flow (repetitive paragraphs)
- Greg Ryan – send write-up to address vague fiber section
- Rick Gamble – revise all diagrams to match PSRC Standards
- Rick Gamble – add auto-sectionalizers to Section 1

D37: Impact of series compensation on transmission lines
Chair: Mike Kockott
Vice Chair: Luis Polanco
Secretary: Nuwan Perera
Working Group Assignment: Create a report the impact of fixed series compensation on transmission line protection.

D37 met as scheduled with 23 attendees (9 members plus 14 guests). Several writing and review assignments were received. WG reviewed the list of writing / review assignment and the overall content of the draft report.

The list of assignments is updated as follows.

Mike Kockott
- Review comments for Section 4
- Follow-up with Luis on following assignment

Luis Polanco
- Research on three (3) Gas-Turbine Generator failures that occurred on South-America few years back to incorporate in Section 5.2.1

Nuwan Perera
- Review overall report for missing information based on WG inputs
- Review and update Section 5.2 (get feedback from Normann Fischer)

Normann Fischer
- Provide draft for Section 7.4.1 on New Technologies (Travelling Wave applications) and for Section 3.2.3 on Low Frequency Oscillations
- Provide draft for Special testing requirements for new technologies
- Provide draft for Section 3.4.4. (Delayed Current Zero Impact)

Adi Mulawarman / Hardesh Khatri
- Provide review comments for Section 3

Zhiying Zhang/ Nuwan Perera
- Review the section on protection solutions for voltage inversion.

Secretory will send the draft version 1.02 to all WG members and guests by Jan 31, 2020.

With no further business, the meeting was adjourned.

D38: Impact of High SIR on Line Relaying

Chair: Chris Walker (Walker Consulting Services)

Vice Chair: Greg Ryan (Ameren Illinois)
Working Group Assignment: Prepare a technical report to the line protection subcommittee to evaluate the impact of high SIR on line protection.

We met today with 43 attendees; 21 members and 22 guests. We added two members today. We are on draft 0.1. We are requesting a room for the next meeting for 50 people and request that we avoid conflicts with D35 and D42.

Chris opened the meeting and introduced the working group title then we did introductions.

Chris explained that we are going to manage the voting members like a PAR related activity.

We have 13 of 19 voting members present and have quorum.

The minutes from the September meeting were approved. Brandon Lewey was first motion and Pratap Mysore was second.

Chris introduced the sections of the report and we asked the people who wrote the sections that have been submitted to present their respective sections.

Pratap Mysore discussed the "What is SIR" section that he, Steve Klecker, and Don Lukach wrote and reviewed, with the working group. Pratap also discussed his sections on Instrument Transformer Accuracy with the working group. The working group discussed these sections.
Sebastien Billaut introduced section 3.5 "Inverter Based Resources" to the working group.

Hardesh Khatri discussed the section "Relay Accuracy" that he and Karl Zimmerman wrote with the working group.

Brandon Lewey discussed his section "Distance Protection" with the working group.

Ted Warren discussed the section "Instantaneous Overcurrent" that he and Bruce Mackie wrote with the working group.

Meyer Kao discussed the section "Supervisory Elements" with the working group.

Those sections wrapped up where we stand today with the report. Chris brought up with the working group that we want volunteers to update/take some sections that Pratap mentioned on why SIR is not an issue with EM relays. Pratap volunteered Bogden to update this section. Bogden mentioned he as written a paper for PAC world that he can share with the working group. Arthur Buonno volunteered to work on that section with Bogden.

Chris asked the working group for volunteers for section 3 "Impact of System Topology on SIR". Rick Gamble, Koustubh Banerjee, Sebastien Billaut, and Ted Warren volunteered for that section.

Quads were mentioned in that we have a discussion on MHO why not quad. Bogden mentioned that polarizing quantanties are not affected as they are either memorized values or unaffected phase values. The issue is operating quantities with that have very low voltage for faults on the remote bus. Resistive faults improve the issue as they have higher voltage at the relay. Bolted faults are the worst case. The working group agreed that we should have a mention of quads even if it is a small section.

We also discussed among the working group that there are many sources of error in the system. We cannot focus and should not focus only on the relay for this report.

D39: Revise C37.104 IEEE Guide for Automatic Reclosing on AC Distribution and Transmission Lines
Chair: Manish Patel
Vice Chair: Brandon Armstrong
Established: May 2018
Output: C37.104 – IEEE Guide for Automatic Reclosing on AC Distribution and Transmission Lines
Draft: ???
Expected Completion Date: December 31, 2022

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

Working Group D39 met on Tuesday, January 14, 2020 at 10:40 a.m.in a single session with 19 members and 11 guests. No Quorum.

After brief introductions, the minutes from the previous meeting were reviewed, though no quorum existed to approve them.

The WG chair, Manish Patel, reviewed major changes since the September 2019 meeting. These changes are noted below.

1. Removal of clause 4.7.7 – Adaptive reclosing: During the previous meeting, WG decided to get away with section and move some of the content to other related clauses.
2. Update to clause 4.4.2 – Dead Time: More content is added to show origin of equation 1. In addition, dead time information from ABB T&D book is added for reference.

Manish Patel proposed to relocate following sections. Members of the WG agreed. Manish Patel will make necessary changes before the next meeting.

1. Clause 7.5 – Automatic load restore after UFLS/UVLS: The content of this clause does not belong in Emerging Technologies section.
2. Clause 7.3 – coordination of fast valving and high speed reclosing: The content of this clause does not belong in Emerging Technologies section. Possibly move to clause 6.3.2 or just following it.

During initial review of the guide, Alla Deronja requested to add a clause (6.3.12) to discuss implementing automatic reclosing when line is equipped with bus or line potentials only. Alla noted that a line-side potential device may not be installed, if this terminal autorecloses first, on HB/DL. The idea is not install a device that has little use but an additional source of failure. Some WG members expressed concerns with this design, however, WG agreed to include this in the guide and plans to detail pros and cons of such a design.
Manish Patel asked Don Lukach to advise the WG with IEEE-SA's guidance on use of "should" in the guide. In general, IEEE-SA discourages use of "should" and recommends detailing "reasoning" instead. Manish Patel noted that there are 153 instances of "should" in the guide currently. Three individuals signed up to review guide for use of "should" and determine if it is appropriate or not. If not, individuals plan to offer an alternate language. These individuals are:

1. Bruce Mackie – Clause 4
2. Hugo Monterrubio – Clause 5
3. Joshua Lamb – Clause 6

WG used rest of time to resolve outstanding comments. Following assignments were made:

1. Joshua Lamb to provide a statement explain "breaker pumping"
2. Ted Warren to offer a new definition for "reclosing relay" for WG's consideration.

WG also briefly discussed the schedule. The chair plans to have WG vote sometime during the third quarter of 2020. The chair to set-up monthly two hour calls to continue to resolve outstanding comments/items.

Contributions are requested by March 20th, 2020.

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

Chair: Ilia Voloh (GE)
Vice Chair: Evangelos Farantatos (EPRI)
Assignment: To monitor and collect line protection events, coordinate with other industry activities, and provide guidance to line protection subcommittee to improve line protection response when connected to inverter-based sources

The meeting started with introductions and then the WG chair described the scope of the WG. It was announced that, based on discussions with PSRC committee officers after the September 2019 meeting, the title and the assignment description of the WG have been updated, to avoid conflict with the scope of other WGs/TFs. The attendees were also encouraged to provide to the WG any fault records they might have related to IBRs, which they can present in future meetings.

Then there were two presentations:

1. Prof. Sukumar Brahma, Clemson University. "Extremely high close to 100% penetration of IBRs - futuristic look at protection issues"
2. Prof. Sakis Meliopoulos, Georgia Institute of Technology. "Dynamic State Estimation Based Protection: Immune to IBR characteristics"

There were total 27 attendees in the meeting, 8 members and 19 guests.

A request was made during the subcommittee meeting for the officers of the subcommittee to review the assignment of working group D41.

DTF42: Investigate need to revise C37.113

Chair: Jeff Barsch
Vice Chair: Don Lukach

Assignment: Investigate the need to revise IEEE Std C37.113-2015, IEEE Guide for Protective Relay Applications to Transmission Lines.

The DTF42 task force met with 37 guests. A motion to approve the agenda was made by Karl Zimmerman with a 2nd by Josh Lamb. There was a unanimous vote to approve the agenda.

The chair showed the scope and purpose of the existing guide. Various topics which had been discussed and researched by the D40 WG were presented. These are topics which could be revised or enhanced in the line guide. In addition, there are some figures which need to be revised, and wording needs to be checked to match SA guidance for proper language.

A motion was made by Josh Lamb to form a working group to revise the guide with a 2nd by Meyer Kao. There was a unanimous vote to recommend to the D Subcommittee to form a working group to revise the guide.

A motion was made by Chris Walker with a 2nd by Brandon Lewey to propose the following assignment for the new WG: Revise C37.113-2015, IEEE Guide for Protective Relay Applications to Transmission Lines. There was a unanimous vote to approve the assignment.

The group then discussed possible wording for the scope of the line guide, and SA word usage was reviewed.

Motion was made at the subcommittee meeting by Jeff Barsch and second by Don Lukach to form a WG with assignment of Revise C37.113-2015, IEEE Guide for Protective Relay Applications to Transmission

Lines. Members of D Subcommittee unanimous voted to form the D42 Working Group. Chair of the D42 WG will be Jeff Barsch, with Rick Gamble as the Vice-chair, and Josh Lamb as the Secretary.

DTF43: Investigate the need to update PSRC Report, Effect of Distribution Automation on Protective Relaying
Chair: Bruce Mackie
Established: January 2020

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

Task Force DTF43 met on Tuesday, January 14, 2020 at 9:20am EST in a single session with 17 attendees.
The meeting started with introductions. The purpose of the task force was discussed in which PES approached PSRC about taking some chosen papers and converting them to the new PES format. This paper was chosen and the task force will determine if the paper should be put in the new format. If the paper is put in the new format, then should the paper be updated as well?

The TF then reviewed the current paper. There was some discussion about the paper. The group decided to put the paper in the new format as a minimum. Each person was given the assignment to review the existing paper and it will be decided if the paper should be updated at the next task force meeting. Two volunteers will be making presentations at the next meeting to discuss possible areas to upgrade. The volunteers are Amin Zamani and Vijay Shanmugasundaram, depending upon their attendance in May.

DTF44: Investigate Need to Revise C37.114 Guide for Determining Fault Location on AC Transmission and Distribution Lines
Chair: Karl Zimmerman

Assignment: Investigate Need to Revise C37.114 Guide for Determining Fault Location on AC Transmission and Distribution Lines

Task Force DTF44 met with 24 attendees, who all agreed to be members of the Task Force.

After introductions, the Chair of the TF presented a review of changes to the C37.114-2014, which included definitions of error, synchronized v unsynchronized data, improvements to traveling wave, and several other items.

Then the TF discussed possible revisions to the guide. These included

- Putting the guide in the new IEEE SA template.
- Micro grid considerations, including traveling wave on distribution systems
- Fault location with inverter based sources
- Expanded TW fault location approaches and experience
- Use of fault indicators as a strategy to work with relays
- Possible creation of excel spreadsheet to calculate single and two-ended FL as part of guide

After a motions from Brian Boysen and a second, the Task Force voted unanimously to recommend to the D Line Protection Subcommittee to create a working group D44 with the following assignment:

Revise C37.114-2014, IEEE Guide for Determining Fault Location on AC Transmission and Distribution Lines

Sebastien Billaut agreed to be Chair of the new WG, Karl Zimmerman agreed to be Vice-Chair.

Motion was made at the subcommittee meeting by Karl Zimmerman and second by Alla Deronja to form a WG with assignment of Revise C37.114, IEEE Guide for Determining Fault Location on AC Transmission and Distribution Lines. Members of D Subcommittee unanimous voted to form the D44 Working Group. Chair of the D44 WG will be Sebastien Billaut, with Karl Zimmerman as the Vice-chair, and TBA as the Secretary.

Coordination Reports

T&D Committee / Distribution Subcommittee

The next T&D Committee / Distribution Subcommittee meeting will occur during the IEEE PES General Meeting in Montreal, Canada, 2-6 August 2020.

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

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

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

P1854: Smart Distribution Application Guide has been published.
Scope: This guide categorizes important smart distribution applications, develops descriptions of the critical functions involved, defines important components of these systems, and provides examples of the systems that can be considered as part of distribution management systems or other smart distribution systems. The Guide was published on August 31, 2019. As a result of comments received during the balloting, a new PAR will be submitted to begin revision of the guide.

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

Work has resumed on P1885 'Guide for Assessing, Measuring and Verifying Volt-Var Control Optimization (VVO) on Distribution Systems'. The task force is preparing for final review with ballotting expected soon.

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

Continued working on the "Guide for Reliability Based Placement of Overhead and Underground Switching and Overcurrent Protection Equipment", P1806 with the plan to go to ballot in February.

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

Purpose: This guide provides means and methodologies for proper placement of switches and protective devices to achieve the desired performance characteristics and reliability for medium voltage distribution circuits, including feeder and branch line equipment, with operating voltages up to and including 38 kV. Drivers for device placement, such as reliability and operational considerations are identified. Various types of switching and overcurrent equipment are covered such as: manual switches, automated switches, reclosers,

sectionalizers, and fuses. Impacts on reliability and device placement are addressed for factors such as fault rate, interruption duration, exposure miles, customers affected and distribution automation.

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

There are two Task Forces in the Distribution Reliability Working group looking at outages from Mylar Balloons, and the revision of IEEE 1656 *Guide for Testing the Electrical, Mechanical, and Durability Performance of Wildlife Protective Devices on Overhead Power Distribution Systems* – both chaired by Yamille del Valle of NEETRAC.

Old Business

None

New Business

Chair initiated the discussion of protection of lines to reduce forest fire Hazards. Motion was made by Bruce Mackie and second by Jon Sykes to form a new Task Force on subject. Members of D-Subcommittee approved to form DTF45.

General Discussion

Alla Deronja suggested the Subcommittee provide a template for meeting minutes for all WG to use so that all the format of the minutes will be similar and consistent. Vice Chair to investigate creating a new meeting minutes template for WGs.

Claire Pattie questioned about 123signup roster retention for this JTCM. Fred Friend said he spoke to Mike Thompson and Mike indicated those who attended this JTCM meeting but are not in the 123signup system will need to create a profile in 123signup so that chair/vice-chair of WG, Sub-committee can record their attendance in 123signup for this January 2020 meeting.

Line Protection operations of interest

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

The meeting adjourned.

H: Relaying Communications and Control Subcommittee

Chair: Galina Antonova
Vice Chair: Aaron Martin

Relaying Communications and Control Subcommittee Scope

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

Included are matters necessary to the function of such systems employed in the generation, transmission, distribution, and utilization of electrical energy, and their effects on system operation. Control systems include data acquisition and processing from devices such as transducers, Intelligent

Electronic Devices (IEDs), and Human Machine Interfaces (HMIs) including the low-level interfaces to these systems.

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

SC H met on September 18, 2019 in Denver, CO with 26 members and 44 guests present comprising a quorum. Minutes of May 2019 SC H meeting were approved unanimously (Bill Dickerson moved, Marc Benou seconded)

Announcements:

1. Announcements from AdCom
    a. New items from
        i. PAR extension requests to be submitted at Sept meeting. Include project status (draft, % completion) and schedule.
        ii. Offer presentations to the Main Committee upon completion.

    b. New items from Awards and Recognition Meeting
        i. Standards Working Group Awards - should be requested directly by the Chair or Vice Chair of the Working Group.
        ii. Starting May 2020 during all future PSRC in May and Sept Awards to be presented during Monday night Reception.

    c. New items from Awards and Recognition Meeting
        i. Use appropriate Words for Standards and Reports. Standards Coordinator will review documents before ballot.
        ii. Revised IEEE Copyright policy: submit a form to IEEE-SA to request permission to present Copyrightable material.
        iii. New My Project system to be launched on January 26, 2020.

    d. New items from SC and reminders carried from prior meetings:
        i. Non-PAR WG officers to attend Stds Coordination meeting.
        ii. SC Members are required to Vote on Reports.
        iii. iMeet space available for Non-PAR WGs.
        iv. PSRC directory to be reviewed by WG/TF Officers.
        v. WG presentations to be reviewed by SC Officers.

WG business:

H35 Report “COMTRADE: Next Generation” was approved the H subcommittee. After editorial changes the report will be distributed to SC H Members and will be published at PES website. H35 Chair Mark Adamiak requested to disband H35. Alex Apostolov made a motion for the H35 to be disbanded. Marc Benou seconded the motion. Motion passed with 23 members voting in favor and zero opposed.

H40 Databases Used in Utility Automation Systems has a new Chair, Theo Laugher. WG approved the below PAR change. Ralph Mackiewicz motioned to approve, Charlie Sufana seconded. Motion passed with 24 members voting in favor and zero opposed. SC Chair to raise H40 PAR change at the PSRC Main Committee Meeting for approval. H40 proposes to change output from Recommended Practice to Guide: New Scope: This guide presents database characteristics to be considered by protection and automation engineers in discussions with the information technology specialists on desired database requirements to meet the needs of the power system applications. New Purpose: The purpose of this guide is to enhance the understanding between protection and automation engineers and information technology specialist in the area of database applications. This will be facilitated by application examples. Current Scope: This recommended practice presents general requirements, design, and lifecycle costs versus performance for databases associated with substation automation systems. Also included are specifications for database elements that should be standardized to ensure interoperability. Example designs are included for reference

purposes, which are not intended to prescribe a definitive database design. Applications utilizing databases can be very different and may have vastly different requirements

Per HTF49 recommendation a new WG H49 was formed with the below assignment. Tom Dahlin motioned to approve WG formation. Ralph Mackiewicz seconded the motion. Motion passed with 23 members in favor and zero opposed.

WG Title: Application considerations for the Use of Packet-Switched Communication Channels for pilot protection and teleprotection schemes
WG Assignment: To develop a report/tutorial on switched networks from an pilot protection application point of view for the benefit of relay engineers
WG Chair: Gary Stoedter.

Standards Nearing Expiration:
Mark Adamiak requested to form TF to reaffirm IEEE C37.239 Standard for Common Format for Event Data Exchange (COMFEDE) for Power Systems that expires in 2020. Alex Apostolov motioned to approve request, Ralph Mackiewicz seconded the motion. Motion passed with 25 members voting in favor and zero opposed. HTF51 to meet in May meeting.

Revision of IEEE C37.232 (COMNAME) standard needs to be initiated in 2020 (The standard expires in 2021). Amir Makki agreed to lead this work, contingent on H22 being finished.

IEC TC 57 IEC 61850 update
Ch. Brunner

For a detailed roadmap of the IEC 61850 related work, please check the IEC document 57/2050/INF.

Recently, the following parts have been published:
Part 2, Ed 2, Glossary
Ed 2.1 of parts 7-2, 7-3, 7-4, 8-1 and 9-2

IEC TC57 / WG10 will meet 2nd week of February in Golden, CO. WG10 has currently the following projects:

Preparation of an Edition 2.1 of IEC 61850 for some of the major parts
Part 4 and 7-1 to be circulated as FDIS; part 5 as CDV. Part 10 still needs to be started.

Technical reports that are under preparation
Several TRs are being worked on, first drafts for Travel wave based fault location and alarm handling have been circulated.

Work on technical specifications for mappings between IEC 61850 and Modbus data (TS IEC 61850-80-5) still ongoing.

Significant work ongoing on enhancing the engineering process to include as well the specification process and to include configuration of the communication network. Important part 90-11 on logic modelling is about ready for publication

IEC TC57 / WG17 will meet in Houston first week of February and is working on the following topics:

Revision of IEC 61850-7-420 to include modelling of grid codes.

61850 modelling of storage including thermal storage

New work on microgrids will be kicked off at the next meeting

IEC TC57 / WG18 is working on the following topics;

Update of IEC 61850-7-410 and IEC 61850-7-510.

Old business: None

New business: Mark Adamiak to raise at the next meeting a Task Force formation on the new generation of Comtrade standard. Contingent on completion of H35.

Reports from the WG Chairs

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

Chair: W. Dickerson
Vice Chair: J. Hackett
Output: IEEE Standard, PC37.237
Completion Date: 2018 December 31
Current Revision: D1.01

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

H3 did not meet and its work is complete. Standard was published effective Dec. 31 2018. A small group is working on a paper.

H6: IEC 61850 Application Testing
Chair: C. Sufana
Vice Chair: B. Vandiver
Output: Report
Established: 1999
Expected completion date: December 2019
Draft: 10.20

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

Introductions were done after a welcome by Chair Charlie Sufana. There were 11 members and 14 guests present for the Jan 14, 2020 meeting. Quorum was met. The new patent and copyright slides were also presented with no objections voiced.

The September minutes were voted approved, motion by Ralph Mackowitz and 2nd by Jay Anderson.

Several IEC 61850 based utility projects were discussed that are ongoing this year and future IEC 61850 industry events for 2020 identified.

The Chair began with a review of the report's status draft 10.13. Comment resolution was continued from the previous meeting. Effort is to try and finalize the report by resolving the last 26 comments.
9 comments were resolved today. The meeting finished with Draft 10.20 of the report and it will need to be finalized before a final WG vote.

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

Chair: T.W. Cease
Vice Chair: Cesar Calix
Secretary: Hugo Monterrubio

Ballot Administrator: Rick Cornelison
Output: Guide - PC37.249
Established: January 2014
Expected Completion Date: December 2020
Draft: 12

Assignment: Identify and categorize protection and automation related data files based on content, use, and risk of disclosure or compromise (confidentiality, integrity, and availability). Protection and automation related data files include, but are not limited to, files used for configuration, management, and analysis of protective relaying systems.
The Working Group met on time with 5 members and 11 guests in attendance. Quorum was not established. Patent and Copyright slides were presented and reviewed. The minutes from the last meeting will need to be approved by e-vote.

T.W. Cease presented the latest draft and explained that the document is near completion. It was agreed that copies of images such as nameplates would be removed and replaced with information that follows IEEE SA Copyright policy. Tony Johnson agreed to update the document. It was also discussed whether it was relevant to include a "table of figures" and a "table of tables" in the Table of Contents section. Tony Johnson agreed to review further and make any necessary revisions to the document.

No objections were received against the Guide going to ballot. A motion for the Guide going to ballot was then presented and seconded. However, as a quorum was not present it will be necessary to get agreement via an electronic vote. The balloting will be via email as Quorum may be difficult to establish. It was noted that the PAR expires at the end of 2020, so the approval schedule will be challenging especially if there are a lot of comments during the approval process.

The meeting included extended discussion on IEEE SA Copyright Policy, including interpretation and challenges presented to standards development. There will be a presentation at the next meeting by the IEEE staff that are responsible for the policy.

H27: PC37.251 Standard for Common Protection and Control Settings or Configuration Data Format (COMSET)
Chair: Mario Capuozzo
Vice Chair: Benton Vandiver
Secretary: Zach Makki
Output: Standard C37.251
Established: 2013
Estimated Completion Date: December 2020
Draft: 1.0

Assignment: Develop a standard file format for exchange of protection and control configuration data between engineering tools and asset management tools.
The working group met with 15 members and 6 guests in attendance.

Introductions were made and the chair presented the Patent and Copyright slides, this then opened the discussion of the material being presented since that material is from IEC 61850. At the September meeting Erin of SA was requested to get permissions but the WG did not receive a reply. Maria of SA was asked to research the status and get the permissions. Galina will follow up on that.

Quorum was met so a vote was taken and the September minutes were approved. The chair informed that iMeet Central would be used to distribute materials going forward and anyone not signed up should

do so to receive the WG documents. Vote was made by quorum to extend the PAR, but submission of extension postponed till May meeting.
The chair presented the latest attribute mapping for WG review, the structure supports IEC 61850 and any data that an IED would have and uses the abstract UML model created.

Draft Status: A UML model has been made to structure the proposed extensions, Herb provided the IEC 61850 XSD file that has been edited to add the extensions and support the proposed schema.

New attribute : isDefault - was defined since the last meeting and has been added to support the revised data structure.

The latest SA template has been used – the draft is now in the latest format and ready for the WG to review and make contributions. (Please download from iMeet Central.)

Integer: The WG discussed the data types, Herb went through the various ways that IEC 61850 handles them and how the mappings to the revised XSD relate. MinValue, MaxValue, Size, IsSigned, StepSize, NumericalBase, SIMultiplier, SIUnit were discused - we need to address “allowed” StepSize if it is required to be different from 7-3.

Discussion was to assign which types were to be optional or mandatory, Herb recommended to make all Integer data types as required. Min/Max may be the exception, Herb suggest to have them as optional but make them floating to accommodate even non-integer entries. They can be restrained by the integer Size type but Mario wants to ensure that any existing mapping can be made. Result: all are required except MaxValue.

Real (Analog) : MinValue, MaxValue, Size, StepSize, NumericalBase, SIMultiplier, SIUnit were presented and discussed. It was determined that accuracy, precision, or decimal was not required as StepSize would be sufficient to represent all use cases.

Meeting Adjourned – Ralph/Jun

Action Items:

Resolve copyright issue with IEC materials for the XSD and references by next meeting.

Make a rev change to the standard (update draft standard based on the discussion).

PAR extension will be revisited at the May meeting.

H30: IEC 61850 User Feedback
Chair: D. Maragal
Vice Chair: A. Martin
Secretary: D. Tessier
Output: User Feedback
Established: September, 2014
Estimated Completion Date: Ongoing
Draft: 0.8

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

Introductions – 10 members 12 guests

Reviewed Agenda

Deepak announced that the imeet site was for H30 (https://ieee-sa.imeetcentral.com/ieeepsrc61850userfeedbackforum) All the current and past presentation slides performed at H30 can be found on the website.

Discussion for need to consider life cycle of traditional technologies (hardwired) versus modern technologies (communication). Need to factor in all pros and cons, including the increased availability associated with PRP/HSR networks (pros), as well as the added costs (more network infrastructure, engineering, etc.)

A discussion focused on the reliability of SV streams vs CT and PT signals.

Feedback to WG10 needs to be specific. There is a need for a standardized means to dynamically associate/flop-over between preferred and alternative SV/GOOSE messages. This flop-over scheme should be capable of being automated using fixed vendor logic, as well as user-defined logic.

Announcement for North East 61850 Utility Forum hosted by Hydro Quebec to be scheduled in 2020.

Announcement for ICAP 1588 profile meeting to be hosted by NYPA to be scheduled in Q2/2020

Discussion Securing PTP signals using DHS/PNT, which is used in other industries/applications.

Herb Falk presented UCA 61850 IOP results including the following:

- Never tested synchrophasors, bridge object model (90-4), and CIM/61850 harmonization.
- Main issues were related to SCL and Cyber Security.
- Majority of the issues were vendor's implementation of IEC 61850.
- Recommend using EDF/Hydro Quebec (Rise Eclipse) SCL validation tool.
- A grandmaster clock skewed the time when a time deviation was applied, instead of jumping. IEC 61869-9 states the clock must jump and not skew/slew upon a time deviation. This "jumping" feature should be specified.
- Final report will be available by DistribuTech (February/2020)
- Many vendors were using beta tools/IEDs.
- Users are encouraged to request SICS statements, and request their configuration tools to undergo conformance testing.
- IEC 61850-9-2LE is no longer being maintained. Users are encouraged to request IEC 61869-9 and IEC 61869-13 compliant device. A task force is currently working on IEC 61869 conformance test plans, which should be available in 2020.

Update from Southern California Edison

- Automated engineering process with SCE specific files (PCD/TCD/ECD/HCD), along with standard IEC 61850 SCL files (SCD)
- SCE has developed customized System Configuration Tool called SEMT (Substation Engineering Modelling Tool) that generates these file sets.
- HMI is automatically configured using these files as "inputs'
- Files sizes are getting large (250MB)
- Changing the datasets caused some issues, and recommend designing "Master" datasets that can be used in all applications, regardless if they are needed. This minimized the need to re-test any devices.
- QA checks are in place that validate the SCL files, as well as SEMT comparison capabilities.

Update from Digital Substation User Task Force – For more information see slides and www.digitalsubstations.com

H31: Common Protection & Control parameters for COMSET
Chair: D. Maragal
Vice Chair: A. Apostolov
Output: Report
Established: September, 2015
Estimated Completion Date: September, 2020
Draft: 4
Assignment: Develop generic models and parameters of protection functions.

Introductions – 4M members 8 guests

The new draft report (Excel) was presented and following items were highlighted:
- List of protection functions
- List of unique protection parameters
- PSRC relay model with Input-Output-Settings
- PSRC interpretation

The group discussed the descriptions for following parameters:

PDIF LineCapac: Missing pu, % or capacitance value

PDIF Lowset: Missing %, pu or sec-A

PDIF RstMod: Missing information on 2nd or 5th harmonic block needed fortransformers.

BlkRef: Need for more information on list of blocking signals defined in relay

ClcMth, ClcMod: Require enumeration of Sequence, Phase, Calculated vs Measured.

ClcIntvTyp, ClcIntvPer, NumSubIntv, ClcRfTyp, ClcRfPer: These all seem to indicate same information of Window Length.

InSyn: Requires enumeration of Bus side, Line side or Source 1 and Source 2.

Alex Apostolov mentioned the need for Logical Device grouping of Logical Nodes with regard to their usage. This work needs to be coordinated with IEC 6100 working group.

There was suggestion to include Z group elements (Power System Equipment) that are related to this group such as Battery, Capacitor bank, Motor, Reactor, Resistor, Motor.

There was recommendation to include TC 95 60255-121, 187, 151 as these groups have developed models. Alex Apostolov and Dr. Murthy Yalla are going to work to collaborate.

To collaborate with other working groups on this matter, request shall be made to ENTSOE if they are willing to wosrk on the same Excel template developed by PSRC. Usage of common template by multiple working groups allows harmonization. Christoph Brunner mentioned the work at ENTSOE has halted but will follow-up on collaboration aspects.

There needs to be copyright permission to enhance the Object Models of IEC 61850 7-4 part of the standard.

H32: Performance requirements for Ethernet circuits applied to teleprotection
Chair: K. Fodero
Vice Chair: W. McCannon
Output: Report
Established: September, 2014
Estimated Completion Date: December 2019
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 7 members and 5 guests in attendance.

The working group reviewed the latest draft and addressed input from Gary Kobet & Stephen Craven of TVA. We have three comments left to address, these all reference the same issue located in different parts of the document. The plan is to complete the edits related to these items and submit Draft 10 to the subcommittee for review. We will also send feedback to Gary and Stephen on the actions taken.

The group will need one more meeting to address feedback from subcommittee review.

H35: XML Translation for COMTRADE
Chair: M. Adamiak
Vice Chair: Z. Makki
Secretary: M. Capuozzo
Output: Report
Established: May, 2015
Estimated Completion Date: December 2019
Draft: 12
Assignment: Create a report with recommendations and implementation guidelines for the update of COMTRADE - specifically with the inclusion of XML definitions of the Configuration, Header, and Data areas.

H35 did not meet. Report has been approved by H-Subcommittee. H-subcommittee voted to disband group.

H40: Databases used in SAS
Chair: T. Laughner
Vice Chair:
Output: Guide
Established:
Expected completion date: December 2020
Draft: 1.6
Assignment: This recommended practice presents general requirements, design, and lifecycle costs versus performance for databases associated with substation automation systems. Also included are specifications for database elements that should be standardized to ensure interoperability. Example designs are included for reference purposes, which are not intended to prescribe a definitive database design. Applications utilizing databases can be very different and may have vastly different requirements.

Working group met with 3 Members and 3 Guests in attendance. Tony Seegers is a new member as I2 (Terminology) liaison. After introductions, IP Policy call was made, no issues were raised.

Before this meeting WG Chair, Jim Bougie, not in attendance, informed SC H Chair of his resignation. SC H Chair, Galina Antonova hosted this meeting. She informed the group that Theo Laughner has accepted a WG H40 Chair position. Theo could not attend this meeting due to a time conflict.

Tony Johnson covered history of the current document. Output, Scope and Purpose were discussed next. It was suggested to change output to Guide from Recommended practice. PAR details were reviewed. It was noted that the original PAR has P2680 number, while C37.1.2 has been used for this work. This has to be corrected. A few changes in the Scope were proposed, such as removing life cycle and cost information. A new Purpose clause was proposed as follows: "The purpose of this guide is to enhance the understanding between protection and automation engineers and information technology specialist in the area of database applications. This will be facilitated by application examples." All changes were captured in Draft 1.6 during the meeting.

With new WG leadership, next steps would be to confirm WG Membership, revise PAR, and focus on completing the document. For the document content it was suggested to include general data base characteristics, and STIG.

H41: Revision of IEEE 1646 Communication Delivery Time Performance Requirements
Chair: D. Holstein
Vice Chair: T.W. Cease
Output: Standard
Completion Date: 2021
Draft: D2

Assignment: Revision to IEEE Standard 1646-2004

The WG met on Tuesday, with 4 members and 2 guests in attendance. A quorum was present. This was the 8th official meeting. Attendees introduced themselves and affiliation.
Attendees signed the attendance list and indicated if they were a member or guest.
The call for patents was presented – no response.
The copyright slides were presented.
The agenda was reviewed and approved without change.
Past minutes were reviewed and approved.
Those attending focused on the following topics:

Went over the action item list. No action items were closed.

Table 2 title was changed to Latency.

Table 4 title was changed to Latency.

Dennis will put the definition of latency in the next draft.

Need to define skew, latency and jitter. Mal Swanson will work with the IEEE dictionary to determine the best definition for our use.

Table 1 add latency in several places.

Dennis to add a note to define time for a ¼ cycle.

Talk to Ken Fodero about time in his working group H32.

Chris Hunley to check with IEC requirements.

Chris Hunley to rewrite section 6.5 to clarify the verbiage.
Look for a place to move future items table 4.

H44: Monitoring and Diagnostics of IEC 61850 GOOSE and Sampled Values Based Systems
Chair: A. Martin
Vice Chair: R. Mackiewicz
Output: ???
Established: May 2018
Expected completion date: January 2022
Draft: 1.0

Assignment: ???

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

Meeting minutes from May and September were reviewed. Jay Anderson motioned to approve and Herb Falk seconded the motion. Minutes were approved unanimously.

Grouped discussed copyright slides because contributions contain references to copyright material. Most of it is from IEC. Members expressed concern about the impact of this new copyright policy and IEC copyrights specifically. P2030.100.1 is supposed to be a guide on monitoring of IEC GOOSE and SV messaging. Some of the content is going to require material from IEC standards. It is not practical for H44 to contact the IEC about the use of these IEC standards. This issue impacts numerous PSRC (and PSCC) committees. IEEE SA needs to set up a fixed arrangement between IEEE and IEC that will enable the IEEE PSRC (and PSCC) to do its work. Dustin Tessier provided a contact at IEC to ask for permission.

Aaron announced his intention to schedule up to 2 web meetings in between the face to face meeting to maintain progress on P2030.100.1 development. Aaron will use Doodle polls to determine schedules.

Discussion focused around improving the flow of document by altering the outline.
Most of the meeting was an open discussion on the structure of the document. The existing document structure not well organized. Aaron wanted to improve the flow of the document in way that better serves the document purpose and that helps keep contributions focused on completing the document. The discussion resulted in changes to the chapter and section structures and titles. Ralph captured the results of this discussion in a document that includes only the document outline which Aaron will post to the iMeet Central site for H44.

Ralph Mackiewicz is working on section with networking principles and how the publisher subscribe mode applies.

Ralph Mackiewicz and Dustin Tessier discussed the Client/Server roll that plays in the monitoring of GOOSE and Sample Values.

Alex Apostolov and Herb Falk discussed the concepts of monitoring. Alex suggested adding the monitoring of transfer time.

There was a discussion about the distinction of monitoring of endpoints vs the monitoring by endpoints.

Dustin Tessier suggested discussing the monitoring of hardware components.

LTRK node was discussed and will be added to the document.

Jay Anderson motioned to adjourn and Herb Falk seconded the motion. Meeting was adjourned at 10:34AM.

H45: Guide for Centralized Protection and Control (CPC) Systems within a Substation
Chair: R. Das
Vice Chair: P. Myrda
Secretary: M. Kanabar
Output: Guide
Established: May 2018
Expected completion date: January 2022
Draft: 0

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

The WG met on January 15, 2020 with 41 participants (30 in person and 1 remotely, with 23 members and 18 guests).

After the introductions, Slides related to IEEE patent policy and other guidelines for WG meetings were shown and discussed.

Minutes of the September face-to-face and Nov (web) meetings were approved via email – they are available in the iMeetCentral. There were no further changes to those already approved minutes.

Review of project plan was done and it was noted that WG work is progressing as per the agreed project plan - Draft 1.0 is in i-MeetCentral. Members are requested to provide comments on the architecture part as in Draft 1.0 as soon as possible as it will have impact on the rest of the guide. We had two interesting presentations – first one by Mr. Prithpal Khajuria of Intel on "Protection Relays & Virtualization Technology" and the second one by Mr. Yuri Luskind of Cybeats on "Device Security". Both presentations were very well received by the participants. Presentations are already available in iMeetCentral.

A web meeting will be held during the last week of March to discuss and assess the progress of the assignments.

H46: Recommended Practice for Human-Machine Interfaces (HMI) used in Substation Automation Systems (PC37.1.3)
Chair: M. Black
Vice Chair: C. Preuss
Secretary: S. Haveron
Output: Recommended Practice C37.1.3
Draft: N/A
Established: September 2018
Expected Completion Date: January 2024

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

The chair called the meeting to order on Monday 1/13/20 at 13:00 EST. There were 31 attendees: 9 out of 15 voting members and 22 guests, achieving a quorum. 3 Guests have requested membership in H46.

Minutes from the previous meeting were approved with Ryan Newell making the motion to approve and Jay Anderson seconding the motion.

The IEEE patent slides shown with no patent claims made. The new IEEE copyright policy was reviewed. Note was made of potential conflicts with any information to be cross-presented with IEC 61850-6-2 tie-ins.

Dustin Tessier had volunteered to present an update on IEC 61850-6-2, but was postponed until the May meeting due to schedule conflicts. Coincidentally this occurred with the introduction of the complication from the copyright policy.

The outline document was reviewed and changes were made to improve the structure and flow. Defining the sections will allow the working group to make better progress with writing assignments. The chair proposed a tiered approach with most sections being relevant for Control Center applications, a subset of these for Substation applications and a much smaller subset for IEDs. Care will be taken to not repeat information unnecessarily.

Having previously reviewed definitions of HMI from ISA101 and C37.2, the group felt that this recommended practice document needs a definition that reflects the scope of work, one which excludes older electromechanical HMIs. The definition will be modified and agreed by the group prior to the next meeting.

IEDs with small screens were discussed, and although there are limits as to what can be achieved, it was felt that it could be beneficial to the operator if HMIs were designed with some considerations in mind, for example the size and placements of operate buttons on a screen, use of color, etc. This recommended practice will highlight several things that should be considered in IED HMI design, but it will not be too onerous. It was pointed out that there may be different requirements between fixed and mobile screens, i.e., built-in to the IED or on a tablet or phone.

Consideration will also be given to HMIs that have been developed for a specific purpose and are fixed, and those that allow user programmability.

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. Ouelette
Output: Report
Completion Date:
Draft: N/A

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

Introductions
IEEE IP & Copyright slides

IEC TC95 WG2 document review -Eric Udren

Eric will provide format documents for the WG to provide feedback
Eric kindly agreed to be liaison between two working groups

CIGRE B5.69 document to be shared by Alex A.
to send document from Experience with Process bus to the WG for feedback
Alex A. kindly agreed to be liaison between two working groups
Report outline reviewed and assigned to members & corresponding members

HTF48: Education/Outreach for Synchronized Measurements

Chair: W. Dickerson
Vice Chair: R. Midence
Output: Recommendation for a WG
Completion TBD
Current Revision: N/A

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

Allen provided an overview for the new participants. The decision to become a working group is still to be decided.

Present our work so far at NASPI (Allen, p/o C23 report)

Allen provided a report on our work at NASPI. In his report, he indicated that he presented the work of the task force and could not identify any volunteers willing to work on this.

Develop Knowledge Framework (Bill, Jason)

In Bill's absence, Jason provided a report on our work regarding developing the knowledge framework such as IEEE Standards Association Collaboration Portal. The idea is to identify what and individual that is new with the technology would need to learn. The idea of a central page that will collect the material.

In the past, the content of the site has been discussed. Multiple languages was also considered.

The size of the video should be considered as short videos rather than one long video with a lot of content.

Jason does not believe that we are at the point to consider the task force to become a working group. Creating a YouTube channel would be a good idea.

It was questioned what will trigger individuals to reach to the IEEE for information. NASPI has a large archive of information that is available. There is no an outreach effort to provide learning material similar to what this working group is intending to prepar.

During the meeting, Allen showed the current work done under the collaboration portal.

Identify 'typical questions' (Ken, Allen)

There was not progress on this activity.

During the discussion, it was agreed that there is interest, but there is limited availability of volunteers to work on this initiative.

New Assignments

It would be great if someone takes the responsibility to review what is available to date to select the best material to be included in the central portal.

It was suggested to create an Outline that will be used as a guide for someone new to learn about the technology. The collaboration portal will be organized based on the proposed Outline where it will be used to collect related material.

The copy right issue was also discussed which will be a road block regarding sharing information.

The need for an outline was identified as a first step. Suggested to approach NASPI for suggestions with regards to the outline. Allan volunteered to reach NASPI for assistance with an outline.

Allen in collaboration with Paul Myrda will draft a letter to NASPI leadership requesting collaboration with an education outline.

The task force believes that there is a need for the information the will result of the task force.

New business

No business was identified.

HTF49: Tutorial on the Use of Packet-Switched Communication Channels for Protection and Control

Chair: S. Ward
Vice Chair: R. Midence
Output: Recommendation for WG
Completion: TBD
Current Revision: N/A

Assignment: To provide a recommendation to the subcommittee whether to form a WG or not

HTF49 met on Tuesday, January 14, 2020, in a single session with 13 guests.

The chair provided background information about the potential need for a WG and received additional input from the group. The scope was discussed extensively and there was a consensus that:

There is a need for material that could provide a level of confidence to relay engineers when they face the need to transition to packet-based communications for the protective relay pilot channels.

WG H32 report covers the global requirements for protective relaying such as latency, asymmetry, and availability.

Focus for this WG could be pilot relaying applications and teleprotection schemes, as they not all have the same requirements. E.g. 21L isn't sensitive to asymmetry while conventional 87L is. Or, using 87L with external time, what factors need to be considered then. GPS vulnerability?
There was a motion to recommend to form a WG. All but one of the 13 guest indicated that they would become members.

Gary Stoedter volunteered to chair the group.

Assignment and scope for the WG is still TBD but preliminary would be:
Assignment: Report/tutorial on switched networks from a pilot protection application point of view for the benefit of relay engineers.
Scope: Document fundamentals of packet switched networks as they apply to protective relaying. Document pilot protection 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. Produce tutorial/summary presentation based on report.

The group suggested to change the title of the WG to: Application considerations for the Use of Packet-Switched Communication Channels for pilot protection and teleprotection schemes

H50: Requirements for Time Sources in Protection and Control Systems

Chair: D. Ouellette
Vice Chair: J. Anderson
Output: Report
Completion Date: 2019
Current Revision: 2022

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

WG met on January 14 at 3:40 PM with 6 voting members, 2 non-voting members, and 15 guests.

Attendance has been recorded in 123Signup (with the exception of a few that need to be added to the H subcommittee first).

The patent slides and new Copyright policies were presented.

Minutes from the September meeting were not accepted due to lack of quorum. The minutes will be sent out for approval via email.

The title of the working group was discussed. The title may imply the development of Requirements; however, the Scope of the working group is to produce a report that documents the requirements for time sources. We will review this for the next meeting.

There was discussion around the energy presently building around the topics of clocks and time distribution systems; work is going on at Cigre, the IEC, EPRI, and other organizations.
Chris Huntley shared additional information on substation time sources; this will be shared again with the (revised) membership.

Dean presented an initial framework for the report. Rich Hunt sketched out additional details for common requirements, including reference sources, performance requirements (accuracy, response to changes in the reference source, security, environmental requirements, etc.).

We solicited suggestions on content for the sections from the members via email

I: Relaying Practices Subcommittee

Chair: Jim Niemera
Vice Chair: Robert Frye

Relaying Practices Subcommittee Scope

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

1. Welcome and Introductions
2. Determine a Quorum (**35 members** total in I SC)
    a. Attendance: 25 members in attendance; quorum was met

b. 30 Guests attended including three newcomers

3. Approval of Minutes of the September 2019 meeting
   a. Motion entered by: Mike Meisinger
   b. Motion seconded by: Fred Friend
   c. Minutes approved with no discussion
4. Coordination & Advisory Committee Meetings Items of Interest
   a. Subcommittee Members' status and incoming Officers for January 2020
   b. Future Meetings:
      i. May 4 – 7, 2020 – Nashville TN
      ii. September 21-24, 2020 – Reno NV
      iii. January 10 – 14, 2021 – JTCM – New Orleans LA
   c. Policies and Procedures for: Power System Relaying and Control Committee Working Group sent to Subcommittee members 31-December 2018 by email for review
      i. Three officers: Chair, Vice-Chair, Secretary
      ii. **All WG Officers must be members of SA!!!**
   d. ***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
   e. 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.
   f. Looking for Webinars to publicize our PSRC work products as part of Global Outreach
      i. Availability of WebEx for presentations by IEEE. Every WG that has completed their work is encouraged to present it to the IEEE community through WebEx which will project our work. Please contact Cathy Dalton, Chair of Publicity group or Russ Patterson, Murty Yalla, or Michael Thompson.
   g. Looking for presentations for future Main Committee meetings – please contact Jim Niemira.
5. 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:

- All PAR related activities must be approved by the PSRC Main Committee members
- 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)

Main Committee motions template.p

- Includes creation of a new PAR
- Includes approval to proceed to IEEE-SA for creation of a balloting body or to proceed to sponsor ballot
- **Includes changes to a PAR title, scope and/or purpose**
- 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.
- 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.**
- Motion to approve the new or modified PAR is done at the Main Committee meeting
- PSRCC is the Sponsor

- 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 ***May 2020*** meeting that you include "do not conflict with I50, D87, …"
e. As Chair or Vice-Chair of WG or TF, please contact Jim Niemira and Robert Frye ***if you cannot attend your session***.
f. Non-PAR related document drafts can be shared with anyone who is interested. Please add a note that this is a draft version subject to change. Once this document is complete and approved it will be posted on PSRC website which is open to all.
g. All PAR related document (IEEE related) drafts cannot be forwarded by the WG member to anyone else – there is a public review period for all IEEE documents where anyone can submit their comments.
h. When submitting "comments resolution" CSV file back to IEEE-SA in myProject, make sure that your draft is updated to reflect all the changes made – must match up to the CSV file!
i. Email WG or TF Minutes to Robert Frye at: rmfrye@tva.gov
j. ***iMeet Central*** (formerly Central Desktop) is to be used for IEEE Guide/Recommended Practice/Standard documents with a PAR
k. Standards WG Awards - The IEEE Standards Association Working Group Awards has a new Procedure to request certificates of appreciation for completed (Approved Standard) work. These certificates have to be requested by the Chair or VC of the WG directly from the IEEE SA. These awards can be shipped to our next PSRC meeting for announcement and distribution. The request for the SA certificates must be made at: http://standards.ieee.org/develop/awards/wgchair/wgawards.html

l. 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.

m. Links to PES:

- PES Technical Resource Center: http://resourcecenter.ieee-pes.org/
- PES - Technical Report Template: https://www.ieee-pes.org/images/files/doc/tech-council/PES-Technical-Report-Template_Jan_2016.docx
- PES - Technical Paper Template: https://www.ieee-pes.org/templates-and-sample-of-pes-technical-papers
- 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

Working Group Reports

WG/TF #	Name	Chair	Report By
I2	Terminology Review	Mal Swanson	Mal Swanson
I4	International Standards Development	Eric Udren	Eric Eudren
I26	Review and Expand Transaction Paper on Mathematical Models of Current, Voltage, and Coupling Capacitive Voltage Transformers	Mike Meisinger	Mike Meisinger
I29	Revision of C37.110 Guide for the Application of Current	Joseph Valenzuela Michael Higginson	Mike Higginson

	Transformers for Protective Relaying Purposes		
I30	Revision of C37.235 Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes	Robert Frye	Robert Frye
I31	P1613 – Standard for Environmental and Testing Requirements for Devices with Communications Functions in Electric Transmission and Distribution Facilities	Brian Mugalian Craig Preuss	Brian Mugalian
I32	A Survey of Protective System Test Practices	Andre Uribe Will Knapek	Andre Uribe
I33	Review of Relay Testing Terms	Scott Cooper	Scott Cooper
I35	PC37.2 – Standard for Electrical Power System Device Function Numbers, Acronyms, and Contact Designations	Mike Dood	Mike Dood
I36	Revision of C37.90.2 – Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers	Jeff Pond	Jeff Pond
I37	Revision of C37.90 – Standard for Relays and Relay Systems Associated with Electric Power Apparatus	Oscar Bolado Marilyn Ramirez	Marilyn Ramirez
I38	Revision of C37.92 – Standard for Analog Inputs to Protective Relays from Electronic Voltage and Current Transducers	Ritwik Chowdhury	Ritwik Chowdhury
ITF40	Revision of IEEE C37.90.1 – Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus	Roger Whittaker	Roger Whitaker
I41	Revision of IEEE C37.90.3 – IEEE Standard Electrostatic Discharge Tests for Protective Relays	Steve Turner	Steve Turner
ITF43	Investigate response to USA executive order regarding EMP protection	Robert Frye	Robert Frye
ITF44	Investigate and write a report on skill sets required by relay test technicians for setting, commissioning, and testing relay systems, given new technologies such as IEC 61850	Will Knapek	Will Knapek

I2: Terminology Review Working Group

Chair: M. Swanson

Vice Chair: F. Friend

Output: Definitions for IEEE Definition Database (formerly IEEE Std. 100)

Established: Circa 1995

Expected completion date: on-going

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

Meeting called to Order at 10:40 am.
Chair's remarks:
Reviewed Copyright policy. Material about the patent policy is available at
http://standards.ieee.org/about/sasb/patcom/materials.html
Quorum was not achieved, so the previous minutes will be approved through an email vote.

Technical Topics discussed:
Updates were given on the status of each of the standards.

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

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

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

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

New Business:
Claire researching definitions for operating device/element and restraining device/element for inclusion in C37.91. Also looking into use of devices 26 and 49 in the body of the document to ensure that their application for transformers is adequately explained to avoid redefining the device numbers.
Matt H44 is working on C2030.101.1 is working on a definition for HMI.

Meeting was adjourned at 11:45 am.

I4: <u>International Standards Development Working Group</u>
Chair: Eric A. Udren
Vice Chair: Normann Fischer
Output: IEC TC 95 USNC standards votes and PSRC status reports
Established: 1990
Expected completion date: Meetings are continuing

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

The WG met on January 14, 2020 with 8 members and 1 guest to review IEC TC 95 standards activities. There were no comments on the September 2019 minutes; not a quorum to vote them. Following are principal discussion points and circulated documents.

The TC 95 Secretary Thierry Bardou had solicited issues and ideas for updating of the TC 95 strategic business plan (see IEC TC 95 website public 'Scope' tab and .pdf). The US TAG as WG I4 added to the list of issues:

- Traveling wave applications in T&D.
- Synchrophasor WAMPAC applications and functional requirements.

- Functional requirements for protection systems in local or wide-area clouds – includes digital I/O but there are issues for protection cloud. Local cloud refers to what is sometimes called centralized protection and control.
- Protection requirements with inverter-based resources (IBR); requirements for IBR performance or response in power system events and conditions.
- Application of self-monitoring for devices and systems.
- Relays as sources of data for SCADA, EMS, WAMS, and fault or disturbance data in integrated utility control and protection systems.
- Cybersecurity of relays, configuration, communications, responses.
- Fault recording
- Fault location capability.
- EMP protection.

Some of these are already in consideration and some may be out of scope - the TC 95 leadership will sort through these and topics from other national committees to prepare for their discussions with other TCs at the scope-coordinating Advisory Committee on Electricity Transmission and Distribution (ACTAD) to make the final decision for the updated scope and strategic business plan for TC 95.

WG2 supplied a pre-CD draft of requirements for relay digital inputs and outputs (e.g. via merging unit data exchange) along with an explanatory technical article, per request from Chair. The goal is to coordinate with and guide the work of PSRC H47 now getting underway on the same topic. Meanwhile, a new work proposal received from China is very similar to work being done by WG2; the Chair of TC 95 is to convey this to the requesters.

The WG got a preview of work on 60255-132 on functional requirements for directional and other power relays from a pre-meeting distribution. The CD is not ready for official commenting review yet. 60255-167 on directional elements will be a separate project.

Other standards projects:

- 60255-1 Ed.2, *Common requirements* – US and other NC comments to the late 2019 CD have been circulated and the MT is working on revisions. [Revised CD is posted after the Jacksonville meeting and is being circulated to WG/TAG].
- 60255-26 Ed. 4, EMC requirements – MT3 is continuing with revisions since last CD and commenting.
- 60255-27 Ed. 3, Safety - US and other NC comments to the late 2019 CD have been circulated and the MT is working on revisions.

WG2 on Digital I/O will have its own meeting in Klaus, Austria in March. The next meeting of standard development teams MT2, 3, 4 and WG2 takes place during the week of May 25-29, 2020 in Dubrovnik, Croatia, jointly with TC 38, Instrument Transformers Committee of IEC. The next TC 95 plenary meeting with MT meetings is planned for November 2-6 in a Korea or India location to be determined.

I29: Revision Of C37.110 – Guide For The Application Of Current Transformers For Protective Relaying Purposes

Chair: Joseph Valenzuela
Vice Chair: Michael Higginson
Minutes Recorded By: Alla Deronja
Output: Guide
Established Date: January 2015
Expected Completion Date: December 2020
Draft: 20190115
Assignment: Revise C37.110-2007 Guide for the Applications of Current Transformers for Protective Relaying Purposes

The meeting was called to order at 10:40 AM by Vice-Chair due to the absence of the Chair at this meeting. Participants introduced themselves. Quorum was met.

The meeting chair displayed the IEEE patent and IEEE-SA Copyright policy slides as required for the working group with PAR related activities. A call for patent issues was made, and no responses were raised.

Meeting minutes from September 18, 2019, meeting in Denver, CO were reviewed. Will Knapek motioned to approve, with a second by Jim Niemira. The working group unanimously approved the minutes.

The chair made a brief overview of the project. The guide's revision was balloted and received 359 comments. The chair and vice-chair will address editorial comments and present their resolutions to the working group. At this meeting, a goal was to start addressing a few top technical comments and form a team(s) to address the remaining technical comments, roughly 10% of the total (~30). The working group agreed to this plan.

Technical Topics discussed:

- Addressed a few technical comments such as the following.
- For knee-point voltage definition, it was proposed to keep definition (B) that is used in C57.113. However, all the calculations in the guide are based on definition (A). This comment was rejected but will be considered in the future revision of the guide.
- There was a comment on polarity underuse in the guide. The comment was rejected as the term is defined and used throughout the guide.
- A comment about a saturation factor was deferred to be resolved by a sub-team.
- Formed a team (Jim Niemira, Don Ware, John Lane, Andy Kunze, and Alla Deronja (joined after the meeting)) to address 30 technical comments that will be evenly split between the team members. The team members will address the comments and report to the WG their proposed resolutions.

Action items:

- Chair/Vice-Chair to email the comments table with the assignments for each comment resolution team member.

Items reported out of Executive Session: Four web meetings are planned to update on the technical comment resolution by the tech comment resolution team members. The comment resolution team indicated that they would prefer Tuesdays at 2:00 central time.

Time of final adjournment: 11:00 AM

I30: Revision of Guide For The Application Of Rogowski Coils Used For Protective Relaying Purposes, C37.235
Chair: Robert Frye
Vice Chair: Chase Lockhart
Output: Guide
Established: 2014
Expected completion date: 2021
Assignment: ???

Time called to Order and Chair's remarks: The meeting was called to order at 13:04 and introductions were made.

IEEE Policy Reminders (patents and copyrights): Copyright and Patent slides were reviewed.
Confirm that call for Patent issues was made and record any responses: The chair asked for any objections and no responses were made.

With 5 members in attendance, quorum was achieved.

Approve minutes of previous meeting: May 2019 minutes
Motion by Ratan Das Second by: Scott Short. Approved by all, motion carried

Approve minutes of previous meeting: September 2019 minutes
Motion by Scott Short Second by Ratan Das. Approved by all, motion carried

Approve minutes of previous meeting: May 2016 minutes
Motion by Scott Short Second by Ratan Das. Approved by all, motion carried

Approve the meeting Agenda:

Technical Topics discussed:

- Draft 8 was sent out for balloting, Draft 9 has all easy "editorial" comments fixed and incorporated.
- Motion to approve Draft 9 editorial comments as presented: 1st by Scott Short, 2nd by Ratan Das. Approved by all, motion carried.
- Discussions were had on 4 comments out of the 17 that still need addressed.
- Motion to Approve Chase Lockhart as Vice Chair: 1st by Ratan Das, 2nd by Edgar Perez Flores. Approved by all, motion carried.

Action items:

- Kevin Donahoe to reword paragraph 5.6.3 on Live tank/Dead Tank breakers.
- Edgar Perez Flores to look up IEC 60794 in reference to a comment regarding fiber optic cables. Edgar will also look at adding burden to section 4.1.
- Ratan Das to clear up section 1.1 based on a comment.

Times of any recesses and time of final adjournment: Motion to adjourn at 14:23 first by Scott Short, 2nd by Edgar

I31: IEEE Standard for Environmental and Testing Requirements for Devices with Communications Functions Used With Electric Power Apparatus
Chair: B. Mugalian
Vice Chair: Jerry Ramie
Secretary: Craig Preuss
Output: Standard
Draft: 1.6
Established Date: 05-Feb-2016 (PAR approval date)
Completion Date: 31-Dec-2020
Assignment: ???

Time called to Order and Chair's remarks:10:45 am chair called the meeting to order

IEEE Policy Reminders (patents and copyrights):
Patent slides were shown and no essential patent claims made.
Copyright slides were shown.

Approve minutes of September 2019 meeting:
Motion by Mike Dood Second by Mike Meisinger

Approve the meeting Agenda:
Technical Topics discussed:

- PAR completion data was removed, action item is for chair to submit for an extension
- Reviewed scope and purpose proposal from meeting of C37.90 series officers and 1613 officers and edits were made. Action item for secretary to provide edits to C37.90 series officers and 1613 officers.
- Work to coordinate with other Committees in PES has not commenced.
- Table cross reference action item was completed by the chair.
- Climatic input was received from Jeff Burnworth, edits to draft 1.9 for ingress were shown.
- Need to agree on approach on how to move forward with climatic sections because IEC 60255 has more extensive and different requirements than 1613: Does I31 wait for C37.90 to make changes and leave reference to old C37.90 or does I31 lead C37.90 with developing these requirements?
- Chair to send out Doodle poll for future web conference meeting to follow up with the C37.90 series to further discuss and revise scopes and purposes for the five documents.

Items reported out of Executive Session: No executive session held

Times of any recesses and time of final adjournment: No recess, time of adjournment approximately 11:56 am.

I32: A Survey Of Protective System Test Practices
Chair: Andre Uribe
Vice Chair: Don Ware
Established: May 12th, 2015
Expected Completion Date: September 2018
Assignment: ???

Working group did not meet.

I33: Review Of Relay Testing Terms
Chair: Scott Cooper
Vice Chair: Hugo Monterrubio
Output: Report
Established Date: Jan 2017
Expected completion date: Dec 2019
Draft: 1
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.

Call to order, Chair's remarks

Reminders of IEEE policies, such as Patent policy and Copyright policy: NA

The fact that a Call for Patents occurred and any responses made to such Call: NA

Approval of minutes of previous meeting: No Quorum

Approval of agenda: Was not approved this time

Technical topics

1) (Ware) Discussed adding load checks
2) Discussed report draft

3) Motions exactly as they are stated, including the names of mover and seconder and the outcome of each motion: NA

Action items

W Knapek volunteered to write introduction.

Items reported out of executive session: N/A

Recesses and time of final adjournment: 10:30AM

I35: Standard for Electrical Power System Device Function Numbers, Acronyms And Contact Designation
Chair: Mike Dood
Vice Chair: Marc Lacroix
Output: Standard
Completion Date: End 2020
Draft: ???
Assignment: ???

Time called to Order and Chair's remarks: 8 AM

IEEE Policy Reminders (patents and copyrights): Complete

Confirm that call for Patent issues was made and record any responses: Complete

Approve minutes of previous meeting: Did not have a quorum

Approve the meeting Agenda: Did not have a quorum

Technical Topics discussed:
- We discussed the status of the project.
- The plan is to complete the draft for ballot in the next week and then get approval of the working group for going to ballot.
- We have conditional approval to proceed from the main committee.
- We will then send it to SA for MEC and start the forming the ballot pool.
- The latest version of the document was uploaded on iMeet Central and available to all members.
- We will need a room for 20 people at the May meeting.

Action items:

Items reported out of Executive Session:

Times of any recesses and time of final adjournment: 9:15 AM

Date, time, and location of next meeting: May 2020, Nashville, TN

I36: Revision of IEEE Std. C37.90.2 – Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers
Chair: Jeffrey Pond
Vice Chair: Jeff Burnworth
Established: September 2017

Output: Standard
Expected Completion date: September 2020
Assignment: Revision IEEE Std. C37.90.2 Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers

Time called to Order and Chair's remarks: The meeting was called to order at 15:43 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 6 members in attendance, quorum was achieved.

Approve minutes of previous meeting: May 2019 minutes
Motion by Jerry Ramie Second by: Tony Bell. Approved by all, motion carried

Approve minutes of previous meeting: September 2019 minutes
Motion by Jerry Ramie Second by Tony Bell. Approved by all, motion carried

Approve the meeting Agenda:

Technical Topics discussed:

The new proposed scope and purpose were discussed:
- General discussion regarding grammar and capitalization.
- Large discussion was had and it was determined that Quiescent and Operate states are to be used instead of tripped and non-tripped in the proposed purpose.

Action items:

- Talk to IEEE Rep Melia regarding Figure 2 IEC 61000-4-3:2010
- Check with SA to see if they have resources to take our current revisions and put it in the new template
- Add Quiescent to definitions

Times of any recesses and time of final adjournment: Motion to adjourn at 16:52 first by Jerry Ramie, 2nd by Tony Bell. Approved by all, meeting adjourned.

I37: Revision Of C37.90 Standard For Relays, Relay System Associated With Electric Power Apparatus
Chair: Oscar Bolado
Vice-Chair: Marilyn Ramirez
Output: Standard
Established Date: 2018
Expected Completion Date: December 2022
Draft: 2.0
Assignment: Revision of C37.90 Standard for withdrawn in 2021. PAR Expiration 31-Dec-2022

Working group C37.90 met on Tuesday, January 14th at 1:00 PM with 4 out of 6 members and 13 guests present. Quorum was met. The following items were discussed:
1. Meeting agenda was reviewed
2. Minutes of the May and September meetings were reviewed and approved.

a. Motion by Tony Bell; Second by Jeff Burnworth

3. Original scope and revisions to title, scope and purpose of this standard were reviewed. To harmonize with all four C37.90 documents and IEEE 1613, the first sentence of the scope was changed by adding "control" portion of the new title.
4. Remaining action items to finalize the revision of this standard were discussed.
5. The WG I37 will seek approval from the I-subcommittee to revise the title, scope and purpose of the 37.90 standard to harmonize with the C37.90.X family of standards and IEEE 1613 and submit a revised PAR with the changes proposed.

a. Conference calls will be scheduled with all affected parties before the PSRC May meeting.

With no additional business to discuss, the meeting was adjourned.

I38: Revision Of C37.92 Standard For Analog Inputs To Protective Relays From Electronic Voltage And Current Transducers

Chair: Ritwik Chowdhury
Vice Chair: E.A. Udren
Output: Standard
Established Date: January 2018
Expected completion Date: May 2021
Draft: N/A
Assignment: Revise and update IEEE Standard C37.92, *Standard for Analog Inputs to Protective Relays from Electronic Voltage and Current Transducers*

The working group met with 7 members and 7 guests. A quorum was achieved. IEEE Patent slides and requirements; no attendees raised patent or copyright concerns. The meeting minutes from September 2019 meeting were approved.

Veselin Skendzic, WG37 Chair in IEC TC 38 standardizing instrument transformers and merging units, gave an in-depth remote webinar presentation of TC 38 scope, projects, standards existing or in development, and strategy that may relate to low-energy analog interfaces. This is supporting the WG objective of collaborating with IEC TC 38 and revising IEEE C37.92 to fit in a specific role in overall P&C systems that is compatible with other IEEE and IEC standards requirements. The presentation included several recommendations for IEEE C37.92 changes or focus to achieve alignment.

With Veselin in continuing remote attendance, the group discussed a list of key features for a revision of IEEE C37.92 from Eric Udren. Many key technical specifications remain intact; a few are enriched to fit into the IEC TC 38 standard architecture. The emphasis shifts away from optical sensor inputs to general low-energy interface standard. A working title revision is "IEEE Standard C37.92 Standard for Low-Energy Analog Interfaces between Protective Relays and Power System Signal Sources". The range of applications is expanded to include relays and IEDs, signal sources including low-energy electronic or passive sensors, test sets, and real-time digital simulators. Hardware requirements for the interfacing are candidates for new specification. Coordination with IEC TC 38 standards requirements is an element of the work plan. The goal is to specify a standard interface, built on the existing IEEE C37.92, that can be convenient, low in cost, and ubiquitous in relay sensor or instrument transformer interfacing, application, testing, and development.

Before the next meeting, the members are encouraged to think about the new title for the standard proposed by Eric: "IEEE Standard C37.92 Standard for Low-Energy Analog Interfaces between Protective Relays and Power System Signal Sources".

At the next meeting, the WG will review the proposed modifications to develop the work plan and assignments.

ITF40: 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: Standard
Expected Completion date: Dec 31, 2022
Assignment: To determine if IEEE C37.90.1 – Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus should be revised.

Task Force I40 met on Tuesday, January 14th at 2:20pm in a single session with 8 members and 5 attendees. A quorum was achieved.

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

Minutes from the September 2019 meeting in Denver, CO, were reviewed and approved. The motion was made by Jerry Raime and seconded by Tony Bell.

Standards IEEE C37.90.1 and IEEE1613 have acquired and have been added to iMeet Central.

Additional standards IEC 60255-26, IEC 61000-4-5, and IEC 61000-4-18 have been requested but not yet received. There is some concern about whether we will be able to get it.

IEEE 1613.1 was identified as needed also and will be requested

There was extensive discussion about the scope of this standards as well as other standards included under IEEE 37.90. A summary of points of the discussion were as follows.

- It was not clear to all when IEEE C37.90.1 or IEEE 1613 was the applicable standard to be used for protective relays.
- It was identified that IEEE 1613 was called out to include 8 tests that were not included in the IEEE C37.90 series. This brings the C37.90 series in harmony in with IEC standards
- New suggestions included expanding C37.90 to include the missing tests or to call out IEC standards as normative references

We will have a meeting with the chairs and vice chairs prior to the May meeting to attempt to have scope and purpose wording ready for vote by the May meeting.

I41: Review of IEEE C37.90.3 - IEEE Standard Electrostatic Discharge Tests For Protective Relays
Chair: Steve Turner
Vice Chair: Dan Ransom
Output: Standard
Established Date: September 2018
Expected Completion Date: ???
Draft: ???
Assignment: ???

Chair Turner began the meeting at 8:04 a.m. He provided reminders of IEEE policies, which are the patent policy and the copyright policy. He issued a call for patents; there were no responses.

Chair Turner gave the minutes of the last meeting, Sept 28, 2019 in Denver, CO.

Chair Turner remarked that we are creating a PAR for revision of the C37.90.3. Participants discussed configuring an iMeet site.

Scope and Purpose

For all of the C37.90 standards, the Scope and Purpose portions will overlap. Chair Turner showed the scope and purpose. During the conference call, the word repeatable was NOT in the revised scope.

We viewed the new Scope and Purpose. The new Scope and Purpose has the C37.90 "boiler plate." We added "and Control" in the title. In addition, there is "when subjected to Electrostatic Discharge."

Members agreed to put this statement, from I36 W Discussion, into the Purpose and into the PAR: "This standard requires that an evaluation is performed during both quiescent and operate states."

Definitions:
- Quiescent is non-trip (not "normal")
- Operate is trip (not "abnormal")

Challenges

Committee members discussed upcoming challenges:
- Communications port discharge-test resiliency
- Repeatability; ESD test are the most difficult to make repeatable

Attendees mentioned coupling planes, circuit board traces, air-discharge distance as problems with repeatability. A participant stated that air discharge tests are a statistical spread on a bell curve. Unique to this testing is the air gap.
- Contact chatter

Definition of "what is a contact closure?" Contact closure chatter is not defined in the standard. A participant mentioned that IEEE C37.98 indicates that a contact closure is an event 2 ms and longer. A participant mentioned that, in their testing, they use a device that latches after 1.5 ms. It was recommended to adopt the existing C37.98 criteria, which is 2 ms. Put a reference for this value from C37.98 into C37.90.3. The members discussed that no circuit breaker will respond to a 2-ms chatter, however, a solid-state digital output to input (like a circuit-breaker-failure input) will react to a 1.9 ms chatter (momentary contact closure). A participant suggested that the standard should have a requirement to monitor contact chatter. The monitoring system should have sufficient sensitivity to detect and indicate any closure lasting at least 2 ms. In addition, the monitoring system should place a note in the test report on the minimum duration of the detected, momentary, contact closure. Most relays include contact-debounce settings for input circuits; chatter at 2 ms and less is not expected to be a practical problem.

Suggested updates to C37.90.3

Jerry Ramie gave a presentation on the topic: "Harmonizing IEEE pC37.90.3 with IEC-60000-4-2 and IEEE C63.16." His recommendations were the following:
- C37.90.3 Figure 1 flowchart is not correct. The statement in question is "NO DISCHARGE: TEST WITH COUPLING PLANE" The definitions are the following:
    - Direct application is air discharge
    - Direct application is contact discharge
    - Indirect application is contact to planes

Figures are normative. Mr. Ramie suggests removing Figure 1.

- Next, Mr. Ramie discussed Section 3.2.6 Selection of Test Points
- Mr. Ramie presented section A.5 from IEC 61000-4-2. He suggested to use selection A.5 for guidance only. In addition, cite IEC 61000-4-2 as normative and cite C63.16 as informative (6.4.3.1) . USB signal pins fail when the item (relay, computer) are running (hot). Also, this applies to 9-pin serial and to RS485. The group discussed the hot plugging of Ethernet RJ45 connectors. It is common practice in relay applications, but is not common in the computer and networking industries
- Investigatory testing: the recommendation is to cite this document as informative: IEEE C63.16 Guidance, Section 6.4.3.3.
- The participants discussed figures in the standard, and a recommendation to delete many of the figure. Instead, the plan is to reference figures in IEC 6100-402 as normative references. We discussed issues of copyright; many of the existing figures have been included in the existing standard for many years
- Acceptance Criteria: Cite the same Acceptance Criteria in P1613, C37.90.1 and IEC 61850-3, for harmonization. IEEE 1613, 2009 is fully harmonized for Acceptance Criteria
- Test Report Contents: in C37.90.3 section 3.5, cite IEEE C63.16 as informative for test report and test data sheets
- IEC 61000-4-2 Test Report Contents—cite as normative
- More Test Report Contents—cite the test report contents and data sheet examples from IEEE C63.16, which was already cited as informative in the existing C37.90.3 standard

New member request
Hani Al-Yousef asked to join as a member.

Action items
No action items were assigned or agreed.

Executive session
There was no executive session (no items were reported out of executive session).

We adjourned the meeting at 9:00 a.m. The next meeting is during the week of May 4–7 at the Sheraton Music City in Nashville, TN USA.

ITF43: Investigate Response To USA Executive Order Regarding EMP Protection
Chair: Robert Frye
Vice Chair: Angelo Tempone
Output: TBD
Established Date: May 2019
Expected Completion Date: May 2020
Draft: NA
Assignment: Investigate need for a Working Group to develop a report or other response by the PSRC to USA Executive Order on hardening of critical infrastructure against E.M.P.

Time called to Order and Chair's remarks: 9:20 AM

IEEE Policy Reminders (patents and copyrights): Reviewed.
Confirm that call for Patent issues was made and record any responses: Reviewed with no responses.

Approve minutes of previous meeting:
Motion by Jonathan Sykes Second by Taylor Raffield

Approve the meeting Agenda: Approved.

Technical Topics discussed:

- Introductions were made by all participants of the meeting.
- Introduction of Jerry Ramie as a guest and liaison with EMP Society (TC5).
- Tapan Manna, Phd gave a Presentation on EMP Threats on Electric Power Grids.
- Discussion on GMD inclusion on document. There is an existing GMD document issued by PSRC, so it was decided that GMD should not be included, and efforts should be focused to E1 waves.
- Some discussion on whether or not PSRC should be part of any testing to verify existing solutions for EMP attenuation.
- Some discussions on existing limitations of EMP attenuation devices that fail to meet the requirements to properly protect against E1 waves.
- Suggestion were made to modify the preliminary scope of the document:
- Change wording from Guide to Information. Suggestion on changes to scope are noted into slide.
- Add some wording: “and secondary AC & DC distribution systems, comm lines, I/O, and station service”. Suggestion on changes to scope are noted into slide.
- Add wording to scope that includes E1 as the focus on this working group. Suggestion on changes to scope are noted into slide.
- Recommendation to create a working group to write a technical report.
- Motion by Taylor Raffield Second by Patrick Carroll.

Action items:

- Tapan’s Presentation to be shared with all attendees.
- Tapan Manna to be included in conference calls per Jerry Ramie’s request.
- Taylor Raffield to be included in conference calls per Jerry Ramie’s request.
- Dave Howard to be included in conference calls per Robert Frye’s request.

Items reported out of Executive Session:

- ITF 43 Investigate Response to USA Executive Order Regarding EMP Protection.
- 13 Members attended the meeting (16 voting members in task force), therefore quorum was met. 39 attendees.
- Introductions of the attendees took place.
- Patent, IEEE SA, and other mandatory slides were presented with no concerns being raised by the attendees.
- Minutes and Agenda were approved.
- Several conversations took place in regard to existing limitations on products available that can provide the needed requirements to meet HEMP E1 protection.
- Scope to be refine in the coming weeks/months with the intention of submitting a request to form a working group.
- We will meet in the next PSRC event in May (Nashville, TN).
- Meeting was adjourned.

Times of any recesses and time of final adjournment: 10:40 am. No recesses were given.

ITF44: Skills Required to Program, Commission, Test, and Maintain Ethernet Based PAC Systems
Chair: Will Knapek
Vice Chair: Andre Uribe
Output: Report
Established Date: January 2020
Expected Completion Date: January 2022

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

Time called to Order and Chair's remarks:)8:00, Chair welcomed everyone and provided background on what and why this task force was created. Gave idea of what the product will be. Then opened discussion on scope.

IEEE Policy Reminders (patents and copyrights): This was discussed. No projector to show the slides.
Confirm that call for Patent issues was made and record any responses: No conflicts noted
Approve minutes of previous meeting: None to approve, first meeting.

Approve the meeting Agenda:

Technical Topics discussed:

- The need for the report was discussed and agreed that such a document would benefit the industry. The title of the report was discussed and revised to include all technologies used in modern substations.
- A concern was raised that since we will be reporting on skills such as communications and networking along with protection that this paper be jointly sponsored with the PSCC.
- We request the TF meet again in May to develop the assignment statement and then request WG status.

Action items: Decide on if joint sponsorship is needed. Move to WG status.

Items reported out of Executive Session: None

Times of any recesses and time of final adjournment: Adjourned at 09:10

Liaison Reports

Instrument Transformers– Fred Friend
Fred Friend will be stepping down and Will Knapek will be the taking on the role as Liaison Officer

Old Business

The Chair reported no standards are expiring until 2023 and no action is necessary at this meeting

New Business

Andre Uribe made a motion to form a task force to review the following standards and determine if anything else needs to be done to ensure proper grounding and bonding in substations: IEEE C57.13.3, IEEE 525, IEEE 1050, IEEE 1100. Robert Frye seconded the motion and the motion was carried with no objections. Task Force ITF45 will be formed with the following title: "Investigation of Grounding and Bonding Issues Associated with Substation Wiring Practices and Instrumentation. The Chair of the task force will be Adrian Zvarych.

Mike Meisinger motioned to adjourn and Jeff Pond seconded, see you in Nashville, TN, in May 2020!

J: Rotating Machinery Protection Subcommittee

Chair: Dale Finney
Vice Chair: Gary Kobet

<u>Rotating Machinery Protection Subcommittee Scope</u>

Evaluate and report on protective relaying concepts and practices applicable to generators, motors,

synchronous condensers, associated auxiliary systems, and performance of plant protective systems. Develop and maintain related relaying standards.

J SC met with 21 out of 29 members and 12 guests, reaching quorum.
Sept 2019 J SC meeting minutes were approved.

The following J SC WGs met

J12: Improved Generator Ground Fault Protection Schemes
Chair: Dale Finney
Vice Chair: Manish Das
Established: Jan 2013
Output: Report to subcommittee
Status: 22th Meeting

Assignment: To review new methods related to generator ground fault protection

WG Report

- J12 met with 16 members and 9 guests.
- This working group is in the final stages of SC ballot. Three ballots are needed to reach 75% approval.
- The minutes from the previous meeting were approved.
- The ballots comments from Randy Hamilton were addressed
- The WG checked the language in the document.

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 session with 13 members and 12 guests present. A quorum was achieved.

The working group approved minutes of the September 17th, 2019 meeting in Denver.

Juan Gers reported on the meetings held via WebEx on November 14th and 22nd of 2019 when the pending comments were reviewed and addressed.

The only open items remaining were the modification of some pictures of Chapters 2 and 3 which Mike Basler kindly implemented after the WebEx sessions. There was also a pending illustration of option 1c of the example

regarding the Setting of the Generator Phase Distance Element according to NERC PRC-025. Phil Tatro illustrated the method, where a transient stability simulation was performed lowering the GSU HV bus voltage to 0.85 pu by connecting a shunt reactor. Since no other open items remain, the paper was then considered as complete.

Juan Gers presented the final version of the paper and also a power point file summarizing all the pictures to show the good quality of them all.

The paper was then submitted for balloting for the WG J13. The paper got 12 approvals, two more by mail and one abstention. Since the total number of Members is 17, the paper was approved to be presented for balloting to the J Subcommittee during the session of January 15th in Jacksonville.

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
The working group held its fifteenth meeting on Tuesday, January 14th, 2020 with 2 members and 8 guests in attendance.
Assignment: Investigate and report to the J Subcommittee on plant protection issues associated with black start.
I. Vice Chair kicked off the meeting at 5:00pm with introductions.
II. Status Update
a. Paper was previously approved in Working Group balloting.
b. Paper was circulated to Subcommittee for balloting.
c. 3 more ballots needed to achieve the 75% balloting threshold.
III. Next Steps:
a. Vice Chair encouraged any J subcommittee members present who have not completed their ballot to do so as soon as possible.
b. There will be at least one more meeting to wrap up any comments that come as a result of subcommittee balloting.
IV. Meeting adjourned at 5:20pm.

J-15: Investigation of the Criteria for the Transfer of Motor Buses
Chair: Wayne Hartmann
Secretary / Vice Chair: Joseph Valenzuela
Established: 2015 (1/15)
Output: Report (D2)
Status: 14th Meeting (190917)

Assignment:

1. Review, compare, and contrast NEMA MG-1 with ANSI C50.41 regarding transfer criteria.
2. Examine published reports and papers on motor bus transfer criteria to compare the conclusions with NEMA MG-1 with ANSI C50.41 regarding fast transfer criteria.

3. Investigate existing open-transition motor bus transfer (MBT) actual data from multiple events at the medium voltage level. Examine for current and torque ratio versus Volts/Hz at transfer periods to see if there is a correlation.
4. Examine published reports, papers, C50.41 and NEMA MG-1 on motor fast bus transfer criteria to reconcile the conclusions with the field-measured results.
5. Study existing motor protection oscillography voltage and current to identify which motors are generating and which are motoring. Examine v/Hz of composite bus and individual motors, and individual motor reacceleration current versus total bus reacceleration current (if available).
6. Produce a Report to Subcommittee with findings of the above

WG Report
Note for comments use "track changes" and a comment bubbles

Assignments:

A. Modeling Team "B"
   a. Reference for Simulink Standard Model
   b. Investigate and verify parameters used in model are realistic
   c. Modify Fig. 3 to label vertical axis
   d. Author a note for certain data points at 120 and 140 degrees exhibit lower torque that rest of same motor power curve (model limits for undervoltage)
   e. Verify if motor +/- torque oscillations for starting is realistic, and if so, explain phenomena that produces the oscillations.
   f. Add any salient conclusions (nuggets) after each figure and its discussion.

B. "MBT Field Data from MV Buses"
   a. Dale Finney
   b. Mani Sankaran
   c. Prem Kumar

C. "Modeling Results for MBT Modelling, Team A"
   a. Doug Weisz
   b. Nate Klingerman
   c. Ryan Carlson

D. "NEMA MG-1, IEEE 666 and ANSI C50.41"
   a. Dennis Tierney to provide brief write up on impact of time limits on transfers. This will be added to Section 3.
   b. Chris Ruckman and Wayne Hartmann to compare and contrast these three works for their motor bus transfer criteria

1. Chair to issue D4 with incorporated comments to be issued to Members and Guest by March 1, 2020.
2. Assignments to D4 are due on April 15, 2020, so Chair can compile Draft 5.
3. Chair to issue Draft 5 before the next WG meeting.

Adjournment

J16: PC37.101, Guide for Generator Ground Protection

Chair: Ryan Carlson
Vice Chair: Doug Weisz
Established: 2016
Output: Guide
Status: 9th Meeting

- J16 met with 7 members and 4 guests. The chair will check for a quorum.
- Both the Chair and Vice Chair were not present. The SC chair ran the meeting.
- The SC chair announced that the current chair is stepping down and Ryan Carlson would take over as the new chair.
- Ratan Das and Doug Weisz have outstanding assignments that they will send prior to the May meeting.
- For the next meeting a single session with setting for 30 and a projector is requested.

J17 - Revision of C37.102 Guide for AC Generator Protection
Chair: Manish Das
Vice Chair: Gary Kobet
Output: IEEE Guide
Draft: 1.6
Established: May 2017
Status: 10th WG meeting,
Expected completion date: December 2021 (initial sponsor ballot by January 2021)
Assignment: Revise C37.102 Guide for AC Generator Protection

WG Report

- J17 met with 16 members and 9 guests.
- The chair will make a quorum check.
- Both the chair and vice-chair were not able attend the meeting. The SC chair ran the meeting.
- Kelvin B and Juan G will follow up on assignments to check the guide against NERC PRCs.
- Sungsoo K raised a question about how to deal with NERC compliance in examples.
- Doug W made a comment that the examples should state whether the examples should use saturated or unsaturated impedances.
- A single session will be required for the next meeting with a projector and seating for 40.

J18: Investigate the effect 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

WG REPORT
ATTENDANCE:
Total 22; Guests 14; Members 7

OVERVIEW:
The chair discussed the present issue with having the papers required for review by the membership placed in a central repository. The Chair will discuss this further with the chair of J subcommittee.

Yanfeng Gong gave an overview of the SSO events at AEP beginning in 2007, he also gave an overview of the recent events in China and the United Kingdom.

The chair discussed the outline of the paper and a consensus was reached the report will discuss the causes of SSO and how-to categories the different SSO conditions, the report will not discuss what action should be taken. The report will discuss which data should be recorded, where to record this data and what is the sample rate etc. at which the data should be recorded

The chair will craft an outline of the report and send it to the membership for review before the May meeting.

REQUIREMENTS FOR NEXT MEETING:
For the next meeting, J18 will need a room for 30 and an overhead projector

J19: IEEE Std C37.106 Guide for Abnormal Frequency Protection for Power Generating Units
Chair: Ritwik Chowdhury
Vice Chair: Jason Espinosa
Output: Guide
Draft: 4.1
Established: January 2019
Expected Completion Date: May 2021

Assignment: To revise and update C37.106, IEEE Guide for Abnormal Frequency Protection for Power Generating Plants

WG REPORT

- We discussed a reset time for the 24DT to account for heat dissipation
    - You may get loss of life for any overexcitation than 105% (per GE protection guideline)
    - Do we need to create some guidance/recommendations for this?? We had discussions about getting a reset time from the manufacturer, but Dennis said it was impossible to get something like that.
    - Dennis stated that he has gotten manufacturers to adjust their excitation systems to remove excitation at 95% instead of 85% (while coasting down) to mitigate the condition he experienced. **Ritwik** will add a few words to a relevant part of the guide: "For a normal unit shutdown while coasting down, if there is a concern with unit overexcitation mitigation, strategies may be considered such as shutting off the field (coordinating the excitation system) at a higher speed."
- We reviewed Annex A
    - Developed overexcitation protection
        - We need to fix the 24 name labels so they are not manufacturer specific
        - We will add exciter trip to figure
            - Some entities disable this function in the excitation system
        - We added language for excitation transfers for dual (redundant) channel
    - **Onur, Steve, Raju and Ritwik** will help finish off Annex A
- We have standardized the figures for the standard
    - The WG approved the standardized figure template for the entire guideline. **Vinod, Derrick, Dale and Ritwik** will finish the remaining figures before the next meeting based on assignments from a phone meeting on Jan 8, 2020.
- Annex B
    - We added additional language to account for hydro unit frequency protection differences

    - We added language for islanding protection
    - **Derrick and Daniel** will review Annex B before the next meeting
- Add language in Annex A to state a Gas turbine aligns with a steam turbine
    - **ACTION ITEM: Jason Espinosa**
    - It is easier to develop a gas turbine protection scheme then a steam turbine protection system
- We removed the potential transformers from V/Hz limitation
    - We do not think the PT is limiting factor
    - The WG approved to remove this language from the guide
- We also got a few volunteers **(Daniel, Dennis, Raju, Jason and Ritwik)** who are willing to help finish other sections between the January and May meeting. The work done will be reviewed at the May meeting. Molson volunteered to review portions of the guide.

J20: Practices for Generator Synchronizing Systems
Chair: Jason Espinosa
Vice-chair: TBD
Output: Report
Established: January 2019
Status: WG (1st meeting 20190508)

WG Report
- J20 met with 10 members and 9 guests in attendance
- Quorum was not met
    - An email will be sent to the WG to vote for approval of the September meeting minutes
- The WG needs a location for storing draft and reference documents
    - The PSRC officer leadership will look into getting us an FTP interface for sharing files (similar to what was used for the generator tutorial)
- We will reach out to a generator breaker expert and request them to present to the working group the different considerations needed for generator breakers.
    - We will aim to have this presentation at the next WG meeting
- Figures for the report must be developed using Visio
    - We will standardize the font size to 10-11
- We will provide synch examples in the Annex of the report
    - We will include different configurations and example torque calculations
- We will include two equations in the report for calculating torque
    - One equation will provide a peak torque
    - The second equation will provide a torque characteristic over a time period
    - We will not go into extreme details on the torque applied to the rotor of the generator; we will provide general reference to the stress exposure and refer to other documents for further information
- We will add a section discussing the ramifications of a faulty synchronization
    - Generator downtime, loss of life, etc.
- It was suggested that this report maybe turned into a guide in the future or included in an existing guide

J21: Investigate Need for Motor Protection Tutorial
Chair: Kelvin Barner
Vice-chair: Derrick Haas

Output: Report
Established: September 2019
Status: WG (1st meeting 20200115)
Assignment: Develop a practical motor protection tutorial based around IEEE C37.96. The intent is to aid the reader to develop effective relay settings.

Task force JTF1 met for the second time on Tuesday, January 14, 2020 with 10 attendees present and 6 prospective members.
Minutes from the September 2019 meeting were reviewed.
A discussion was had about the path forward for the Task Force. The Task Force believes there is a need for a motor protection tutorial. This discussion also included development of a scope statement, and the development of the outline for the tutorial. The intention is to propose a Working Group.
Reviewed proposed assignment and developed a proposed working group name:
NAME - "Motor Protection Tutorial"
Assignment – "*Develop a practical motor protection tutorial based around IEEE C37.96. The intent is to aid the reader to develop effective relay settings.*"
The draft outline was reviewed and discussed on protection requirements/concerns. Including:

- Fuses
- ASD's
- Soft starting
- Undervoltage Tripping
- Tripping philosophy and interaction with controls/DCS

Formatting of a tutorial was discussed to follow the Generator Protection tutorial precedent to allow easier consumption:

- Use Generator Tutorial and C37.96 as guides for outline.
- Suggestion to add more sample calculations, C37.96 has calculations in Annex - will consider putting example calculation not in an Annex but spread through the document itself.
- A suggestion was made to form a presentation once the tutorial is completed.

A suggestion was made to form a list of improvements/enhancements to C37.96 at its next revision in the near future.
The assignment statement has been submitted to the J Chair for consideration of WG formation.
For the May 2020 meeting, a single session is requested with room for 30 and a projector.

Liaison Reports:

Electric Machinery Committee - M Yalla – There are no developments since the September meeting. The attendees were reminded that WG14 C50.12 Requirements for Low-Speed Generators in Hydroelectric Applications; is under revision.

Industry Applications Society (IAS) / Industrial & Commercial Power Systems (I&CPS) - M Donolo

Liaison Report I&CPS 2019 General Meeting

- P3004.7 – Recommended Practice for the Protection of Conductors Used in Industrial and Commercial Power Systems is close to reballoting
- P3004.3 – Recommended Practice for the Application of Low-Voltage Fuses in Industrial and Commercial Power Systems is close to reballoting

- 3004.11 – Recommended Practice for Bus and Switchgear Protection in Industrial and Commercial Power Systems was approved.
- New Par for 3003.5 - Recommended practice for connections to earth. Recommended Practice for Connections to Earth for Industrial and Commercial Power Facilities

Other new PARs in the works:
- Communication and protection
- Arc Flash standard.
- Terminal box for generator transformers

Nuclear 1E WG - Prem Kumar - IEEE 741 are working on "a draft for open-phase "criteria" only (just high-level statements that require protection from power supply "quality" issues. They are targeting going to ballot this fall. Document may get approved by end of year if all goes well.

The SC chair will notify the subcommittee chair when the balloting group is formed.

Old Business

Working Groups and Subcommittee ballots should be returned quickly to facilitate the work of the subcommittee

The subcommittee was reminded to avoid the use of shall, must, should, recommend, safety, etc.

WG Chairs should include the assignment, draft number and meeting number in the minutes

New Business:

Rich Bauer from NERC gave an update on PRC 024-02, Generator Frequency and Voltage Protection settings which has been recently balloted. Follow the update, there was a lively discussion with Rich providing many details on the ballot process.

New task force JTF1
To be chaired by Steve Turner "Investigate the need for a Generator Condition Monitoring WG". Will English pointed out that this may not be an appropriate WG due to possible overlap with other PES WGs. The task force should investigate this possibility.

New task force JTF2
To be chaired by Dennis Tierney "Investigate the need for a Disturbance Recording WG"

The initial meetings of these TFs may be deferred until other working groups wrap up in order to avoid having too many meeting conflicts.

New J Members
Kelvin Barner
Derrick Haas
Dennis Tierney
Steve Turner

Meeting was adjourned

K: Substation Protection Subcommittee

Chair: Jeff Barsch
Vice Chair: Adi Mulawarman

Substation Protection Subcommittee Scope

Evaluate and report on methods used in protective relaying of substations and the consumer or independent power producer, associated equipment and performance of these protective systems. Develop and maintain relaying standards which relate to this equipment and the utility-consumer interface.

The K-Subcommittee met on January 15th, 2020 in Jacksonville, FL with 23 of 31 members and 19 guests in attendance. A quorum was achieved. Jeff Barsch requested a motion to approve the September 2019 subcommittee meeting minutes. Steve Conrad made the motion, Mike Thompson seconded. Vote was unanimous to approve.
Advisory Committee and other items of interest were discussed:

1. Standards WG Awards - Reminder that the IEEE Standards Association Working Group Awards has a new Procedure to request certificates of appreciation for completed (Approved Standard) work. These certificates have to be requested by the Chair, VC or an officer of the WG directly from the IEEE SA. These awards can be shipped to our next PSRC meeting for announcement and distribution or they can be shipped directly to every member if addresses are provided.
The request for the SA certificates must be made at: http://standards.ieee.org/develop/awards/wgchair/wgawards.html
This procedure and associated links will be posted in the PSRC website in the next week or two for easy access.
2. Reports/Paper Final Output – Reminder that to be considered for PES level award for Technical Reports, Transactions/Journal and conference papers, these must be completed in PES Format and submitted and posted in the PES Resource Center.
Links to PES
PES Technical Resource Center: http://resourcecenter.ieee-pes.org/
PES - Technical Report Template: https://www.ieee-pes.org/images/files/doc/tech-council/PES-Technical-Report-Template_Jan_2016.docx
PES - Technical Paper Template: https://www.ieee-pes.org/templates-and-sample-of-pes-technical-papers
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

Reports from the WG Chairs

K10: SCC21 Distributed Resources Standard Coordination

Chair: R. Benjamin Kazimier
Vice Chair: Mark Siira
Established, 1999
Output: Standard through the SCC 21
Expected Completion Date: 20xx

Assignment: To interface with SCC21/P1547 in order to reduce unnecessary delays by getting PSRC input into the process without having to wait for after-the-fact coordination.

K10 met on Tuesday 01-14-2020 at 10:40am in City Terrace 8. There were 6 voting members and 10 non-members in attendance.

1547.1 4th recirculation balloting closed 1-13-20. Note, originally there were 1300 comments. This is expected to be the last recirculation ballot. It is anticipated that 1547.1 will be sent to RevCom for approval at their March meeting.

1547a is in recirculation and is also expected to be complete and sent to RevCom for approval at their March meeting.
1547.2/.3/.9 will be holding a collocated meeting the week of Feb 24th. The meeting registration link is:
http://www.cvent.com/d/9hq58k
Note that 1547.3 is a joint working group between SCC21 1547.3 and PSCC S13. It will be the first official meeting for both groups.

Jason Allnutt of IEEE gave a presentation on the IEEE 1547 conformity assessment program. His presentation slides will be sent with the meeting minutes. If you have any questions please reach out to Jason.

K11: Open Phase Detection for Nuclear Generating Stations
Chair: C. Sufana
Vice Chair: M. Urbina
Output: Report [Draft 7.30]

Assignment: Write a report to the K Subcommittee entitled Methods for Analyzing and Detecting an Open Phase Condition of a Power Circuit to a Nuclear Plant Station Service or Startup Transformer.

Introductions were done after a welcome by Chairman Charlie Sufana. There were 4 members, 5 guests, and 0 SC officer in attendance for the January 14, 2020 meeting in Jacksonville, FL.

The minutes from the September 17, 2019 K11 meeting were read but quota was not met, so the minutes will need to be approved later. The working group also saw the patent slides and copyright slides and no objections were noted.

Charlie then went over the report draft 8.70. Since the last meeting, the previous draft was approved by the K Subcommittee, changes were made, the working group reballoted the K SC requested changes, and the PSRCC officers have approved the draft. Charlie is currently working with the IEEE HQ folks to get the technical report uploaded. The latest draft has been given the title PES-TR75.

K12: P1032 Guide for Protecting Transmission Static Var Compensators
Chair: Satish Samineni
Vice Chair: Martin Best
Established: 2019
Output: Guide for Protecting Transmission Static VAR Compensators
Expected Completion Date: 2021

Assignment: To work jointly with Substations WG I9 to write a guide for protecting transmission static VAR 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 VAR compensators.

PSRC K12 had a joint meeting with Substations WG I9 on Monday, January 13th, 2020. K12 had 4 members present and no guests. Quorum was not met.
The K12 meeting minutes from September 2019 meeting will be approved after the meeting through email.

Current version of the draft is D22.

The Substation I9 submitted a new PAR on 9-17-2019 to increase the scope of the original proposed Standard 1032: Guide for Protecting Transmission Static VAR Compensators (SVCs) to include the protection of SVCs, STATCOMs and Hybrid STATCOMS and the new PAR was approved on 11-7-2019.

Technical topics:

1.) Reviewed SVS (Static Var Systems) figure and definitions, and VSC Protection section.

Action items :

a. Move the bi-weekly web meetings from Thursday to Wednesday.

The working group also reviewed and provided additional comments in Section 8 on Protective Functions in the SVC Control System.

Recesses and time of final adjournment: 5:30PM, 01/13/2020

K16: PC37.91 Revision of IEEE Guide for Protecting Power Transformers
Chair: Will English
Vice Chair: Steve Conrad
Established: 2014
Output: Guide
Expected Completion Date: 2020
Assignment: To revise and update C37.91, IEEE Guide for Protecting Power Transformers to correct errors and address additional protection related topics.

The meeting was called to order by the chair at 3:40PM on January 14, 2020 at the Hyatt Regency Jacksonville Riverfront, Jacksonville, FL. The working group met with 13 members out of 26 attendees. Quorum was not achieved.

IEEE-SA slides 1-4 containing patent policy and guidelines for WG meetings were displayed. A Call for Patents was made by the chair. No one acknowledged or identified having a patent claim.
IEEE Copyright policy information was provided and the copyright slides were shown.
The minutes from previous meeting will be submitted electronically for working group approval.

Technical topics:

1.) Draft 16.1 was discussed regarding comments received from the IEEE SA ballot. There are 33 technical comments. Many, but not all were reviewed at this meeting. The chair will schedule webex meetings in February.

Claire Patti will search existing definitions for operating and restraining elements. If definitions exist they will be added to the document. If not, the response will be that Clause 7.3.3 fully describes operating and restraining.
One comment related to the use of "oil" as the cooling/insulating medium. Randy Crelin will review this and consider the use of "insulating liquid" where applicable and report back to the chair.
2.) Having no more business a motion to adjourn was made by Brian Boysen, second by Paul Elkin, motion carried.

Recesses and time of final adjournment:4:50 pm on 1/14/2020

K18: PC37.108, Guide for Protection of Secondary Network Systems
Chair: Adi Mulawarman
Vice Chair: Roger Whittaker
Established: May 2015
Output: Guide
Expected Completion Date: December 31st 2019
Assignment: To revise and update C37.108-2002 Guide for the Protection of Secondary Network Systems

The Workgroup K18 January, 2020 meeting was called to order by the chair, Adi Mulawarman. In attendance were 7 members and 17 guests. A quorum was achieved. Kevin Donahoe and S. Venkata each asked to become new members.

IEEE-SA patent slides were presented and a call for patent issues was made. There were no responses.

A motion was made by Rafael Garcia and seconded by Charlie Sufana to approve the May 2019 Cinncinnati meeting minutes. The minutes were approved unanimously. A second motion was made by Roger Whittaker and seconded by Adi Mulawarman to approve the July 24, 2019 Webex meeting minutes. This motion was unanimously approved.

The chair explained that the first ballot has been completed and one hundred forty comments were received, mostly editorial in nature. There were four negative ballots and the response rate was over eighty five per cent. It was decided that technical comments would be considered by the overall group and that editorial comments would be gathered together in groups and assigned to members to resolve. (Each comment is either approved, disapproved, or revised. Several technical comments were resolved during the meeting. Another group of style-related comments will be referred to the SA editors. It was mentioned that the PAR has been extended for one year to allow for comment resolution.

The chair will set up a Webex meeting for members to continue the technical comment resolution process.

K22: PC37.234 IEEE Guide for Protective Relay Applications to Power System Busses
Chair: Abu Bapary
Vice Chair: Alla Deronja
Established: January. 2017
Output: Guide
Expected Completion Date: December 2021
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 16 voting members, 3 non-voting members, and 17 non-members. One guest asked to become a WG voting member and another asked to become a WG non-voting member.

A motion was made by Claire Patti to approve the minutes from the Webex Meetings (2019-10-15, 2019-11-21, 2019-12-11), and 2019-09-17 face to face PSRC meeting. The motion was seconded by Chris Walker. The minutes were unanimously approved.

Technical topics:

1.) All action items from the last meeting were submitted.

2.) Don Lukach to send IEEE SA Verbiage Usage presentation/document to WG Chair/V-Chair for distribution to the group.

3.) Discussion on tertiary ungrounded bus protection from shunt reactor guide. Some considered that this may not be the right document for it. However, the WG eventually decided that the bus protection guide will have a sub-clause on ungrounded bus protection encompassing tertiary transformer and generator isophase buses. Ground fault protection would be the focus of the new sub-clause. It would be also worth mentioning that the phase fault protection of the ungrounded bus is accomplished using standard bus protection.

4.) The WG also discussed where to put this section, and it was agreed to have it in Clause 8.0. A team was assigned to write this new section titled Bus protection in an ungrounded system.

5.) Discussion on CT Column Ground Bus protection. Hillmon Ladner-Garcia will update the 2nd figure, out of four that were considered. It will be cleaned up, simplified and put in Visio format.

6.) Discussion on normative references. The WG proposed to move C37.119 and C57.13.3 to the Bibliography.

Action items :

- **Sebastian Billaut (lead), Ratan Das, and Mike Thompson** will write a new sub-clause, 8.3, titled Bus protection in an ungrounded system. Status: new, expected March 1, 2020.
- **Hillmon Ladner-Garcia** will provide an updated figure for 8.13 *CT column ground fault protection* based on the second figure he contributed to show a breaker, a block of 4 stand-alone CTs, a ground CT, and a relay. Status: pending, expected March 1, 2020.
- **Don Lukach** and Brian Boysen will work on updating the guide to remove words such as “shall”, “must”, “recommended”, etc. where appropriate. Status: pending, expected March 1, 2020.

Recesses and time of final adjournment : 10:30 am 01/14/2020
Next Meeting : Webex meetings are planned to be scheduled for February, March, April.

K24: Summary paper for PC37.245, Guide for the Application of Protective Relaying for Phase Shifting Transformers

Chair: Brandon Davies (filled-in by Hillmon Ladner)
Vice Chair: Hillmon Ladner (filled-in by Lubomir Sevov)
Established: January 2019
Output: Summary Paper for PC37.245 PST Guide
Expected Completion: May 2020
Assignment: Write a summary paper for the recently completed PC37.245 Guide for the Application of Protective Relaying for Phase Shifting Transformers (PST) for presentation at regional conferences.

- The K24 working group met on January 15th at the PSRC in Jacksonville, Florida with – 4 members and 2 guests present.
- Quorum met with 4/6 members in the meeting.
- Reviewed plan for submissions to relay conferences during the year:
  - Georgia Tech – Accepted
  - Western – Call for papers open March 10 for Fall 2020 conference
  - Texas A&M – Call for Papers close to September for 2021 conference
  - Need to verify if IEEE conferences will Accept papers with the same title
  - The group discussed the possibility of taking the paper to other conferences.
- The WG will also present in the main committee meeting in May 2020
- WG Reviewed and resolved K Subcommittee Ballot Comments.
- Review the presentation:
  - Brandon Davies provided a presentation to serve as a starting point. The WG reviewed the presentation and provided comments on modifications or additions to fit the material in the paper. Brandon Davies will work on the updates discussed and share with the group for comment.
  - The group will aim to cover each section in the paper and touch on the unique topics that would motivate attendees to read the new guide, such as:
- Winding configurations and CT locations
- Setting relays for unique phase angle shifts – Not every traditional transformer relay can work
- Automatic Power Control features
- Equivalent MVA
- Overload Mitigation
  - A WebEx meetings will be scheduled for February to finalize the presentation before the GA Tech relay conference.
  - WG discussed the possibility of recording the presentation to create a Webinar.

Current Version of the Draft: Rev. 5
Request for next meeting: No meeting room requested.

K25: C37.99 Revision of IEEE Guide for the Protection of Shunt Capacitors

Chair: Meyer Kao
Vice Chair: Rick Gamble
Established: January 2019
Output: Guide
Expected Completion Date: 2022
Assignment: Revise the existing C37.99 IEEE Guide for the Protection of Shunt Capacitors

The WG met on Tuesday, January 14, 2020. A call to order was made and the WG stared introductions.

A check for quorum was made. Quorum was met with 15 voting members present out of 28 total members. The patent slides were reviewed with no issue. The chair also reviewed the IEEE SA Copyright slides and the Editorial Basics The previous meeting minutes were reviewed. Pratap Mysore moved to approve the minutes, Eric Thibodeau seconded the motion.

The WG started a review of previously submitted assignments, starting with a look at the Normative References and a discussion on when to use dated references - which the WG will continue to do. Further, it was discussed that NEMA CP1 has merged with IEEE STD 18, so the WG will need to remove references to NEMA CP1 and ensure STD 18 contains the relevant content.

The bibliography was then reviewed, with a noted need to locate some previously used resources (reference B1 and B5). A WG member added references B14 through B35 which are CIGRE and IEC reports and guides on capacitor protection. These additional references will be reviewed by the WG body at a later date based on the chair's assignments.

Section 8.6 Fuseless Capacitor Bank Protection was reviewed. The discussion centered around the proposal to move away from making protection calculations based on number of elements, and instead use current and voltage. The suggestion was made to consider the style of the existing guide as only one method of calculating protective setpoints and to expand the guide to consider other methods.

In Section 4, the WG discussed the differences in fuseless and unfused banks. The direction of the WG will be to remove content on unfused banks as this is a design not typical nor recommened at the PSRC level.

The session wrapped up with a discussion on fuses and how the guide handles content on inrush and outrush considerations.

Action items :

a. Terminology liaison to be assigned - Claire Patti
b. 4 (expand and clarify, remove unfused references) - Pratap Mysore
c. 4.4 - Michael Bloder (review of 110% limit)
d. 7 (including structure of 7 and 8 overall) - Eric Thibodeau, Rick Gamble
e. 8 (formatting of tables) - Claire Patti
f. 8.1, 8.2, 8.3 - Pratap Mysore, Satish Samineni
g. 8.4 - Steve Klecker
h. 8.6 - Hillman Laduer
i. 9 - Brandon Lewey, Steve Conrad
j. Including review of 1531 applicable sections
k. 10 - Kent Ryan
l. 11 - Satish Samineni
m. 12 - Ben Malcolm
n. 13 - Pratap Mysore
o. Calculation examples in lieu of Table 2 - Pratap Mysore, Dean Sorensen
p. Fault study example text - Dean Sorensen

K26: C37.109 Revision of IEEE Guide for the Protection of Shunt Reactors
Chair: Kamal Garg
Vice Chair: Ilia Voloh

Established: January 2019
Output: Guide
Expected Completion Date: 2023
Assignment: Revise the existing C37.109 IEEE Guide for the Protection of Shunt Capacitors

1. Introductions
2. September meeting minutes displayed-was approved already in October webex meeting
3. 29 people in presence. (15 Voting members).
4. Patent slides displayed-no concerns
5. September meeting minutes displayed-was approved already in October webex meeting
6. Kamal introduced latest changes in the guide. Additional discussion on chapters 4 and 5. Also discussed VSR, Auxiliary winding, magnetically controlled shunt reactor. Some utilities use Auxiliary winding, we are still looking for applications with VSR and magnetically controlled shunt reactors
7. Gary presented TVA cases with tertiary reactor protection and ungrounded bus ground protection alarm/trip followed by group discussion
8. Group was of the opinion that ungrounded bus protection should be included both in reactor and bus guide. Bus guide may have more details.
9. Figures review – Dean and Jonathan Sykes agreed
10. Split core reactors configuration-if anyone has experience to reflect in the guide. WG still reaching out to others.
11. Should tertiary bus be in this guide only or in transformer and bus. Opinion is to keep here and make reference in other guides. Especially when tertiary is unloaded.
12. Siemens webinar February 25th
13. Discussion on tertiary reactor breaker line/neutral side.
14. Breakers can be on the bus side (Dean), but for reactor fault whole bank is tripped, if the breaker is not rated for fault current. Needs to be reflected in the guide.
15. Typically from 2 to 4 reactors are used, Pratap proposed to show 3 zones when breaker on the bus side
16. Taylor Raffield and Brendon Davis and Paul Elkin and Ed Chen agreed to review
17. Pratap would like to reorganize the guide for better flow. Ilia and Kamal will work on it and propose in next meeting.
18. Adjourn

Recesses and time of final adjournment : 01/14/2020, 0210 am MST

KTF27: *TF: C37.95 IEEE Guide for the Protective Relaying of Utility-Consumer Interconnections*
Chair: Paul Elkin
Vice Chair: Jeff Barsch
Secretary: Jeff Barsch
Established: January 2020
Output: Recommendation
Assignment: Investigate the need for revising IEEE Std C37.95-2014, "IEEE Guide for the Protective Relaying of Utility-Consumer Interconnections"

The chair called the meeting to order. The chair mentioned that the guide is generally in good shape, but there are some places in the document that could be improved. Several attendees noted that they have used the existing document. There were 15 attendees.

The Standards Association pre-PAR slide was displayed.

Jason Buneo made a motion to approve the agenda, and Steve Conrad seconded the motion. The agenda was unanimously approved.

The chair displayed the existing guide and provided a high-level overview of its contents. The guide has many examples, both with and without generation. It was noted that inverter based resources are not discussed. It was felt that the section pertaining to consumers with generation could be further developed. It was suggested that voltage and frequency ride-through requirements and how they don't necessarily apply to co-gen facilities should be included in the guide, and that these requirements can vary by region.

Inverter controls and associated protection could be discussed in the guide. It was also suggested that an effort should be made to distinguish between cases where the consumer wants to separate themselves or not from the grid. It was further suggested that a figure could be included which shows ground overvoltage protection with high side PT's.

Ted Warren made a motion to recommend forming a WG to revise the guide. The motion was seconded by Steve Klecker. There was a unanimous vote to form a WG.

Paul Elkin has volunteered to be chair of the WG.

The proposed assignment for the WG is as follows: Revise IEEE Std C37.95-2014, IEEE Guide for the Protective Relaying of Utility-Consumer Interconnections.

Subsequent to the KTF27 meeting, Hillmon Ladner volunteered to be the vice chair/secretary of the WG.

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: Create a Transaction Paper

Call to order, Chair's remarks
14 participants with 8 members and 6 guests. The assignments were discussed and several volunteers agreed to provide contributions by mid-April.
Technical topics:
Assignments made. Include Abstract, References. Assignments due in mid April, 2020.

Liaison Reports:

T&D Committee, Capacitor Subcommittee

Pratap Mysore

- IEEE Std 18 Shun Capacitors and IEEE Std 1036 Application Guide are in the final stages of revision and will be balloted soon.
- NEMA CP1 Shunt Capacitor document will not be revised but will remain active. All the content of CPI1 document is no incorporated in IEEE Std 18 and only this standard will be used as reference in capacitor protection guide.

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

TX Committee

Fred Friend will be replaced by Will Knapek going forward as transformer committee liason.

http://www.transformerscommittee.org/

Old Business:

SA standard word usage; style manual section 10.2 (absolute verbiage to avoid); link on the pes-psrc knowledge base website.

New SA Patent slide and SA Copyright slide (new).

New Business:

- Ground fault detection on ungrounded buses – K22 & K26 WG's. Discussion at the subcommittee meeting
    - Decision to pass along G. Kobet write-up on ungrounded bus protection to K22 for starting point to be put in Bus Protection guide.
    - Pratap also requested that the section include calculation of the resistor sizing.
    - K26 will use a shortened version of G. Kobet's write-up in the reactor guide.
    - Adi Mulawarman motioned the above. Dean Miller seconded. Motion carries unanimously.
    - Action items for Kamal to pass along the information/write-up to Abu/Alla.
- K3 report – "Reducing outage durations through improved protection and autorestoration in distribution substations" (not enough time to discuss; postponed to next meeting)
- Request from Pratap to reinstate Bogdan Kasztenny as K Subcomm member.

Adjourn: Ben Kazimier motioned to adjourn. Pat Carroll seconded.