



**POWER SYSTEM RELAYING AND CONTROL COMMITTEE
OF THE IEEE POWER AND ENERGY SOCIETY
MINUTES OF THE MEETING
January 13-17, 2019, Garden Grove, CA**

I. Call to order / Introductions: Russ Patterson

Chairman Russ Patterson called the meeting to order at 8:00 am on Thursday, January 17, 2019.

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 87 members in attendance out of a total membership of 127. An attendance sheet was routed.

II. PES Award: Miriam Sanders

Solveig Ward was presented with a PES award for her service as the JTCM Planning Chair for 2018.

III. Approval of Minutes / Financial Report: Michael Thompson

A motion to approve the minutes of the September meeting of the PSRC Committee in Minneapolis, MN was made by Steve Conrad. The motion was seconded by Gene Henneburg. There was no further discussion. The motion was approved.

The PSRC committee financial status fine.

IV. Chairman's Report: Russ Patterson

We had 247 attendees for our January 2019 meeting in Garden Grove, CA including 18 newcomers. This meeting was a joint meeting with other PES committees (<https://www.pestechical.org/>). At this meeting I took over the role of chair from Pratap Mysore. It has been an absolute pleasure to work with Pratap as his vice-chair for the past 2 years. He is a kind and considerate gentlemen and one of the best engineers in our committee. He never tires of teaching and helping with any technical problem.

It is an honor to chair the PSRC Committee. As Gary Stoedter so eloquently described in his acceptance speech during the awards section of our Main Committee meeting, the PSRC is a wonderful place to be for an engineer. We are surrounded by the best protection engineers in the world. We do our best to support each other without seeking individual credit for our successes. Like any human institution it is a flawed machine, but the positives definitely outweigh the negatives. Participating in the PSRC provides opportunity to learn from the top experts in our field and to find out how other utilities do things.

There are many challenges facing protection engineers now and more to come in the future. One of these challenges is performance of protective relays in the presence of inverter based resources (IBR). There is much industry activity around this topic and the PSRC is right in the middle. We are joint sponsors of IEEE P2800 - Standard for Interconnection and Interoperability of Inverter-Based Resources Interconnecting with Associated Transmission Electric Power Systems. This standard will establish the recommended interconnection capability and performance criteria for inverter-based resources interconnected with transmission and networked sub-transmission systems. See <https://standards.ieee.org/project/2800.html>

for more details. There are several working groups that have been working on this topic or are starting to now. This is just one challenge among many facing our industry.

We welcomed the following contributors who have accepted Pratap's invitation to join the PSRC Committee. We appreciate their dedication to this organization and look forward to many more years of contributions in the future.

Martin Best	Rick Gamble	Phil Tatro
Matt Black	Allen Goldstein	Jun Verzosa
Jöerg Blumschein	Michael Higginson	Chris Walker
Oscar Bolado	Will Knappek	Don Ware
Cathy Dalton	Manish Patel	

It is with sadness that I report the passing of Joe Uchiyama. Joe was a consistent member of the PSRC since he first started coming in 1981, 38 years ago. Joe was a leader in the Rotating Machinery subcommittee and a senior protection engineer at the Bureau of Reclamation. Joe chaired the working group that revised C37.101 in 2006, the IEEE Guide for Generator Ground Protection. Most recently he was a member of the working group that revised C37.119, the IEEE Guide for Breaker Failure Protection of Power Circuit Breakers, which earned the 2018 PES Outstanding Standard or Guide Award.

Thank you to all PSRC attendees for making our January 2019 meeting a successful meeting. I wish you a blessed and happy new year and look forward to seeing you all in Cincinnati, OH for our May meeting.

Sincerely

Russ Patterson

V. Reports of Interest

A. Technical Paper Coordinator's Report: Murty Yalla

40 papers were submitted for the 2019 PES general meeting (August 4-8, 2019 in Atlanta, GA). 22 papers will likely be accepted.

56 transactions papers were submitted. 25 were accepted. 50 PSRC participants contributed their time and expertise to the advancement of the industry by reviewing papers.

B. Future Meetings: Murty Yalla

May 2019 Meeting; the Westin Cincinnati, Cincinnati, OH; May 6-9, 2019.

September 2019 Meeting; the Hilton, Denver City Center, Denver, CO; September 16-19, 2019.

January 2020 Joint Technical Committee Meeting (JTCM) Hyatt Regency Jacksonville, FL; January 12-16, 2020.

May 2020 Meeting; Sheraton Music City, Nashville, TN; May 4-7, 2020.

Details are posted on the PSRC website.

C. CIGRE B5 Activities Report: Rich Hunt

Three new B5 Working Groups have been approved since the General Session in Paris in August. These Working Group are:

- B5.68 Optimization of the IEC 61850 Protection, Automation and Control Systems (PACS) engineering process and tools
- B5.69 Experience gained and Recommendations for Implementation of Process Bus in Protection, Automation and Control Systems (PACS). The convener is our own Alex Apostolov
- B5.70 Reliability of Protection Automation and Control System (PACS) of power systems – Evaluation Methods and Comparison of Architectures

To participate in one of these Working Groups, you must be nominated through your National Committee. If interested, contact your B5 national representative. (Rich Hunt for the U.S., Richard.hunt@ge.com, Bogdan Kasztenny for Canada, Bogdan_kasztenny@selinc.com. For other countries, contact Rich and he'll provide the name and contact information.)

CIGRE 2019 B5 Colloquium, Tromso, Norway

The B5 Colloquium will be held June 23 through June 29, 2019 in Tromso Norway. Inside the Arctic Circle, and the best place in the world to watch the Northern Lights. (Though the meeting is in June, during the period of the midnight sun).

The preferential subjects are:

PS 1: Leveraging PMU data for better Protection, Automation and Control Systems

PS 2: Time in Protection Applications – Time sources and distribution Methods

PS 3: Future technologies for inter-substation communication, Migrating Digital Teleprotection Channels to Packet-Based Networks

Head for the land of the midnight sun in June. Details on the Colloquium and the Call for Papers can be found on the website:

<https://www.cigrebtromsoe2019.com/>

<https://www.cigrebtromsoe2019.com/call-for-papers>

CIGRE 2020 General Session

The 48th CIGRE General Session will be held August 24th to 28th in Paris. The Call for Papers is just out.

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

- Causes, types, stages of occurrence, and consequences of human errors.
- Impact of PACS complexity and degree of functional integration on human errors.
- Prevention of human errors including training; work authorisation and peer reviews; procedures; application templates and standardisation; and best practices for working with sub-contractors and third parties.

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

- Management of redundancy in communications networks for applications and Intelligent Electronic Devices.
- Data Segregation, including use of virtual networks for PACS applications.
- Architecture of PACS communication network, including management of communication constraints.

Synopses are due to your CIGRE National Committee through your B5 National Representative by June 28th, 2019. Authors will be notified of successful selection by October 15th, 2019, with completed papers due by February 14th, 2020.

There were 4 papers accepted for the technical sessions from U.S. and Canadian authors. During the B5 Study Committee meeting, the Preferential Subjects for the 2020 General Session were determined to be:

- Communications Networks in PACS, Experience and Challenges
- Human Aspects of Protection and Automation

Look for the Call for Papers to come out in 2019. The CIGRE General Session requires submission of a full paper (not just a synopsis), through your country B5 members. So start planning your papers now.

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

D. IEEE PES Report on GDPR: Erin Spiewak

Erin Spiewak of the IEEE Standards Association made a presentation on IEEE policies to ensure compliance with the European Union's General Data Protection Regulation (GDPR). The title of the presentation was IEEE Data Privacy Guidelines & Working Group Communications.

To review the details of the presentation, it can be accessed at the following link.

E. IEEE PES Update: Miriam Sanders

IEEE PES Staff Support and liaison to the IEEE PES Tech Council and Committees, Shana Pepin, was introduced in December as well as on-site at JTCM 2019 in Ocean Grove, CA. PSRC members are tasked with helping to identify individuals or groups for collaboration on different aspects within technical activities including insight into relevant topics and projection to generate content for promotion of technical activities. Three major goals and ways to support technical activities promotional efforts were presented as such: globalization, industry engagement, and intellectual property. Additionally, technical committee website revitalization in line with the revamping of the ieee-pes.org [ieee-pes.org] site will be underway in the coming months. PSRC (as well as any other technical committees) have been tasked with continuing to create and share content such as webinars, tutorials, technical reports, guides, (etc.) and noted that all content produced should ultimately be housed in either the PES Resource Center or IEEE Standards Shop. PSRC is also in the midst of transitioning into 123Signup (along with the rest of the technical committees) in an effort to create a centralized database of all technical committees, sub-committees, working groups, and task forces and provide insight into meetings and on-going work and participation of each committee/group.

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 PSRCC 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) nominee as of January 2019 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.

TC 95 held its plenary meeting in Frankfurt, Germany on November 9, 2018, at the end of a week of Maintenance Team or standards drafting team meetings. This gathering saw the highest US engagement and PSRC collaboration in these TC 95 meetings and projects since the 1970s. In-person attendees included the TC 95 Chair Murty Yalla, and Maintenance Team working members Alex Apostolov, Oscar Bolado, Normann Fischer, and Scott Hodge. This highlights the trend of growing collaboration over the last 5-7 years as Eric reported to PSRC in a 2017 presentation.

Update on active standards projects worked on in Frankfurt and ongoing:

- IEC 60255-118-1, Synchrophasor standard – now published as an official International Standard and as IEC/IEEE dual logo standard - the one synchrophasor standard for the world. This is a landmark

collaboration achievement for PSRC and for TC 95. Hearty congratulations to Convenor Ken Martin, who has served both organizations and the industry; and to the WG members.

- IEC 60255-181 Functional Requirements for Frequency Relays – FDIS was balloted and is now officially accepted as a new international standard to be published.
- 60255-1, General requirements, is being rolled back from CDV to CD as the MT determines clear requirements for relay settings to be used during various type tests.
- IEC 60255-26 Ed. 4 Electromagnetic compatibility requirements – CDV was rolled back to CD stage as the MT determines clear requirements for relay settings to be used during various type tests.
- IEC 60255-27 Ed. 3 Product safety requirements – USNC submitted comments on the last CD. We are awaiting compiled comment responses and the next revision of the draft.
- IEC 60255-21, Vibration, shock and seismic tests: Part 21-1 – Vibration tests; Part 21-2 – Shock and bump tests; Part 21-3 – Seismic tests – MT3 is evaluating changes to and consolidation of these decades-old physical environment type tests. We still await the first CD.
- TC 95 is looking at creating a new JWG with TC8 and other TCs/SCs on requirements for frequency measurements in DER and load controllers, and asked national committees about interest in the project. The USNC will endorse the project and will be looking for participants. Our US TAG sees two issues for standardization – valid frequency measurement algorithms or requirements with appropriate response for variations in power system behavior; and fundamental application logic that is free of aberrations – e.g. specifications that insure no tripping of inverters on fault-induced voltage phase shifts or other transient events for which we require inverter ride-through.
- 60255-132/167 (new) – TC 95 plans to begin a new functional standard development for directional power and directional overcurrent relays.
- In the wake of an ad-hoc WG (AHWG) report on performance or evaluation of relays whose inputs are data streams from 61869-9 merging units, a new WG has been established to develop standards. Analog properties like filter response to input transients or phase shifts are already addressed in the merging unit standard IEC 61869-9 from TC 38, but the new TC 95 work aims to standardize response of relays to data transmission errors, configuration problems, and failures.
- IEC 60255-187-1: Functional requirements for restrained and unrestrained differential protection of motors, generators and transformers – CDV has been rolled back to CD as the MT addresses significant editing issues.
- 60255-187-2: Functional requirements for busbar differential protection – The first draft is expected in 2019 – then PSRC will create a focused WG to review and support development.
- 60255-187-3: Functional requirements for biased (percentage) differential relays for transmission lines - The first draft is expected in 2019 –PSRC already has created WG D34 under Normann Fischer to deal with the CD when it arrives.

The next meeting of MTs and WGs takes place in Paris in March.

G. Standards Coordinators Report: Don Lukach

This report summarizes the status of PAR related projects as of the January 2019 meeting.

Note that the IEEE SA RevCom applies to the revision of existing PAR related projects and NesCom refers to new projects.

IEEE SA commented the following topics of interest:

- GDPR policy changes associated with PAR-related documents remain a are still a concern and issues are under review.

- iProject changes are expected in the third or fourth quarter, 2019. Expect training to be provided by SA.
- Copyright information processing changed slightly. Information cannot be placed into draft documents until applicable releases have been obtained.
- SA Editorial staff may become available at PSRC meetings once a year to help. This worked well in 2018, and will assist PSRC greatly.
- iMeet training is planned for the May meeting.
- Policies and Procedures have been recently updated.

This is Don Lukach's first meeting as Standard Coordinator. Many thanks and appreciation to outgoing Coordinator Adi Mulawarman for his outstanding work!

Main Committee PAR Submissions approved at January meeting:

P1613 IEEE Standard for Environmental and Testing Requirements for Devices with Communications Functions in Electric Transmission and Distribution Facilities.

Proposal was to revise the PAR title contingent upon moving the standard from the Substation Committee C0 into the PSRCC. Also, the intent is to have joint PSRCC/ PSCCC development.

Main Committee PAR Submissions of projects to SA ballot approved at January meeting:

None

Revision to existing projects completed since September 2018

60255-118-1	Measuring Relays and Protection Equipment - Part 118-1: Synchrophasor for Power System - Measurements
C37.112	Standard Inverse-Time Characteristic Equations for Overcurrent Relays
C37.116	Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks
C37.237	Standard Requirements for Time Tags Created by Intelligent Electronic Devices - COMTAG(TM)
C37.245	Guide for the Application of Protective Relaying for Phase Shifting Transformers

RevCom approval or acceptance of project:

None

NesCom approval or acceptance of project:

PC37.252	Guide for Testing Automatic Voltage Control Systems in Regional Power Grids
----------	---

Projects currently in Balloting (Sponsor Ballot, Comment Resolution, Recirculation)

PC37.230	Guide for Protective Relay Applications to Distribution Lines	Sponsor Ballot: Comment Resolution
PC37.247	Standard for Phasor Data Concentrators for Power Systems	Sponsor Ballot: Comment Resolution
PC37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers	Sponsor Ballot: Invitation

PARS expiring at the end of 2019 to 2022

Standard	Title	SASB Expiration
C37.106	IEEE Guide for Abnormal Frequency Protection for Power Gr	12/31/2019
C37.233	IEEE Guide for Power System Protection Testing	12/31/2019
C37.234	IEEE Guide for Protective Relay Applications to Power Syste	12/31/2019
C37.105	IEEE Standard for Qualifying Class 1E Protective Relays and	12/31/2020
C37.110-2	IEEE Guide for the Application of Current Transformers Use	12/31/2020
C37.239	IEEE Standard for Common Format for Event Data Exchange	12/31/2020
C37.90.2	IEEE Standard for Withstand Capability of Relay Systems to	12/31/2020
C37.101	IEEE Guide for Generator Ground Protection	12/31/2021
C37.232	IEEE Standard for Common Format for Naming Time Sequen	12/31/2021
C37.90	IEEE Standard for Relays and Relay Systems Associated with	12/31/2021
C37.92	IEEE Standard for Analog Inputs to Protective Relays From E	12/31/2021
C37.102	IEEE Guide for AC Generator Protection	12/31/2022
C37.104	IEEE Guide for Automatic Reclosing of Circuit Breakers for A	12/31/2022
C37.109	IEEE Guide for the Protection of Shunt Reactors	12/31/2022
C37.231	IEEE Recommended Practice for Microprocessor-Based Prot	12/31/2022
C37.90.1	IEEE Standard for Surge Withstand Capability (SWC) Tests fo	12/31/2022
C37.90.3	IEEE Standard Electrostatic Discharge Tests for Protective Re	12/31/2022
C37.96	IEEE Guide for AC Motor Protection	12/31/2022
C37.99	IEEE Guide for the Protection of Shunt Capacitor Banks	12/31/2022

PAR/Standard Submittal Deadlines & Standards Board Meeting Schedule:

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

Submittal dates are as follow. Note that the last deadline for a submittal is now September 17.

February 8

March 22

May 3

July 26

September 17

All PSRC PAR-Related Projects:

1646	Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation
60255-118-1	Measuring Relays and Protection Equipment - Part 118-1: Synchrophasor for Power System - Measurements
C37.101	Guide for Generator Ground Protection
C37.101-2006/Cor 1	Guide for Generator Ground Protection - Corrigendum 1: Annex A.2 Phasor Analysis (Informative)
C37.102	Guide for AC Generator Protection
C37.103	Guide for Differential and Polarizing Relay Circuit Testing
C37.104	Guide for Automatic Reclosing of Circuit Breakers for AC Distribution and Transmission Lines
C37.105	Standard for Qualifying Class 1E Protective Relays and Auxiliaries for Nuclear Power Generating Stations

C37.106	Guide for Abnormal Frequency Protection for Power Generating Plants
C37.108	Guide for the Protection of Network Transformers
C37.109	Guide for the Protection of Shunt Reactors
C37.110	Guide for the Application of Current Transformers used for Protective Relaying Purpose
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
C37.111	Standard for Common Format for Transient Data Exchange (COMTRADE) for Power Systems
C37.112	Standard Inverse-Time Characteristic Equations for Overcurrent Relays
C37.113	Guide for Protective Relay Applications to Transmission Lines
C37.114	Guide for Determining Fault Location on AC Transmission and Distribution Lines
C37.116	Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks
C37.117	Guide for the Application of Protective Relays Used for Abnormal Frequency Load Shedding and Restoration
C37.119	Guide for Breaker Failure Protection of Power Circuit Breakers
C37.2	Standard Electrical Power System Device Function Numbers, Acronyms and Contact Designations
C37.230	Guide for Protective Relay Applications to Distribution Lines
C37.231	Recommended Practice for Microprocessor-based Protection Equipment Firmware Control
C37.232	Standard for Common Format for Naming Time Sequence Data Files (COMNAME)
C37.233	Guide For Power System Protection Testing
C37.234	Guide for Protective Relay Applications to Power System Buses
C37.235	Guide for the Application of Rogowski Coils used for Protective Relaying Purposes
C37.237	Standard Requirements for Time Tags Created by Intelligent Electronic Devices - COMTAG(TM)
C37.239	Standard for Common Format for Event Data Exchange (COMFEDE) for Power Systems
C37.241	Guide for Application of Optical Instrument Transformers for Protective Relaying
C37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMU) for Power System Protection and Control
C37.243	Guide for Application of Digital Line Current Differential Relays Using Digital Communication
C37.245	Guide for the Application of Protective Relaying for Phase Shifting Transformers
C37.246	Guide for Protection Systems of Transmission to Generation Interconnections
C37.248	Guide for Common Format for Naming Intelligent Electronic Devices (COMDEV)
C37.90	Standard for Relays and Relay Systems Associated with Electric Power Apparatus
C37.90.1	Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
C37.90.2	Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers
C37.90.3	Standard for Electrostatic Discharge Tests for Protective Relays

C37.91	Guide for Protecting Power Transformers
C37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers
C37.95	Guide for Protective Relaying of Utility-Consumer Interconnections
C37.96	Guide for AC Motor Protection
C37.98	Standard for Seismic Qualification Testing of Protective Relays and Auxiliaries for Nuclear Facilities
C37.99	Guide for the Protection of Shunt Capacitor Banks
C57.13.1	Guide for Field Testing of Relaying Current Transformers
C57.13.3	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases
P1646	Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation
P2030.100.1	Monitoring and Diagnostics of IEC 61850 Generic Object Oriented Status Event (GOOSE) and Sampled Values Based Systems
P2030.12	Guide for the Design of Microgrid Protection Systems
PC37.101	Guide for Generator Ground Protection
PC37.102	Guide for AC Generator Protection
PC37.104	Guide for Automatic Reclosing on AC Distribution and Transmission Lines
PC37.106	Guide for Abnormal Frequency Protection for Power Generating Plants
PC37.108	Guide for the Protection of Secondary Network Systems
PC37.110	Guide for the Application of Current Transformers Used for Protective Relaying Purposes
PC37.120	Protection System Redundancy for Power System Reliability
PC37.2	Standard Electrical Power System Device Function Numbers, Acronyms, and Contact Designations
PC37.230	Guide for Protective Relay Applications to Distribution Lines
PC37.233	Guide for Power System Protection Testing
PC37.234	Guide for Protective Relay Applications to Power System Buses
PC37.235	Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes
PC37.242	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control
PC37.247	Standard for Phasor Data Concentrators for Power Systems
PC37.249	Guide for Categorizing Security Needs for Protection and Automation Related Data Files
PC37.250	Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes
PC37.251	Standard for Common Protection and Control Settings or Configuration Data Format (COMSET)
PC37.252	Guide for Testing Automatic Voltage Control Systems in Regional Power Grids
PC37.300	Guide for Centralized Protection and Control (CPC) Systems within a Substation
PC37.90	Standard for Relays and Relay Systems Associated with Electric Power Apparatus

PC37.90.2	Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers
PC37.91	Guide for Protecting Power Transformers
PC37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers
PC37.92	Standard for Analog Inputs to Protective Relays From Electronic Voltage and Current Transducers

H. NERC Report: Mohamed Osman

NERC has a number of standards authorizations for modification of existing standards pending.

SAR for Modification to PRC-019

Background

- It is clear to the industry that PRC-019 is a standard developed and written for traditional synchronous generation;
- Inverter Based Resources (IBR) are designed and operated in a completely different manner than synchronous generators;
- This misalignment forces entities to make interpretations and assumptions of the requirements.

Scope

- Revise PRC-019 standard to address the ambiguity and conflicts within the existing standard
- Identify and delineate the differences between synchronous and asynchronous generation
- Clearly specify requirements that align with these differences and support system reliability.

Additional

- Momentary Cessation
 - Manufacturers are moving away from this function but some of the older inverters cannot remove this function
 - Entities should place limiters to prevent an inverter from going into momentary cessation.
- Stability Limits
 - References and methods for stability limits are based on synchronous machine theories.
- Reactive Compensating Devices
 - The language in footnote 1 (R1) implies that reactive compensating devices are out of scope for PRC-019 since they are not installed or activated on a generator

SAR for Modification to PRC-023

Background: Conflict in the Standard

- Requirement R2 and Attachment A, Item 2.3 exclusion
- Exclusion exempts the power swing blocking (PSB) relaying that Requirement R2 addresses

Scope

- Retire Requirement R2
 - Addresses tripping for a very unlikely three phase fault during power swing blocking
 - Does not address a loadability concern; instead mandates reliable tripping during faults

- Reliable tripping can be addressed elsewhere in the standard
E.g., “while maintaining reliable protection of the BES for all fault conditions” (Requirement R1)
- Clarify Attachment A, Exemption 2.3
 - Provide clarity as to protection related to stable power swings
 - Ensure no conflicts with PRC-026 (Relay Performance During Stable Power Swings)

SAR for Modification to PRC-024

Background

- IRPTF identifies use of Momentary Cessation (MC) in Solar PV as a primary contributor to Blue Cut Fire Event (8/2016) and Canyon 2 Fire Event (10/2017)
- California ISO submits two SARs to address risks and other identified issues with PRC-024-2
- Standards Committee rejected two California ISO SARs (9/2018)
- PC and OC leadership ask IRPTF to create Technical Report and SAR to address identified issues with PRC-024 (submitted Nov. 16, 2018)

Scope

- The standard is often interpreted and applied as a “ride-through standard”, whereas it is fundamentally intended and approved to be a voltage and frequency protective settings standard.
- The region outside the “No-Trip” zone of the PRC-024-2 curves should be clearly marked as a “May-Trip” zone so it is not interpreted as a “Must-Trip” zone. The preferred behavior is for the generators to remain connected and producing current during disturbances to the greatest extent possible.
- There is inconsistency between the Curve Data Point tables and the Off Nominal Frequency Capability Curves as the table identifies “instantaneous” trip points while the time axis of the curve starts at 100 ms.
- There is confusion in point #5 of the Curve Details section of the Voltage Ride-Through Curve Clarifications section regarding crest and RMS voltage relationship. There is also confusion regarding why the high voltage curve uses phase-to-phase voltage only but the low voltage curve uses phase-to-phase or phase-to-ground (this may be inconsistent with inverter-based resource protection practices). There is also confusion on the use of instantaneous tripping, particularly since inverter protection may be much faster than conventional relaying, which perform filtering on the incoming waveform.
- There is confusion regarding the inclusion of the four second cumulative timer functionality, as well as when the timer starts, stops, and resets.
- There is confusion regarding footnote 1 and the applicability of inverter protective functions within the inverter control systems.
- There is confusion as to the use of momentary cessation within the “No Trip” zone of PRC-024-2.

NERC IRPTF and NERC SPCS

Having close coordination between NERC IRPTF (our inverter-centric folks) and NERC SPCS (protection-centric folks), which is turning out to be a fruitful exercise. Close coordination with PSRC, IEEE PES, NAGF, CIGRE, etc., and the linkage between these entities is essential for success. May be worth noting the p2800 effort, and how that some of these protection-related activities need to land in p2800. Encourage participation on relevant topics, and have folk’s interested reach out to Bob.

NERC/DOE

NERC and DOE are working together to have the National Labs, in cooperation with industry representatives, perform studies and create a report on the impact reduced levels of negative sequence current may have on the electrical system. This would include impacts to phase voltages during unbalanced faults on the system.

I. PSCC Committee Report: Craig Preuss

The PSCCC would like to announce our biannual rotation of officers has occurred. Thanks to Mike Dood whose leadership has helped the PSCCC get off the ground to a great start. Ken Fodero is the new Chair, Craig Preuss is the new Vice Chair, and our new Secretary is James Formea.

New study groups of potential interest to the PSRCC that are kicking off at the May 2019 meeting includes:

- P13, 61850 for beginners. This work will focus on explaining the 61850 standard from a protocol and architecture perspective to people who have little to no knowledge of it. Contact Antonio Riccardo the chair or any PSCCC officer for more information.
- P14, Review of C37.236, IEEE Guide for Power System Protective Relay Application Over Digital Communication Channels, to see if revision or withdrawal is warranted. Contact Tom Dahlin the chair or any PSCCC officer for more information.
- P15, DNP3 profile for DER communications, 1815.2, which would take the DER profile that already exists and turn it into a standard. Contact Eric Thibodeau or any PSCCC officer for more information.
- S12, Virtual IED cyber security requirements. Contact the officers Marc Lacroix or Bill Dickerson or any PSCCC officer for more information.

The PSCCC Cybersecurity Subcommittee (S0) is looking for the attendees of the main committee meeting to engage their IT organization, or whomever is responsible for cybersecurity, to participate in S0 work. Contact Steve Kunsman the S0 chair for more information.

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 14, 2019 in Garden Grove, CA with 5 members. The September 2018 meeting minutes were discussed and approved.

The following items were discussed during this meeting:

1. The WG welcomed two new members, Adi Mulawarman representing the K SC and Jim Niemira representing the I SC.
2. IEEE & PES Individual Awards
 - 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. Review of New Assignments and Deadlines
3. Review of IEEE Nomination process & available tools including:
 - a. Instructions on Submitting an IEEE/PES Nomination
 - b. IEEE Awards: Preparing a Successful Nomination
 - c. IEEE PES Reference Manual for Preparing Effective Nomination

4. New Sponsor Recognition Award – The group discussed and selected the name for this new annual recognition. The purpose of this award is to recognize the long-term support and encouragement given by utilities to their employees to participate in our Committee. A new nomination form will be posted on the PSRC website to allow any PSRC member to nominate their employer with a deadline to submit nominations set to September 1st. This award will be presented every January to one or two utilities per year
5. Increased membership – The WG would like to increase membership in the group to be able to expand our reach pursuing nominations for IEEE and PES awards. The motion was made and approved by the PSRC Chair and officers during the ADCOM meeting. Starting our May 2019 meeting the B1 WG will include all Outgoing SC Chairs who will be invited to serve as members for one, two or more years as their schedule allows it. Also, an invitation was made to any PSRC officer to join our WG and help us identify and recognize fellow PSRC members.
6. The following awards were announced or issued on Thursday January 17, 2018 during the PSRC Main Committee Meeting

Award and Recognition Announcements

2019 IEEE Fellows:

The class of 2019 newly elevated IEEE Fellows includes 3 PSRC participants.

- Jonathan Sykes: For leadership in the application and management of reliable protection systems for electric power networks
- Prof. Paul Lee: For contributions to power distribution protection and automation
- Prof. Bao-hui Zhang: For contributions to power system transient stability prediction

Most Downloaded Technical Report in the IEEE PES Resource Center

PES-TR68 – Impact of Inverter Based Generation on Bulk Power System Dynamics and Short Circuit Performance:

This Technical Report was a collaboration between IEEE/PSRC and NERC.

It has the highest download count ever from the IEEE Resource Center.

PSRC Contribution by CTF34.

- Kevin Jones (Chair)
- Gary Kobet (Vice Chair)

Outgoing SC Chair Awards

- Eric Allen H-SC
- Mike Reichard J-SC
- Don Lukach K-SC

Distinguished Service Award – Outgoing Standards Coordinator

- Adi Mulawarman

Distinguished Service Award - Outgoing Committee Chair

- Pratap Mysore
PSRC Chair 2016-2018

2018 PSRC Prize Paper Award

Paper Title: Impact of Power-Electronic Sources on Transmission Line Ground Fault Protection

- Mukesh Nagpal
- Charles Henville

2018 PSRC Outstanding Technical Report

C20 - Impact of Voltage Source Converter (VSC) Based HVDC Transmission on AC System Protection

- Joe Mooney (Chair)
- Ian Tualla (Vice Chair)

WG Members:

P. Beaumont	K. Houser	S. Subramanian
W. Brown	B. Johnson	C. Vo
S. Chan	H. Kirkham	S. Ward
A. Deronja	T. Manna	J. Wilson
N. Fischer	P. McLaren	A. Zamani
R. Hedding	R. Midence	P. Zinck
M. Hilaly	S. Samineni	

2018 PSRC Outstanding Standard or Guide

I29 - C37.110 Revision of C37.110 Guide for Application of Current Transformers for Protective Relaying Purposes

- Joseph Valenzuela (Chair)
- Michael Higginson (Vice Chair)

WG Members:

Alla Deronja	Guillermo Weyer	Ron Pate
Jim Niemira	John Lane	Jalal Gohari
Jackie Wilson	Jeff Long	Will Knapek

2018 Sponsor Recognition Award

MidAmerican Energy Company

This award was accepted on behalf of MidAmerican by:

Brian Harris
General Manager of Delivery
MidAmerican Energy Company

MidAmerican Employees who attend our PSRC meetings

Gary Stoedter	Steve Klecker	Doug Thomer
Luke Erichsen	Ben Malcolm	Jeff Hart
Brandon Janssen	Mark Ziegler	

Request for Nominations

IEEE PES & PSRC Young Professional Award

- Recognizes the technical and PES leadership contributions of younger members of PES.
- PES Young Professionals are PES members who will be 35 years of age or younger on July 31 of the year in which the award is given (7/31/2020).
- The Nominee must be a member of the IEEE Power & Energy Society.
- Each Technical Committee is allowed one nomination per year, per committee.
- Nomination deadline is December 1
- Deadline to submit your name to the B1 Chair will be September 1

B. B3: Membership Working Group

Chair: Mal Swanson

Attendance during the Garden Grove meeting was 247, which is near the top attendance mark for us. We all were rewarded with 4 days of rain.

18 new attendees were in our Newcomers Orientation meeting on Tuesday. Cathy Dalton sent a pre-meeting welcoming email and a follow up to each newcomer for first impressions.

No management support letters were drafted. 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

No report.

D. B5: Publicity Working Group

Chair: Cathy Dalton

Vice Chair: Mal Swanson

IEEE PES PSRC committee flyer was distributed at the annual PES General meeting in July 2018; following precedent, we will update it for distribution at the August 2019 General meeting in Atlanta.

PACWorld Updates have been provided regularly to Alex Apostolov. Cathy Dalton requested subcommittee input after each committee meeting in January, May and September, so as to provide this input to the magazine. She also requested that each subcommittee chairperson provide her with key accomplishments from each of their subcommittees—after each meeting—so this information can be shared in the magazine’s IEEE PSRC Update.

A “Spotlight” article which focuses on PSRC was developed and shared with Angelique, who then left her role at IEEE. So, it has not yet been included in the IEEE newsletter, as it had planned to be in the December 2018 issue. Cathy was in touch with Dan Toland and called him to determine status. Shana Pepin has since been in touch and is our new contact point. Cathy will work with Shana on this article.

Webcasts will be scheduled as each subcommittee chair advises Cathy regarding the topic and timing. We will work with IEEE to schedule these webcasts for the broader IEEE audience.

PSRC has a new APP, in addition to its updated website. The B5 committee (Cathy Dalton and Malcolm Swanson) would like to thank Russ Patterson and Rick Gamble for all the time and effort they have each put into improving our website and creating this amazing APP for our meetings. The APP will be used for May and September meetings, and not the IEEE JTCM combined meeting.

E. B8: Long Range Planning Working Group

Chair: Pratap Mysore

No report.

F. B9: Web Site Working Group

Chair: Rick Gamble

No report.

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

The chair of the I subcommittee, Brian Mugalian made a motion to revise the PAR for 1613, to change the title, scope, purpose, sponsorship contingent upon Substation Committee C0 approving moving the project to PSRC and PSCC. The motion was seconded by Ken Fodero. The details of the motion are included in the minutes from the I subcommittee. The motion was approved by the committee.

Approved PAR Title: IEEE Standard for Environmental and Testing Requirements for Intelligent Electronic Devices (IEDs) Installed in Transmission and Distribution Facilities.

Proposed PAR Title: IEEE Standard for Environmental and Testing Requirements for Devices with Communications Functions in Electric Transmission and Distribution Facilities.

Proposed PAR Scope: This standard specifies ratings and service conditions, environmental performance and testing requirements for devices with communications functions installed in electric transmission and distribution facilities. Environmental and electromagnetic compatibility (EMC) immunity levels and type-tests simulating electric transmission and distribution facilities are described. Acceptance criteria for evaluating device functionality are provided.

Devices performing strictly protective relaying functions covered by the IEEE C37.90 family of standards are not covered by this standard. Where a device includes communication functions that support both protective relaying and non-protection functions, the most rigorous standard shall apply.

Proposed PAR Purpose: The purpose of this standard is to define the environmental and EMC conditions present in electric power transmission or distribution facilities and to establish a common reproducible basis for designing and evaluating devices to be installed in those locations.

Proposed PAR Sponsorship: PSRC and PSCC Committees

VIII. Subcommittee Reports

C: System Protection Subcommittee

Chair: Gene Henneberg

Vice Chair: Fred Friend

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 PSRCC met on January 16, 2019 in Garden Grove, CA. The participants introduced themselves, a quorum was achieved (42 of 59 members and 39 guests), and the September 2018 minutes were unanimously approved.

Advisory Committee and other Items of Interest

- WG Chairs required to post agenda at least two weeks prior to the meeting.
- WG chairs and vice chairs please note the newest P&P Manual (provided a couple of weeks ago). Organization should include chair, vice chair and secretary—vice chair and secretary may be the same person. Share the terms of WG membership. Should lead to fewer quorum issues.
- A custom web page is available for each WG, if the Chair wishes to use it. Contact Rick Gamble, webmaster@pes-psrc.org
- WG meeting minutes due to Fred and Gene by this Friday, January 18. **Please include your most up to date member list.**
- WGs that complete their work are encouraged to present it to the IEEE community through WEBEX. Contact PSRCC officers or Cathy Dalton (Publicity Chair) for further information.
- The new IEEE privacy policy to comply with the European Union requirements were implemented on May 25, 2018. Attendance sheets can only be pre-printed with names and affiliations, no email

addresses. In order to continue to receive correspondence, the policy must be accepted using the following url: <https://engagestandards.ieee.org/IEEE-SA-Privacy-Policy-Acceptance.html>

C-19 WG PC37.247, “Standard for Phasor Data Concentrators (PDC) for Power Systems” has been approved through the IEEE SA balloting process and is undergoing final SA editing.

C-30 Working Group on Microgrid Protection has successfully balloted their report through the C subcommittee. This work will feed into the recently formed C-38 WG which is developing this subject into Standard P2030.12 Guide for the Design of Microgrid Protection Systems.

The work of several WGs is being used in the initial development of the new P2800 Standard for Interconnection and Interoperability of Inverter-Based Resources Interconnecting with Associated Transmission Electric Power Systems and P2800.1 Guide for Test and Verification Procedures for Inverter-Based Resources Interconnecting with Associated Transmission Electric Power Systems. These efforts are being coordinated through the new B-10 WG, with members limited to the chairs and vice chairs of the involved WGs.

Old Business

A brief review of the recent joint work with NERC work of CTF-34 and the ongoing work for which C24, C25, C32, D29, D38, D41, and J-18 are expected to make significant contributions regarding Inverter Based Generation to the new P2800 and P2800.1 standards.

New Business

No new business

General Discussion

There was a brief discussion whether there is any appetite within PSRCC to extend the traditional Tuesday 8 am through Thursday noon meeting time frame. This issue was also raised at Ad Com, but no conclusion has been reached.

Working Group Reports

C-19: Standard for Phasor Data Concentrators for Power Systems

Chair: Vasudev Gharpure

Secretary: Mital Kanabar

Output: IEEE Guide C37.247

Draft: 2.46

Established: September 2011

Expected Completion Date: May 2019

Scope:

Develop a standard for Phasor Data Concentrators for power systems.

The C-19 WG did not meet at Garden Grove.

The proposed C37.247, “Standard for Phasor Data Concentrators (PDC) for Power Systems” has been approved through the IEEE SA balloting process and is undergoing final SA editing.

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

Chair: Yi Hu

Secretary: Gene Henneberg

Output: IEEE Guide C37.250

Output: IEEE Guide C37.250

Draft: 0.92

Established: September 2013

Completion: December 2020

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

Working group C21 met on Wednesday, January 16, 2019 in Garden Grove, CA in single session chaired by Yi Hu and Gene Henneberg with 6 members and 3 guests attending. Each attendee introduced themselves and described their affiliation.

Yi Hu presented the IEEE patent slides. No attendee indicated any knowledge of any patents critical to implementation of the proposed PC37.250 Guide.

The proposed agenda was approved. A quorum was not achieved. The September 2018 minutes will be sent to WG's voting members for approval.

Yi Hu informed the attendees that PAR extension request for this work has been approved. The new completion date has been extended to December 2020.

Gene Henneberg provided an overview of the current status of the draft guide. The WG has been holding regular web meetings since the September 2018 meeting. As a result, the main editing work of the draft guide has been completed.

The rest of the meeting discussions were focused on required actions to be taken to address a few remaining areas of the draft guide, and the WG approval processes to be completed before the May 2019 PSRCC meeting, so that the WG will be able to request PSRCC main committee's approval to proceed to form the ballot group for the balloting guide. The followings are the discussed actions:

- Complete the following remaining edits of the draft guide by 02/08/2019
 - Incorporate Roger's edits and comments (Gene)
 - Finalize the references (Gene)
 - Divide existing references into two groups: One includes those that are referenced in the main body and one for those that are not referenced in the guide which will be labeled as "for further reading". The IEEE editing team will be consulted to see if the second group of references can be included for this guide.
 - Remove all remaining comments (Yi and Gene)
 - Redraw three figures (6, 7 and 8) using Visio – Dean
- Complete the WG vote to approve the guide to be forwarded to PSRCC main committee by 03/08/2019
 - Start the WG vote on 02/08/2019 (Yi)
 - Votes due back before or by 02/22/2019 (All active WG members)
 - All vote comments addressed by 03/08/2019 (Yi and Gene)
- Complete editing by IEEE SA editing team by 04/05/2019
 - Request IEEE SA editing team support on 02/08/2019 (Yi and Gene)
 - Confirm the team will be available to work on this guide once the WG vote and comments resolution process is completed before or by 03/01/2019 (Yi and Gene)
 - Send the draft guide to IEEE SA editing team by 03/08/2019 (Yi and Gene)
- Complete addressing all comments from IEEE SA editing team by 04/19/2019 (Yi and Gene)
- The WG will then ask for permission to form a Ballot Body at the May 2019 PSRCC Main Committee meeting.

Meeting minutes by Gene Henneberg and Yi Hu 01/17/2019.

C-23: Coordination of Synchrophasor Related Activities

Chair: Mahendra Patel

Vice Chair: Allen Goldstein

Output: Ongoing Liaison

Draft: N/A

Completion: Ongoing

Assignment: The ongoing task force 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.

Attendance: 12 (10 Members and 2 Guests)

Introductions

Discussed status of various IEEE and NASPI activities:

Status of IEEE projects:

- PDC Standard
- Synchrophasor Standard (IEC/IEEE 60255.118.1)
- STTP
- ICAP Synchrophasor Performance TSS – Needs completed for the new Standard
- C28 – Revision of C37.242 Guide for Synchronization, Installation, Calibration & Testing of PMUs
 - WIP, meet over WebEx every 2 weeks
- H40 – Recommended practices for Databases?
- HTF 48 – Education/Outreach for Synchrophasor Measurements
 - Plan to develop Webinars for Different Audiences – looking into media/Web sites etc. options
 - Also plan to have Outline put together by next meeting – TF now, WG by Sept. 2019?
- C37.237 – Time Tagging of measurements (sample value data)
- HTF-50 - Timing Sources for protection & Control - will be WG soon

NASPI Activities:

- Next meeting in San Diego - April
- NASPI is looking to expand to other time synchronized data
- NASPI Distribution Task Team?
- NASPI - Synchrophasor performance under fault conditions whitepaper in progress.

- NASPI paper on data mining applications for archived synchrophasor data is being reviewed by the NASPI leadership team

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

Chair: Sukumar Brahma (Clemson University)

Vice Chair: Evangelos Farantatos (EPRI)

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.

In the absence of the chair (Sukumar Brahma), vice-chair (Evangelos Farantatos) ran the meeting. The meeting started with introductions, and then the May 2018 minutes were approved.

The meeting started with introductions, and then the September 2018 minutes were approved.

First a discussion on the title of the report took place. Based on a comment from the previous meeting, one thought was to replace “Wind Turbine Generators” with “Inverter Based Resources” in the title so that the report covers also solar PV, batteries and other technologies. The opinions within the attendees were mixed. The argument of those that supported the change was that the model applies for these devices also. The argument of those that didn’t agree with the change, was that we would need data from solar and battery inverter manufacturers to justify the validity of the model, which would require engagement with more manufacturers and would delay the publication of the report. After the discussion there was a motion to change the report title, which was not carried. So the title of the report will not change.

Next, the status of the report was described to the attendees, as follows:

With respect to member contributions, all have been received. Sherman Chan (ASPEN) did some revisions in his contribution. The contribution from Electrocon was received a few days before the meeting. It was reviewed by Sukumar and Evangelos and it was discussed that the writing style is not meeting the expectations for the report. So Evangelos will update this section by January 31st and will have it reviewed by Electrocon.

With respect to manufacturer-data, a) Dean Miller contacted Vestas again, and they indicated that they plan to send updated data based on new simulations, b) Siemens-Gamesa was approached and they provided data for Type IV WTG. They are working to provide also data for Type III WTG, and c) Ratan Das (GE) will pursue again data for GE Type III WTG.

In general, it was agreed that the WG has collected enough data to justify the recommended models. If more data is collected by the submission of the report, it will be included, otherwise the report will be published without additional data that are now pending.

Then a technical discussion on the Type III WTG model followed. Evangelos will work with Sherman to run simulations and do some further testing.

Reviewers for the report have been identified. The report will be sent to them by February 1st. Their review is expected by March 1st. Then the report will be sent to all members and guests for final review before the May 2019 meeting.

There were total 36 attendees in the meeting, 8 members and 28 guests.

C25: Protection of Wind Electric Plants_

Chair: Martin Best
Vice Chair: Keith Houser

Assignment:

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

Working Group C25 met in Garden Grove, CA in a single session on Tuesday January 15, 2019. Charles Henville chaired the meeting and Jim van de Ligt took notes in the absence of the Chair and Vice Chair. There were 10 members and 15 guests present. After introductions, the agenda and minutes of the September 11, 2018 meeting were approved.

The group started reviewing sub-clause 3.1.1.1. There were several items of discussion. Charles Henville revised the document (minor revisions only) as the discussions proceeded. An update of the document showing the revisions will be sent to the Chairman.

The following tasks which need to be done were identified:

- Replace the term GSU where appropriate. - The term GSU was used in the document to represent the unit step up transformer as well as the substation step up transformer. It was agreed that the term GSU will be reserved for WTG unit step up transformers and not for the substation step up transformers. It was noted that the term GSU is also used inside some of the figures, and these may also need to be revised in some cases. Charles Henville will do this.
- Jason Buneo volunteered to review the negative sequence coordination in detail and the associated wording.
- There was significant discussion on changes to sub-clause 3.1.1.2. Three people are to review the direction of the currents in sub-clause 3.1.1.2, the reference paper [22] and Appendix A – Fig A1 in particular and the associated text. Concern had been expressed that the text is not clear and also the possibility that some of the contents in [22] are not correct. The volunteers are: Dean Miller, Charles Henville and Jim van de Ligt. These tasks are to be completed by March 31st, 2019.
- Post meeting note. Frank Gotte agreed to do an editorial review on the document to try to unify the style.
- Jason Buneo and Frank Gotte were welcomed into the working group.

C26: Revision to C37.233, Power System Protection Testing Guide

Chair: D. Ware

Secretary: M. Black

Scope: Revise C37.233 Power System Protection Testing Guide

The C26 working group met on Tuesday, January 15, 2019 with 14 members, 4 Guests, 1 new member, and 1 member corresponding by phone.

When attendance was taken at the beginning of the meeting quorum was not satisfied; therefore, minutes from the September meeting were not voted on for approval. We plan to have an email correspondence to satisfy this issue.

Don discussed status of current draft 2.20 and it has been acknowledged that we have not been meeting as intended using web meeting capabilities since the September meeting and are significantly behind schedule.

Matt discussed our scheduling issues with the Standards coordinator – Don Lukach. A decision will be made following the May Meeting for whether or not to submit an extension. For the record the PAR for the guide is presently scheduled to expire 12/31/19. If an extension is requested the guide will go into an inactive status until it is completed.

Tony Seegers' has implemented work to include Nina Selak's suggestions as pertains to cohesion and flow of the guide. Some more work needed to address contents listed in her original comments. This will be a focus of one of our upcoming online meetings.

Action items:

1. Mark Siira to address annex work.
2. From outside meeting conversation Mike Bloder to share "lessons learned event".
3. Don to edit writing on taking "in-service" load readings, and to add metered information from microprocessor relays by reading and saving HMI information on phasors, etc.
4. Scott Cooper to address end-to-end testing with mismatched test sets in order to correct timing issues.
5. Eugenio Carvalheira to finish review of IEC-61850 and then Alex Apostolov to do final review.
6. Matt to assist in cleanup of section number discrepancy. The Table of Contents is largely still intact, should optimize the clean-up of MS Word's auto-formatting.
7. There are many unaddressed comments that need to be accepted / rejected prior to WG/SC approval of the guide. Aggressive use of Web Meetings will be used to try to make-up time.

The version of the Guide C37.233 is ver. 2.22 as of Jan. 15, 2019. Our next meeting will need a single session with a pc/projector and room for 40. We please request conflict avoidance with K16, C31, I2, 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: 20190115
Established: September 2015
Completion: November 2019

Scope:

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.

1. **Introductions of officers, members, circulation of attendance list.**
There were 8 members and guests present for the meeting. The list is appended. Harold Kirkham, vice-chair, acted as chair for the meeting.

The IEEE patent statements were noted.

2. **Review and approval of minutes of previous meeting:**
The minutes from the last meeting were not voted on, there being no quorum present.
3. **Document review and Edit**

The meeting chairman noted that many changes had now been reviewed and accepted in the main body of the document, and we were now working on the Annexes, where much work had already been done.

In particular, the topic for the meeting was the new Annex B. Some numerical values for parameters applicable to some instrumentation transformers had appeared in diagrams and were used as a basis for some calculations, and seemed to be incorrect. The origin of the models was not certain, but was likely some work by a student of Sakis Meopoulos that had been adapted by NASPI.

After some discussion of the values, several members of the meeting agreed to attempt to find support for them (or to refute them).

4. New Business

There was no new business.

5. Adjourn

The chairman adjourned the meeting early, shortly before noon.

Next meeting requirements: Single session, a room for 30 people and a PC projector with HDMI connector. Do not conflict with other synchrophasor related activities C19, C23, and C28.

C29: Power System Testing Methods for Power Swing Blocking and Out of Step Tripping

Chair: Heather Malson

Vice Chair: Mike Kockott

ASSIGNMENT:

Create a report on test instructions/parameters to accompany the PSRC documents Application of Out-Of-Step Protection Schemes for Generators, and Tutorial on Setting Impedance Based Power Swing Blocking and Out of Step Tripping Functions 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.

OVERVIEW:

ATTENDANCE

18 Total with 9 Members and 9 Guests.

GENERAL ITEMS:

WG C29 met in single session on January 16, 2019, in Garden Grove, CA with 9 members and 9 guests. Mike Kockott participated as WG Chair due to Heather Malson not being able to attend. Kevin Jones participated as Vice Chair. After introductions, it was announced that Kevin Jones agreed to become the Chair of C29 effective September, 2019, due to current Chair, Heather Malson, needing to take a sabbatical from PSRC attendance. Mike Kockott will remain Vice Chair.

Next, Mike led a discussion on the latest document and writing assignments. It was requested that fresh versions of the current C29 draft document, the J5 report (draft 6) and J5 testing section be provided by Mike to C29 membership by

the end of January, 2019. Kevin Jones will provide the current copy of the D29 tutorial to C29 membership by the end of

January, 2019. Kevin agreed to convert the fresh C29 version provided by Mike into the new PES template. Once

converted, Kevin will send to C29 membership by February 15, 2019.

The following writing assignments were given a new deadline of April 5, 2019:

· Old II (new III) Test Equipment and Environment: Rob Fowler, Benton Vandiver, Eugenio Carvalheira, Mohit

Sharma (Lead), Jun Verzosa.

· Old III (new II) Types of Tests: Rob Fowler (Lead), Jun Verzosa, Jim van de Ligt, Mohit Sharma, Benton Vandiver.

Ratan Das committed to completing the Transient portion of section V (c) (Test Data Formats and Creation) by April 30, 2019.

Once assignments are completed, Mike will compile them into the C29 document and will distribute to membership by

April 19, 2019, to be ready for review at the May, 2019, PSRC meeting.

REQUIREMENTS FOR NEXT MEETING:

For the next meeting, C29 will need a single session room for 30 and an overhead projector.

C30 Microgrid Protection Systems

Chair: Michael Higginson

Vice Chair: Fred Friend

Output: PSRC Report

Draft: 7.0

Expected Completion Date: May 2019

Assignment

Prepare a report that will investigate and assess techniques, approaches, and potential solutions to the challenges of microgrid protection.

The working group meeting was conducted on Tuesday morning at 11:00 AM with 43 attendees, including 15 members and 28 guests.

The Chair opened the meeting with introductions. The minutes for the September meeting were reviewed and no corrections were noted. Mani Venkata motioned for approval, seconded by Ratan Das and unanimously approved.

The chair reported the results from WG ballot. We obtained over 80% approval with plans to finalize and submit to the C subcommittee leadership prior to the May 2019 PSRCC meeting. He then provided an overview of the report.

A few of the latest comments were discussed:

- 1 Clause 1.3.1: Proposed to add rate of change of voltage (should be in Clause 2.3.2). Wayne will send in applicable references. Wayne Hartmann motioned to add, Vahid Madani seconded with unanimous approval.
- 2 Clause 1.4: Should travelling wave be removed? Doesn't seem to be viable considering short distances in many microgrids. Members believe it should be left because there has been some research in this area. Ratan Das motioned to keep as written, second by Sukumar Brahma with member approval (1 nay and 1 abstention).
- 3 Clause 1.3.1: Discussion to add ROCOF (81R) for real power balance protection. Members agreed it was not necessary to add.
- 4 Other comments were generally editorial.

Next steps: The chair will incorporate these items by the end of January, and then submit for subcommittee review.

Ratan Das motioned to submit to the Subcommittee for review and approval, seconded by Wayne Hartmann with unanimous approval.

Mark Siira will provide reference for P2030.9, a new entity mode document on microgrid design. This reference will be reviewed by C30.

Mani Venkata invited attendees to become members of the C38 working group meeting this afternoon, where this work can be developed into a Guide for the Design of Microgrid Protection Systems (P2030.12).

There was no new business and the meeting was adjourned.

Next meeting: Computer projector and room for 20 attendees. Please avoid conflict with I2, I29, C32, and C38 (conduct C30 prior to C38).

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)

Established: September 2017

Output: Guide C37.120

Expected Completion Date: December 2021

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 15, 2019, in a single session with 13 voting members, 6 non-voting members, and 25 non-members attending. 2 non-members became new members by taking on assignments. The quorum was not met so the September 2018 meeting minutes will be approved via email.

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

The chair reviewed the status of all assignments made at the previous WG meetings and the WG reviewed the received contributions.

There was a discussion on redundancy for communication channels, typical for line protection. Two independent channels should be considered redundant because they cover a failed channel or maintenance scenario. At the same time, one or both channels can be over two communication media (in-service and hot stand-by) if the communication infrastructure allows. It goes beyond basic redundancy but may be used by electric utilities.

There was a comment that different electric power systems may need a different level of redundancy such as extra high-voltage vs. high-voltage systems and a different redundancy philosophy may be needed for each. The guide appears to be dealing with this issue.

There was a question whether we should use term of Bulk Electric System (BES) that is applied in North America for the systems 100kV and above. It may not be widely used in other regions in the world. We will work on using a more generic term; one option is to use terms transmission, sub-transmission, and distribution systems, instead. Alexis Mezco will revise sub-clause 4.4 *Industry practices* that specifically introduces BES.

There was a question from Alla whether we should discuss different types of redundancy: parallel redundancy for dependability and series redundancy for security. We do discuss parallel redundancy but not security and thought to add this discussion tentatively to sub-clause 4.2 *Influence of redundancy on a voting scheme*.

Action items:

1. **Alla Deronja** will incorporate in the next guide's draft version Gary Stoedter's review comment for Clause 4 *General Considerations*.
2. **Derrick Haas** is to review Clause 4 *General Considerations*. (outstanding)
3. **Paul Thompson** is to review Clause 6 *Redundancy Applications Considerations*. (outstanding)
4. **Alla Deronja** is to review Robert Frye's contribution to sub-clause 4.5 Basic principles of relay redundancy.

5. **Solveig Ward and Joerg Blumschein** will review the new material incorporated in sub-clause 5.9 *Timing system redundancy*.
6. **Tony Bell** to investigate the available power line carrier technical documentation and correct Figure 12 Two PLC channels, coupled together via phase to phase. (outstanding)
7. **Roy Moxley and Solveig Ward** are to add control application section to clause 6 if affecting protection. (outstanding)
8. **Charlie Henville** will review sub-clause 5.11 *Redundancy simplicity considerations* and recommend its final placement. The WG thought that it should be in Clause 4.
9. **Mark Schroeder and Jim O'Brien** will write sub-clause 6.6 *Capacitor bank protection*.
10. **Phil Beaumont** will review sub-clause 6.9 *SIPS redundancy considerations*.
11. **Alla Deronja** will check if the topic of crossover/mixed-use SIPS/primary protection/automation is covered in new SIPS guide C37.250 IEEE Guide for engineering, implementation and management of SIPS.
12. **Alexis Mezco** will review and revise sub-clause 4.4 *Industry practices* that specifically to replace term BES.
13. **Angelo Tempone and Alla Deronja** will integrate the clause 6.0 *Redundancy application considerations* introductory material to clause 4 Review Clause 4 *General Considerations*.
14. **Solveig Ward** will edit sub-clauses 4.1 *Definition of redundancy* and 4.2 *Influence of redundancy on reliability*.

All the outstanding and new assignments are due to the Chair by **February 28, 2019**. Please email them to sward@quanta-technology and aderonja@atcllc.com.

The WG will conduct bi-weekly, initially every second Thursday, webex meetings in March to review and edit the guide. A series of meeting invitations will be sent shortly.

For next meeting, the WG needs a room for 50 people, single session. Please avoid conflicts with I2, K22, and C35.

C32: Protection Challenges and Practices for interconnecting solar or other inverter based generation to utility transmission systems

Chair: Mukesh Nagpal

Vice Chair: Mike Jensen

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

Working Group C32 met with 26 members and 45 guests present. The following items were discussed:

1. Mukesh started the meeting with a welcome and attendee introductions. He indicated that some people (highlighted) need to correct email addresses, and some (with red arrows) have requested membership but have not contributed or attended enough meetings.
2. Michael Higginson motioned to approve. Jim van de Ligt seconded motion. Working group approved minutes from last meeting.
3. The planned presentation for this meeting is not possible because the presenter is unavailable.
4. Mukesh requested volunteers to review document and edit for flow, identify gaps. Alla Deronja, Jim van de Ligt, Sukumar Brahma, Abu Bapary, and Randy Cunico volunteered to help with this effort.

5. Mukesh requested one volunteer to review references and prepare the bibliography section by the end of January. Hillmon Ladner Garcia volunteered to prepare this.
6. Charlie Henville indicated that we should not have a recommendations section because this is not a standards document. The working group decided to rename this section to "Findings and Conclusions".
7. Mukesh requested Evangelos Farantatos and Krish Narendra contribute their Findings and Conclusions from the sections they had previously contributed to the report. This assignment is due at the end of January.
8. Alex Apostolov had a technical comment on accelerated transmission system protection. The working group decided that Alex should review the document and prepare a technical comment with supporting material. This contribution is due by the end of January.
9. Duane will revise and align anti-islanding section with new NERC guidelines and send back to chair by 30 January, 2019.
10. A comment arose on the role of Type 3 wind turbines, which perform differently than full-converter machines. Bob Cummings volunteered prepare text to explain IBR, considering Type 3 wind turbines, full-converter, and partial converter machines by the end of January.
11. The plan is to send the report out by February 15 to the volunteers who accepted to review. Between February 15 and March 15, the above designated reviewers plan to review the report and provide feedback. If there are no contentious comments, Mukesh plans to incorporate the comments send the draft report for ballot by the working group by April 8. Ballots will be due prior to the May PSRCC meeting.
12. The working group reviewed the open assignments and due dates.
13. With the remaining time, the working group reviewed the report.

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

Web Teleconference and in-person (Pittsburgh, PA, USA)

11 September 2018, 9:30-10:45 EST

Chair: Michael "Mischa" Steurer
Vice Chair: George Lauss
PSRC Chair: Dean Ouellette
PSRC Vice-Chair: Sakis Meliopoulos
PSRC Secretary: Arron Findley

P2004 Scope: This recommended practice provides **established practices** for the use of the method of **Hardware-in-the-Loop (HIL) Simulation based Testing** of Electric **Power Apparatus** and **Controls**. It is intended to be **generically applicable** in synergy (in conjunction) with any specific testing standard (if applicable).

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

WG C33 of the PSRC met on January 16, 2019 in Garden Grove, CA. There were 6 members and 3 guests attending. Specific requests from WG-P2004 chapter leads regarding protection testing

requirements and procedures for Control and Power Hardware In-The Loop Testing were reviewed and writing assignments were made.

Aaron Findley agrees to become secretary

Agenda reviewed by Dean

IEEE SA requirements and WG member details:

CH 5, relay testing –

Sakis noted that modeling requirements would be different for different relay types. Sakis agreed to develop these categories.

Terminologies and definitions request from P2004 was discussed; Dean will request clarification from P2004 on what they need there.

CH6, Dinesh will help with writing assignments. Mahendra: discussion about amplifier issues and the lag introduced

Ch7, execution of simulation

Aaron to write up execution steps on CHIL testing

Sakis and Dean to reach out to Benjamin Kolpasky from ENREL (spelling?) for someone with PHIL experience.

Mahendra asked if we should add corruption of data discussion and how to include that into the model. Use model to find limit to control system tolerances. External devices can be used to introduce error without adding complexity to the model. Checking latency and communication tolerances, noise tolerances etc. would be useful in specifying equipment.

Dean will write of something for terms, definitions, and abbreviated terms.

CTF34 – Inverter-Based Short Circuit Current Impacts

Chairman: Kevin W. Jones

Vice Chair: Gary Kobet

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.

OVERVIEW:

ATTENDANCE

37 Total with 7 members and 30 Guests.

GENERAL ITEMS

WG CTF34 met in single session on January 16, 2019 in Garden Grove CA with 7 members and 30 guests.

Introductions were made.

The minutes from the September 12, 2018 meeting in Minneapolis were reviewed and approved.

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

- C24 Modification of Commercial Fault Calculation Programs with Wind Turbine Generators - Evangelos Farantatos: Still working with vendors on models, Type III models being simulated. Report almost complete, a section to be revised by next meeting.
- C25 Protection of Wind Electric Plants – Mohammad Zadeh: Report nearly ready.

- C32 Impact of Inverter Based Resources on Utility Transmission System Protection - Michael Higginson: Report nearly complete, WG balloting by May meeting, then to C subcommittee ballot. Working group was told the report should not make recommendations because it is only a report, not an IEEE Guide/Recommended Practice/Standard. Bob Cummings/Ryan Quint of NERC requested performance specifications regarding what PSRC requires from IBR (how much/how quickly?); it is critical this is provided as input to IEEE P2800. Manish Patel notes even if we specify negative sequence characteristics, it likely still will not be enough relative to conventional generation. Manish Patel stated the answer to how quickly is probably 0.25 cycle; the answer to how much remains to be decided. Kevin Jones recommended collaboration between NERC/IEEE P2800/PSRC. Ratan Das noted they will need input from C24 as well. Ritwik Chowdhury noted C25 also has useful information. Manish Patel/Bob Cummings agree modeling should be a focus. It was noted that different schemes have different requirements (e.g., current differential, distance protection, different elements, etc). Need to work on both wind and solar. Manish Patel will be liaison between C32/C24/C25 (and likely D41) and P2800 and NERC.
- D29 Tutorial on Setting Impedance-Based Power Swing Blocking and Out-of-Step Tripping Functions on Transmission Lines - Kevin Jones: Model IBR in test system, run studies to compare 100% conventional with various penetrations of IBR, to determine performance of out of step protection, ready by May meeting.
- D38 Impact of High SIR on Distance Relaying - No representative present
- D41 Coordination of Activities Related to Line Protection Inverter-Based Sources - Iliia Voloh: The assignment of this new D working group is to "Monitor and collect line protection events, coordinate with other industry activities, and provide recommendations to improve protection response when connected to inverter-based sources". Iliia noted that CIGRE B5 WG is also investigating protection response to IBR. Evangelos Farantatos is Vice-chair.
- J18 Investigate the effect sub-synchronous oscillations due to inverter based resources (IBR) on rotating machinery protection and control- Ritwik Chowdhury: This is a new working group just starting work, with the output being a report to the J-SC. It is expected the working group assignment will cover at least the following topics:
 1. Describe the different types of SSO or SSR phenomena, what causes them and what effects these may have on the power system
 2. How to detect this conditions and what mitigation techniques can be applied
 3. Describe the consequential risks associated to the mitigation techniques
 4. How much inverter based resources (IBR) penetration is required before it becomes an issue ??? (this may be omitted from the scope)
 5. Impact on existing rotating machinery protection
 6. Engineering steps that can be taken to avoid the phenomenon to happen
- NERC - Bob Cummings/Manish Patel/Ryan Quint:
 - P2800/P2800.1 - just starting, aggressive completion targets, Jens Boehmer chairing P2800
 - Ryan noted NERC doesn't review or write standards - will need email from CTF34 to NERC SPCS. Work has already begun on the following two NERC standards with SARs being prepared:
 - PRC-019 Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection
 - PRC-024 Generator Frequency and Voltage Protective Relay Settings

C35: IEEE transactions paper development for C37.246 IEEE Guide for Protection Systems of Transmission-to-Generation Interconnections

Chair: Alla Deronja (aderonja@atcllc.com)
Vice Chair: Keith Houser (keith.houser@dom.com)
Output: Conference and IEEE transactions paper
Established: January 2018
Expected Completion Date: May 2019

Assignment:

Write a conference paper for C37.246 IEEE Guide for Protection Systems of Transmission-to-Generation Interconnections.

WG C35 met on Wednesday, January 16, 2019, in a single session with 6 members and 8 guests attending.

The Chair explained the WG assignment and distributed the final draft of the paper. It is complete, reviewed, and approved by Subcommittee C. Many good comments received from the Subcommittee C members were incorporated in the final paper draft.

The WG Chair submitted the paper abstract to 2019 relay conferences. It was accepted by Texas A&M and Georgia Tech. The WG chair will submit the paper to WPRC (mid-April of 2019) and MIPSYCOM (end of February of 2019).

The following WG members from C18 and C35 have volunteered to make presentations at the relay conferences:

Texas A&M – **Abu Bapary** or **Jim O'Brien** (not committed). Call for another volunteer!

Georgia Tech – **Manish Patel** (committed)

Western Protective – **Mike Jensen** (committed)

MIPSYCOM – **Alla Deronja** (not committed). Call for another volunteer!

The power point presentation is also complete so the WG spent the remaining meeting time to review the presentation. Many thanks to **Mike Jensen, Steve Klecker, Yuan Liao, Dean Miller, Abu Zahid,** and **Abu Bapary** for their participation in developing the PP presentation and **Jeff Barsch** for his insightful formatting comments.

At the meeting, we dry ran the PP presentation, and there were few additional comments. The WG chair will attempt to reduce the size of the presentation to about 24 slides, per the conference requirements.

The paper is ready to be presented at the PSRCC Main Committee meeting in May of 2019 in Cincinnati, OH.

Action items:

1. **Alla Deronja** is to distribute the Power Point presentation empty slides and the final draft of the paper to the PP presentation developers.
2. **Alla Deronja** is to submit the paper abstract to the two remaining protective relay conferences and submit the paper and the presentation to the Texas A&M and Georgia Tech.

We will not meet in May of 2019, but we request to not disband the WG yet to monitor the paper presentation at the conferences.

C36: IEEE Transaction Paper Development from C2 Report: Role of Protection Relaying in the Smart Grid

Chair: Roy Moxley

Vice Chair: R. Benjamin Kazimier

Established, Jan 2018

Output: IEEE Transaction Paper

Expected Completion Date: Sept 2019

Assignment: To develop an IEEE transactions paper based on the C2 report “Role of protective relays in the Smart Grid”

C-36 met on Tuesday in Valencia South Tower at 8:00am. There were 11 members and 4 guests present. Currently the group is working on draft 1.0. The group worked on combining the writing assignments from the individual members into the main document. Because the work was not completed by the end of the meeting, a web meeting will be hosted before the end of March. This will allow the working group to have a rough draft complete by the May meeting. This will keep the working on track to be completed by the Sept 2019 meeting.

Suggested conferences for the paper to be submitted for presentation:

Edison Electric Institute – Rob F.

Cigre – Grid of the future - ?

TDMM - ?

Relay conferences

IA/NE – Ben M.

Mipsycon – Ben K.

GA Tech - Taylor

Texas A&M – Rene M.

WPRC – Steve K.

Pac World – Taylor R.

APAP – Alex A.

DPSP – Alex A.

Writing Assignments –

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

Alex Apostolov - Create 150 word abstract for conference submissions.

Link to C2 paper:

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

C38: Guide for the Design of Microgrid Protection Systems

Chair: S. S. (Mani) Venkata

Secretary: Michael Higginson

Output: IEEE Guide, P2030.12

Draft: 0

Expected Completion Date: February, 2022

Scope

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

Purpose

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

January 15, 2018 Meeting Minutes

This is the second meeting of C38 as a working group.

C38 met on Tuesday, January 15, 2019 with 59 attendees, with 32 members and 27 guests. We met quorum.

The working group reviewed our minutes from the September meeting. Brian Boysen motioned to approve, and Mukesh Nagpal seconded. The working group voted unanimously to approve the minutes from the past meeting.

There was some concern over the “passive and active” statement in the PAR purpose. The working group agreed to clarify as needed in the draft document introduction.

Mani updated the working group that the PAR has been approved by NESCOM. We are having our kickoff meeting this Thursday and will have web meetings.

There is confusion on what the overlap between what C38 and P2030.12 is. Mani indicated that going forward, there is only one group. We will discuss working group meeting schedule on Thursday. There was extensive discussion among the working group on what is the relationship between C38 and P2030.12.

Murty Yalla indicated that in the future this should be fit into the PSRCC schedule, and finish before the main committee meeting on Thursday. There will only be one meeting (single or double slot) in future meetings. The four-hour time slot was requested for the kickoff meeting only.

Mani agreed to re-send the P2030.12 agenda prior to the meeting on Thursday.

Murty asked what the expected completion is. Based on completion of 2030.7 and 2030.8, we are estimating this will take 2-3 years.

Considering the time available, Ratan requested that we share the draft table of contents. Mani indicated that this is not yet available.

Don Ware suggested that we use the C30 report as a place to start. Mani confirmed that this is the plan.

In the future, we should avoid conflict with and have a liaison with Distributed Resources Integration and the microgrid task force. It was recommended that we also have a liaison with the centralized protection group. It was recommended that we have a liaison with IEC microgrid protection working groups.

January 17, 2018 Meeting Minutes

This meeting is an extended-duration kickoff meeting for the P2030.12 work.

The working group started with a discussion of our attendance sheets, and introductions of attendees.

Mani clarified that this work is under the PSRCC, and will plan to regularly meet with the PSRCC, either in single or double sessions. We may have web meetings to ensure we progress with our work quickly.

The working group reviewed the patent slides.

The working group reviewed our PAR.

Brian Boysen motioned to approve the agenda, seconded by Mukesh Nagpal. The working group unanimously approved the agenda.

There was interest of some working group members in clarifying the scope. Jim Niemira proposed that the scope should read “This guide covers the design of protection systems and selection of protective devices ...”. The working group agreed that we do not intend to cover the design of protective devices. The scope will be revised at some time in the future. Jim van de Ligt clarified that we have the option of under delivering on the scope of the PAR, but we cannot overreach.

Mark Siira proposed we clarify what types of microgrids we intend to cover with our work. Michael Higginson recommended that we clarify our definition of microgrid and what we will cover in the initial documentation in our report. Don Ware recommended that we have a liaison with the terms and definitions working group. Working group leadership will ensure this occurs.

The working group discussed that we should be aware of and avoid overlapping with work that IEC and CIGRE. Mark Siira will provide us information on similar efforts that he is aware of.

The working group reviewed the outline of the C30. There was a question on whether we can copy material developed for C30 considering copyright considerations. The working group’s understanding is that we can re-use that material. This is to be confirmed by working group leadership.

Mark Siira indicated that we should discuss overlap unintentional and intentional islanding considerations in C30.

The working group took a break.

After our break, the working group began work on the draft document table of contents.

The working group discussed options for microgrid definitions. It was agreed that someone should take that on as an assignment.

The working group discussed whether we should include DC microgrids. The working group agreed that we will keep it in our scope for now, and exclude it later if needed.

The outline is as follows:

1. Overview	Error! Bookmark not defined.
1.1 Scope	Error! Bookmark not defined.
1.2 Purpose	Error! Bookmark not defined.
2. Normative references	Error! Bookmark not defined.
3. Limitations	Error! Bookmark not defined.
4. Definitions	Error! Bookmark not defined.
5. Types and structures of microgrids	Error! Bookmark not defined.
5.1 Classification	Error! Bookmark not defined.
5.2 Asset description and operation	Error! Bookmark not defined.
6. Microgrid system configuration and considerations	Error! Bookmark not defined.

6.1 Grounding design.....	Error! Bookmark not defined.
6.2 Feeder configuration	Error! Bookmark not defined.
6.3 Distribution grid connection	Error! Bookmark not defined.
7. Protection system objectives.....	Error! Bookmark not defined.
7.1 Systems – description and operation.....	Error! Bookmark not defined.
7.2 Protection design considerations.....	Error! Bookmark not defined.
7.3 Stability.....	Error! Bookmark not defined.
8. Protection system structure.....	Error! Bookmark not defined.
8.1 Centralized.....	Error! Bookmark not defined.
8.2 Decentralized	Error! Bookmark not defined.
8.3 Adaptive relaying implementation.....	Error! Bookmark not defined.
9. Modes of operation of the protection system.....	Error! Bookmark not defined.
9.1 Functions at the POI	Error! Bookmark not defined.
9.2 Grid connected mode.....	Error! Bookmark not defined.
9.3 Islanded mode.....	Error! Bookmark not defined.
9.4 Transition considerations	Error! Bookmark not defined.
9.5 Blackstart considerations	Error! Bookmark not defined.
10. Protection system studies.....	Error! Bookmark not defined.
10.1 Grid connected mode	Error! Bookmark not defined.
10.2 Islanded mode	Error! Bookmark not defined.
10.3 Transitions	Error! Bookmark not defined.
10.4 Permanently islanded mode – autonomous.....	Error! Bookmark not defined.
11. Microgrid control system coordination.....	Error! Bookmark not defined.
11.1 Controller interaction.....	Error! Bookmark not defined.
11.2 Sectionalizing consideration under faults	Error! Bookmark not defined.
12. Other coordination functions	Error! Bookmark not defined.
12.1 DMS interaction.....	Error! Bookmark not defined.
13. Protection system communication structure	Error! Bookmark not defined.
13.1 Interaction with the protection system	Error! Bookmark not defined.
13.2 Coordination with the protection system	Error! Bookmark not defined.
14. Protection system testing	Error! Bookmark not defined.
14.1 Scenarios.....	Error! Bookmark not defined.
14.2 Testing approaches	Error! Bookmark not defined.
Annex A (informative) Bibliography.....	Error! Bookmark not defined.

Volunteers to work on sections are (lead listed first, team members listed after):

4. Ben Kazimier, Ward Bower, Mark Siira
5. Steve Klecker, Rob Fowler, Ben Kazimier
6. Mike Bloder, Looja Tuladhar
7. Matt Reno, Scott Manson, Mark Siira
8. Ratan Das, Sakis Meliopolous
9. Scott Manson, Ward Bower, Nito Bridges, Joshua Earle
10. Sukumar Brahma, Rob Fowler, Steve Klecker

11. Geza Joos, Ravindra Singh
12. Ravindra Singh, Mani Venkata
13. Don Ware, Mark Siira
14. Don Ware, Joshua Earle

The working group agreed to meet six times per year, with two hours per meeting. We will enable people to call in to meetings at the PSRCC. Meetings not at the PSRCC will be web accessible. We are targeting have our next meeting on Tuesday, March 19 from 1:00-3:00 PM central time.

First drafts of assignments are due at our March meeting.

The working group leadership will get an iMeetCentral workspace set up for people to access the document. We will also request documentation on iMeetCentral usage for working group members.

C-39 C37.252 Guide for Testing Automatic Voltage Control Systems in Regional Power Grids

Chair: TBD

Secretary: Yufei Teng

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 Group did not meet in Garden Grove. This effort has been initiated by members from China as an entity developed standard. The expectation is that the WG will meet in conjunction with PSRCC once per year, either at the upcoming Cincinnati (May) or Denver (September) meeting.

D: Line Protection Subcommittee

Chair: Karl Zimmerman

Vice Chair: Bruce Mackie

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 16, 2019 with 29 members and 35 guests present.

Following introductions, a count of SC membership was made, and it was determined a quorum was present (29 out of 43 members present).

Minutes from the September 2018 meeting in Minneapolis were approved after motion made by Fred Friend and seconded by Rick Gamble.

The Vice Chair reviewed items of interest from the Advisory Committee as the chair was not present.

- WG Chairs – please send minutes to Chair and VC – new P&P has format for minutes
- Please send agendas one month prior to meeting

- New Policies and Procedures have been approved and include membership attendance requirements, office of secretary is now required and agenda should be approved at the meeting. Training will be provided soon.
- Privacy Clause – due to privacy concerns, the roster shall not be distributed, except to the IEEE-SA staff, IEEE-SA Board of Governors and IEEE-SA Standards Board, unless everybody on the roster has submitted their written approval for such distribution
- IEEE SA has new Procedure for requesting certificates of appreciation for completed Standards work. WG Chair or VC directly request from IEEE SA
<http://standards.ieee.org/develop/awards/wgchair/wgawards.html>
- Template for Technical Report (including Tutorials) – Must be used to be considered for PES level award
 - PES Technical Paper Templates <https://www.ieee-pes.org/templates-and-sample-of-pes-technical-papers>
 - Template for IEEE/PES Technical Reports https://www.ieee-pes.org/images/files/doc/tech-council/PES-Technical-Report-Template_Jan_2016.docx
 - PES Resource Center Submission Checklist http://ieee-pes.org/images/files/doc/tech-council/Submission_Checklist_PES_Resource_Center.docx
- Rick Gamble is webmaster for D Subcommittee
- IEEE SA has agreed to review PAR documents prior to balloting
- Next RevCom meeting is September 17, 2019 which is the same time PSRC meets. Therefore, if anyone has PAR request, these motions need to be brought to the Main Committee in May.

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 :2.3

Expected Completion Date: 2019

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 on Tuesday, January 15, 2019, 9:30 am PST.

There were 14 members and 12 guests in attendance.

September meeting minutes were presented. Fred Friend motioned to approve and Pat Carroll seconded the motion. The minutes were approved with all in favor.

December web-meeting minutes were presented. Joe Xavier motioned to approve and Jack Jester seconded the motion. The minutes were approved with all in favor.

The agenda was presented. Bruce Mackie motioned to approve and Randy Crellin seconded the motion. The agenda was approved with all in favor.

The patent slides were presented. No concerns were voiced.

The D28 Working Group reviewed and discussed the following comments. Where necessary, comment resolution was assigned to the individual(s) noted:

- Comments on Clause 9: i-372, i-373, i-371, i-374, i-442, i-353, i-443, i-354, i-135, i-117 – Jack Jester and Juan Gers

- i-40: Discussed comment and reviewed IEEE dictionary definition which matches version in document. Comment was rejected by the WG.
- i-115: Review document for references to the “color books” and confirm that documents are still active standards. Claire will confirm all references to color book standards are still active and/or whether other standards should be referenced – Claire Patti.
- i-413: Accepted comment and will revised figure – Brian Boysen
- i-360: Discussed comment. Comment was rejected by the WG.
- i-116: WG discussed the figures noted. Brian will investigate if Figure 34 can be easily revised or is original to the standard – Brian Boysen
- i-321: Working group discussed the comment and determined that additional content was not necessary.
- i-290: Working group discussed the comment and decided to reject it.

D29: Tutorial on Setting Impedance-Based Power Swing Blocking and Out-Of-Step Tripping Functions 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.

WG D29 met in single session on January 15 in Garden Grove, CA with 10 members and 22 guests.

GENERAL ITEMS:

The chair gave a presentation on a generic power swing blocking philosophy that will be proposed at Xcel Energy. The discussion centered around the issue of whether concentric blinders or an extended polygon characteristic should be used. The group debated the pros and cons of each of the methods and the outcome of the discussion was that the extended polygon method would likely provide better performance during an OOS condition.

WRITING ASSIGNMENTS:

The chair is going to move the document from its present format to the new IEEE PES document format and will complete this task by the 15th of February, 2019. It will also be re-organized to flow more logically. The following members agreed to review and comment on the reorganized document prior to the May meeting: Normann Fischer, Manish Patel, Phil Tatro, Jared Mraz and Gene Henneberg. Also, the section titled “Power Swing Detection Methods”, which includes the zero settings algorithms, will be moved to an appendix of the new document. A section referencing NERC Standard PRC-026 will also be added to the document. The chair stated that it is desired to have the tutorial near completion by the January, 2020 PSRC 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 in Garden Grove on January 15, 2019, with 9 members and 15 guests.

After introductions, the WG Chair reviewed the assignment and discussions from the previous meeting. Most prominent of these was the strong opinion that a section on settings guidelines be added to the tutorial.

Karl Zimmerman then presented a proposed additional section on setting guidelines. The presentation included a short description of ground distance setting guidelines, and then showed two examples of lines with zero-sequence mutual coupling. The examples included how to set underreaching zones and overreaching zones with mutual coupling in and out, and with a parallel line out with grounds at line ends. The WG discussed the examples in depth and agreed on the need for the section and basic format for the setting guidelines and this would be added as Section VII. Abu Zahid agreed to assist with this section. The Chair will send a write up of the first examples so the format will be consistent.

Also, we discussed an example of setting quadrilateral elements with a non-homogeneous system.

Craig Holt agreed to review section IV and was going to send a paper from a previous conference on the comparison of mho and quad elements.

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

CHAIR: Normann Fischer

VICE CHAIR: Joe Mooney

D34 did not meet in Garden Grove and has no minutes to report.

For the next meeting, WG D34 will not request a room until it is determined a room is needed.

D35: Evaluation of Transmission Line Pilot Protection Schemes

Chair: Rick Gamble

Vice Chair: Brandon Lewey

Established: January 2017

Output: Technical report to the Line Protection Subcommittee

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.

Expected Completion date: September 2019

Draft: 6

Working Group D35 met on Wednesday, January 16, 2018 at 8:00am in a single session with 26 members and 10 guests.

After introductions, the chair discussed the vacant Vice Chair position. Brandon Lewey stepped up as volunteer to fill the position.

The working group then reviewed 3 writing assignments: Weak Infeed, Underground Cable, and Single Pole Tripping. The Single Pole Tripping section will need more review, and a decision will need to be made as to whether or not it ends up in the final report.

Several comments from the chair were reviewed, and a few re-work assignments were made.

Draft 6 will be distributed to working group members for review. The membership was requested to provide comments back to the chair by April 15.

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

Action Items:

All Members: Review and provide comments by April 15, 2019.

D37: Impact of series compensation on transmission lines

Chair: Mike Kockott

Vice Chair: Luis Polanco

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

D37 met on January 15, 2019 with 7 participants (3 guests and 4 members – 2 of guests were first time attendees).

Writing / review assignments due for this meeting were not received, and will stand over. The meeting attendees agreed to 15 March as the deadline for submission of these outstanding assignments to the WG chair / vice-chair. The WG chair / vice-chair will insert the received assignments into the report structure and then send out this draft of the report to all WG members / guests by 19 April in preparation for the May D37 meeting. The present revision of the draft report remained unchanged as 1b. WG chair to send 1b draft to all WG members / guests together with the minutes. With no further business, the meeting was adjourned.

Requirements for May 2019 meeting: single session, room for 25 attendees plus projector.

Here is the list of the writing / review assignments that were due for the D37 January 2019 meeting (copied from the D37 September 2018 minutes), that now have 15 March as deadline

Roy Moxley

Provide draft on section 3.4.4. (Delayed Current Zero Impact)

Provide review comments on the Fault Levels Section 3.3

Tapan Manna

Research section 3.2.5 on current harmonic distortion on series capacitor.

Peter McLaren

Research a Manitoba Hydro directional line protection trip during series compensation bank switching operation for section 5.2.1

Luis Polanco

Research on three (3) Gas-Turbine Generator failures that occurred on south-america few years back to incorporate section 5.2.1

Provide review comments for section 5.2 (a&b) on motivation of upfront real-time dynamic simulator studies, and benefits.

Provide review for section 4 on planning for addition of series capacitors.

Nuwan Perera

Provide draft for the Section 7.2 on Faulted phase selection.

Provide draft for the Section 7.5 on Staged fault testing.

Normann Fischer

Provide draft for section 7.4.1 on New Technologies (Travelling Waves applications) and for section 3.2.3 on Low Frequency Oscillations.

Kamal Garg

Provide review comments for section 3.1 on Understanding series capacitors

Aaron Findley

Provide review comments on the 3.2.2 voltage and current inversion section.

Provide review comments on the 5.1.2 on Impact of the capacitor protection and bypassing mechanism on the line protection.

Mike Kockott

Provide draft for section 3.2.1 on Instrument Transformers placements

Provide review comments on the 3.4.2 Sub-synchronous resonance section.

Provide draft for section 7.1.1 on Impact of series compensation on the Permissive over-reaching Transfer Trip (POTT) scheme.

D38: Impact of High SIR on Distance Relaying

Chair: Chris Walker

Vice Chair: Greg Ryan

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

D38 met on January 16, 2019. Started with introductions and attendance sheet. Ted Warren started off with his presentation on instantaneous overcurrent and discussed high SIR. After Ted's presentation we tentatively approved the minutes from Minneapolis with 15 Members. Ted Warren motioned and Don Lukach seconded. Chris presented the outline and we began

to discuss. Pratap discussed the key issue of relay speed with the transients of CCVT's. Normann discussed transients and filtering of the relay. Normann agreed to write some of the information and provide it to the working group.

We added 5 new members to the working group.

We met with 21 Members and 18 Guests

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 : 0.3

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 Wednesday, January 16, 2019 at 9:30am in a single session with 26 members and 13 guests.

The meeting started with introductions. The patent slides were reviewed. No one knew of any patent issues at this time. The working group approved the meeting agenda and September 2018 meeting minutes. The meeting minutes for May 2018 were approved by an electronic vote after the September 2018 meeting. The chair briefly discussed new membership classifications.

Items discussed are as follows:

1. Michael Higginson & Paul Therrien provided a brief update on the contribution that they provided in regard to auto-reclosing considerations for DERs on distribution circuits.
2. Ritwik Chowdhury provided an update on the contribution that he provided in regard to application of travelling waves for autoreclosing on hybrid lines.
3. At various places in the guide, there is a discussion about considerations for number of reclose attempts and dead time intervals. Chair, based on comments from some WG members, brought up that there is a lack of reference that would support the discussion in these sections. However, it was quickly realized that it would be difficult to find an appropriate reference and likely does not exist. Paul Therrien has provided two references, the PSRC survey from 2002 which includes some information on reclosing practices and an EPRI report which includes some statistical data. Both will be added to the guide.

Following assignments were made:

1. Gary Stoedter & Ted Warren to work on section 4.5 (Autoreclose supervision) – restructure to improve readability and revise to address comments and improve clarity.
2. Rafael Garcia to work on Sections 4.6 & 6.3.1 (Autoreclose Blocking) – revise as necessary to address comments. Divide section 4.6 into multiple subsections to describe various blocking functions (79DTL, 79STL, 79RIS etc.).
3. Craig Holt, Addis Kiffle & Wayne Hartman to work on section 4.7.7 & 4.8.
 - a. Is there an opportunity to define adaptive autoreclosing? Differentiate between condition (weather etc.) based autoreclosing from autonomous decisions (based on inputs and programming) based autoreclosing. Which one of these two should be considered adaptive reclosing?
 - b. Section 4.8 (substation controller) – is this same as adaptive autoreclosing? Or does this belong to emerging technologies section? Consider including a brief example.
4. Brian Boysen, D28 WG chair, to work on sections 5.2.2 and 5.3 to maintain consistency and avoid duplication with the D28 guide. It is expected that any revisions will wait till after the D28 guide is approved.
5. Rick Gamble & Andrew Nguyen to work on section 6.2. Address comments and revise as necessary to add clarity.
6. Ritwik Chowdhury to review and revise section 7.6 (POW autoreclosing).
7. Michael Higginson to review and revise section 7.8 (Pulseclosing).
8. Outstanding Items

- a. Section 4.7.9 – Adi Mulawarman, Philip Richardson and Scott Elling volunteered to review and revise as necessary.

Contributions are requested by March 15th, 2019.

D40: Manage the Development of Line Protection Topics

Chair: Jeff Barsch

Vice Chair: Don Lukach

Assignment: Manage the development of line protection topics and harmonize efforts with IEEE Std C37.113-2015, IEEE Guide for Protective Relay Applications to Transmission Lines.

The D40 working group met with 18 members and 15 guests. A motion to approve the September 2018 minutes was made by Abu Bapary with a 2nd by Chris Walker. There was a unanimous vote to approve the minutes.

The output of existing working groups D30 (Tutorial on Application & Setting of Ground Distance elements), D37 (Impact of Series Compensation on Transmission Line Protection), and D29 (Tutorial on Setting Impedance-Based Power System Blocking and Out of Step Functions on Transmission Lines) may be applicable to the next revision of the guide.

The following topics were also mentioned in discussion and may be useful additions to the guide.

- Protecting lines with long radial taps.
- Protecting parallel lines which feed a load. Considerations would include mutual coupling, fault location, current reversals, and line out contingencies. Section 5.13 of the line guide has some information on parallel lines, but the examples include a source at each end of the parallel lines.

Members volunteered to take the following actions by May 1.

- Bruce Mackie & Rick Gamble: Review the two multi-terminal papers and compare to what is already in the line guide.
- Steve Klecker & Dom Fontana: Research what more could be added to the guide regarding load encroachment and loadability.
- Karl Zimmerman & Daniel Lebeau: Research information related to loss of potential overcurrent protection scheme.
- Gary Stoedter: Research protection for lines with long radial taps.
- Abu Zahid: Provide information on protection for dual element spot network (two lines from different sources which are paralleled and feed paralleled distribution transformers).

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

Chair: Ilia Voloh

Vice Chair: Evangelos Farantatos

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 on Tuesday, January 15, 2019 started with introductions and then the WG chair described the scope of the WG.

A list of prior related activities, including PSRC, PES and CIGRE reports was provided.

Then a list of ongoing related activities, including PSRC and CIGRE WGs was provided. For each of those a summary of the scope and the present status was also given. The list includes the following:

1. CTF34 “PES/ NERC Joint Effort to Prepare a Report on Inverter-Based Short Circuit Current Impacts”
2. J18 “Impact of Inverter Based Sources on Rotating Machines”
3. C32 “Protection Challenges and Practices for Interconnecting Inverter Based Resources to Utility Transmission Systems”.
4. C24 “Modification of Commercial Fault Calculation Programs for Wind Turbine Generators”.
5. C25 “Protection of Wind Electric Plants”
6. CIGRE B5.65 “Enhancing Protection System Performance by Optimizing the Response of Inverter-Based Sources”.

Then a discussion on the new IEEE standard P2800 followed. The kickoff meeting took place at the JTCM on Monday January 14th. It was agreed that the standard scope aligns with the scope of this WG.

Then there was a short discussion on IEEE 1547 and it was explained that it applies only to distribution connected DERs. There was a question whether this WG scope includes both transmission and distribution connected IBR, and it was discussed that the focus is on transmission connected sources but the scope also includes distribution.

With regards to the assignment of D41, it was explained that it has no assignment to produce a report, its scope is mainly educational, collect event data, and coordinate with other WGs.

There was a question on what platform will be used for storing event data. The WG chair will check what IEEE offers.

A comment was made that CTF34's scope is also to coordinate activities within PSRC and NERC, so there might be some overlap.

Finally, Ryan Quint (NERC) summarized some events analyzed by NERC IRPTF in which transmission events caused solar inverters to trip unexpectedly. A new event of a line energization that tripped a solar plant not close to the line is under investigation by NERC. Ryan was invited to present at the next meeting in May.

There were total 31 attendees in the meeting, 7 members and 24 guests.

For the next meeting in May 2019, we need a room with capacity of 30, and a computer projector. Please avoid conflict with WG C24, C32, CTF34, in that order.

Coordination Reports

T&D Committee / Distribution Subcommittee

The next T&D Committee / Distribution Subcommittee meeting will occur during the IEEE PES General Meeting in Atlanta, GA, 4-8 August 2019.

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 following link:

<http://grouper.ieee.org/groups/td/dist/>

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

Working Group on Smart Distribution <http://grouper.ieee.org/groups/td/dist/da/>
Larry Clark, Chair Sal Martino, Vice-Chair Fred Friend, Secretary

P1854: Smart Distribution Application Guide has been balloted and recirculated and recirculated. Awaiting word if the comment resolutions are adequate for the negative balloter.

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.

Volt-VAR Control Task Force
Mike Simms, Chair Suresh Gautam, Vice-Chair John Sell, Secretary

Work is slowing resuming 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 balloting expected later this year.

Working Group on Switching & Overcurrent Protection <http://grouper.ieee.org/groups/td/dist/sop/>

Fred Friend, Chair Casey Thompson, 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 late 2019. A PAR extension was granted until 2020.

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

Alex Apostolov suggested a working group be formed to look at impact wide area communications schemes can have on line protection. No action was taken at this time.

General Discussion

None

Line Protection operations of interest

Vice Chair presented an event with double breaker failure on 161kV breakers.

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 January 16, 2019 in Garden Grove, CA with 27 members and 36 guests present comprising a quorum. Minutes of September 2018 SC H meeting were approved unanimously (A. Makki moved, R. Mackiewicz seconded)

Announcements:

1. Announcements from AdCom
 - a. New items from May 2018 Adcom Meeting
 - i. Embrace the new WG P&P => changes are significant
 - ii. Ways to reduce time conflicts are under review
Agenda to be timely reviewed to resolve conflicts
 - iii. Improve performance providing meeting minutes
 - iv. WG Chair training to be provided in May 2019
 - b. New items from Awards and Recognition Meeting
 - i. IEEE-SA WG Awards has a new Procedure to request certificates of appreciation for completed (approved) work. These certificates have to be requested by the Chair, VC or an officer of the WG directly from the IEEE SA. The request for the SA certificates must be made at: <http://standards.ieee.org/develop/awards/wgchair/wgawards.html>
 - ii. 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.
 - c. New items from Standards Coordination Meeting
 - i. New Roster Format is required for all meetings attendance to comply with GDPR.
 - ii. iMeet training will be given at May 2019 meeting.
 - iii. Discussion - Standards WG minutes must have attendance lists – one option is to scan & attach to file.
 - d. Reminders carried from prior meetings.
 - i. Please announce meeting cancellations in advance
 - ii. Please use PSRC template for minutes
 - iii. Please apply for IEEE Senior Membership

- iv. Standard format for SC H vote mailings (Subject line): **PSRCC VOTE REQUIRED SC H [WG HXX] (2014-10 by May 31, 2019**
- v. Minutes are due in 2 weeks so successive minutes assembly levels stay on 60-day schedule.

WG business:

H3: IEEE C37.237-2018 Standard for Requirements for Time Tags Created by Intelligent Electronic Devices—COMTAG was published.

H11: IEC/IEEE 60255-118-1-2018 Measuring relays and protection equipment - Part 118-1: Synchrophasor for power systems – Measurements was published.

H30 assigned Dustin Tessier as group's Secretary.

H35 completed a report that will be circulated in the SC H. Further work must be coordinated with IEC TC 95 COMTRADE via Murty Yalla.

H46 met for the first time as a WG. PAR to be submitted as soon as possible.

Standards Nearing Expiration:

Revision of IEEE C37.239 – Standard for Common Format for Event Data Exchange (COMFEDE) for Power Systems needs to start in 2019. A previous Task Force [HTF43] already concluded in September 2017 that the standard should be re-approved as is without changes. As re-affirmation process is no longer available a TF to be formed. A volunteer to chair a TF for reapproving the standard is requested.

Revision of IEEE C37.232 (COMNAME) standard needs to be initiated in 2019-2020 (The standard expires in 2021). Those interested to lead this work to reach out to SC H Officers.

Old business:

Formation of a Task Force on SDN was not discussed as the proposer was not present and the feedback from PSCCC was not received.

New business:

HTF47: the Chair M. Kanabar recommended to form with an assignment to produce a report on "Impacts of IEC 61850 and supporting technologies on protection and control applications in digital substations." Concerns on potential breadth of scope were expressed. It was suggested to refine the scope and focus on high-speed or streaming or publish-subscribe services and network interactions. A call for vote followed the discussion (16 in favor; 3 opposed; 5 abstain). Per SC H Chair call, WG formation request was returned to HTF47 for resolution at May 2019 meeting. All negative votes (K. Martin, C. Preuss, J. Bougie) were requested to clarify their comments and reasoning and cooperate on resolutions.

HTF50: The chair J. Bougie recommended to form a WG with an assignment to produce a report on "Requirements for Time Sources in Protection and Control." Formation of the WG was approved (24 Members in favor).

The meeting was adjourned (M. Benou moved, K. Fodero seconded). Attendees approved adjournment.

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. So no minutes to send.

H6: IEC 61850 Application Testing

Chair: C. Sufana

Vice Chair: B. Vandiver

Output: Report

Established: 1999

Expected completion date: December 2019

Draft: 8.65

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, 9 guests present for the Jan 15, 2019 meeting.

The minutes from the last meeting were reviewed and approved with no comments. The new patent slides were also presented with no objections voiced.

The Chair began with a review of the report's status draft 8.60. Upon circulation to the SC and WG there were still some comments received which the chair, Ralph, and Harsh mostly addressed prior to the meeting. The remaining comments were reviewed by the group with edits made to accommodate the items noted. A few new references were added to clarify issues of testing and time reference. The revised draft 8.65 will be re-circulated to the WG for their final vote in about 2 weeks since all previous comments have been resolved.

Once completed, it will be resent to the SC for final approval and subsequent posting. Once the Report has received final SC approval, the SC will be requested to approve disbanding the H6 WG.

H11: IEC/IEEE 60255-118-1, Synchrophasor for Power Systems – Measurements

Chair: K.E. Martin

Vice Chair: A. Goldstein

Assignment: Develop a joint IEC/IEEE standard for synchrophasor measurements based on the IEEE Stds. C37.118.1-2011 and C37.118.1a-2014 according to the PAR issued June 2013.

Par expiration date: 31-December-2018

WG H11 met Wednesday Jan 16, 2019, 9:30 – 10:45 am.

The attendance was 8 members, and 2 guests. Attendees introduced themselves, and a sign-in was circulated. The chair made the patent announcement and reviewed the current status:

The standard was approved September 10 and published December 17 by the IEC. It was also approved September 27 and published December 19 by the IEEE. So the standard itself is complete. The WG had also decided to write a summary paper targeted for conferences. It was submitted by WG members to conferences as follows: Gert Rietveld to CIRED in Madrid, Eric Udren to Texas A&M relay, Shi Bonian to

CIGRE in Norway, and Ken Martin to Georgia Tech relay. It was accepted for Texas A&M and CIGRE, turned down by CIRED, and waiting on Georgia Tech. A first draft was created and once edited for coherency.

The intent of the summary paper is to get as widespread notification as possible. A problem has been that efforts by IEEE to eliminate plagiarism prevent use of a paper at more than one conference or journal, making coverage at several conferences impossible. However several WG attendees reported that it is acceptable to use a paper or a variant at more than one venue. It is not completely clear where this rule applies, and Harold Kirkham will investigate and report to the WG.

Acceptance/rejection by Georgia Tech was questioned as we have received no response. Eric Udren investigated and we received notice of a rejection at this conference. This leaves 2 conferences for which we need to complete the paper.

The WG reviewed the current draft and discussed continued development. We have also received reviews of the paper by members who could not be present. The consensus was to keep the current history, differences from C37.118.1, formula development, and evaluation sections even though they are a little long. The presenter can cut down what is appropriate to the particular audience. It was also agreed that the paper could use more figures and a more complete treatment of the actual requirements and clauses. Ken Martin will offer some additions and circulate.

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

Chair: Amir Makki

Vice Chair: Cesar Calix

Secretary: Hugo Monterrubio

Ballot Administrator: Rick Cornelison

Output: Guide - PC37.249

Established: January 2014

Expected Completion Date: December 2019

Draft: 9

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 6 members and 9 guests in attendance. The working group has a total of 12 voting members, quorum was established. The minutes of the last meeting were not approved at this meeting. The minutes were posted to I-Meet Central and will be approved electronically. The Chair was pleased to announce that the Working Group request to extend their PAR until December 2020 was approved.

The Chair then started the discussions on the next step which is to revise the PAR. The group agreed that the only changes needed are to add the word Control to the title as well as the purpose and scope for consistency with the new PSRCC designation. The reference to joint effort with Substation Committee C19 will also be removed as it no longer exists. The Chair will edit the PAR accordingly for approval at the next meeting and the request to revise the PAR will be submitted to SA before the September meeting.

The Chair thanked Tony Johnson for preparing the initial draft Guide in line with the format recommended by Craig Preuss. A motion to accept the changes was seconded and approved unanimously. Tony will complete the draft guide in time for review at the next meeting. The Chair again requested that all members review the assigned assessments for each category in the draft Guide and comment on reasonability.

Especial thanks to T.W. Cease for, among other things, maintaining the I-Meet site for the working group and for helping the members learn how to use it.

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

Chair: Mario Capuozzo

Vice Chair: Benton Vandiver
Secretary: Zach Makki
Output: Standard
Established: 2013
Estimated Completion Date: December 2020
Draft: 0.4

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.

Meeting was called to order by the chair and introductions made. The patent slides were presented and reviewed. The chair recapped the last six meetings and then began a scope review with a list of the history of sources and use cases and why it exists in present form.

A lot of work has been performed since the last meeting by the chair and Herb Faulk to develop a CIM compatible foundation for COMSET that would already be in a correct profile to move it forward. A brisk discussion of the applicability of this approach began which was a re-hash of old 61850 discussions. The chair brought that discussion to a close until the prepared presentation was finished.

The chair proceeded with the modeling presentation reviewing an example (groups & settings) and how it fits into the proposed CIM structure. Alex and Herb discussed issues of why this is different than existing 61850 syntax and why to re-invent this. Herb noted that there are limitations in 61850 and it needs a non-SCL expansion to make a universal exchange format in the same vain as COMTRADE. No agreement was reached.

The chair continued with the presentation reviewing what specific vendors protection architectures provide in terms of editable settings and logic. This review resulted in a simplified logic structure mapping of Functions / Connectors / Sources / Sinks based on the proposed modeling. The chair further demonstrated how this UML profile was adapted to develop a schema and then compile a C-sharp open source code for developing the mapping model. A simple trial of mapping several vendors relay's settings into it was successfully done and result shown.

However, the group broke out into many discussion tangents on why this approach was or was not needed and some claiming it has or already exists in the 61850 standards or other reports. Yet no one can show that any existing vendors for all relay settings in use are supported to the 61850 SCL in a single file format. The argument is 61850 should be extended not replaced and that all relays 61850 or legacy can be supported. Advantages/ disadvantages were discussed till end of session. No decision was taken.

Action Items:

The chair will schedule additional conference calls to continue the discussion on the perceived technical discrepancies posited and then address them at the next 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 – 20 attendees
Reviewed Agenda

National Grid Presentation

Background of Presentation

- IEC 61850 breaker and a half scheme for system 1 and system 2
- Process bus and station bus implementation
- Three 115kV lines
- System 1 is IEC 61850 with redundant networks.
- System 2 is conventional
- Operating two labs, which are interconnected
- Two vendors engaged for testing equipment
- Protection/Tele-control have been involved throughout the process, and
- First pilot project to start construction in June/2019

Experience by National Grid

- Lack of support for IEC 61850 data models @ LN/DO/DA level
- Timed overcurrent operates 5 times slower due to lack of time sync support from some test sets
- PTP equates to 90% of testing issues
- New test procedures need to be developed to facilitate the IEC 61850/PTP/PRP functionalities
- Using LGOS/LSVS for most vendors, except one.
- Time sync profile used: IEEE C37.238:2017
- There are redundant HMI and Station controllers per system
- Using Test modes support and Simulation flag.
- Time synchronization between test sets (IRIG versus PTP) caused varying results through testing.
- 2 – IEC 61850 based HMI applications, each that can run independently and autonomously
- Engineering process was used for System 1. Plan is to have separate System Configurator Tool for each system. Currently evaluating different SCT options
- Using commercially available configuration tools

Lessons Learned by National Grid

- First clarify the support of data model from each vendor, rather than using whatever is supported.
- Performance of conventional P&C system was slower than IEC 61850 based system.
- Construction costs were decreased.
- 20 substation rebuilds are scheduled, and expect future savings once the standard IEC 61850 design is finalized and replicated.
- Slowest aspect of the protection trips was the electro-mechanical delay of the tripping contact from the MU's.

Configuration of IEC 61850 Configurations

- Supported mainly via MMS or on-line IEDs or SCL
- Not all IEC 61850 attributes can be used in logic.
- Need extension to standard that can model ALL physical aspects (LED, BI/BO/AO, etc.). This work is undergoing in WG10 as part of the Virtual IED initiative.
- Need standard to enforce that IEC 61850 DO/DA's can be used directly in the IED's logic engine, without the need to map to internal words bits/logic variables that are specific to each vendor.

Reliability requirements for IEC 61850 based P&C schemes (MMS/GOOSE/SMV)

IEC 61850 Substation Topologies

- Need standard terms for Merging Units (A/D only), Process Interface Unit (A/D with Discrete) and Breaker/Switch IED (Discrete only)
- One switch topology
- Multiple switch topology with/without link failover
- RSTP versus PRP versus HSR
- Discussed pros and cons of each

Physical Connections

Dedicated ports for SMV, GOOSE, SMV, PTP?

Pros and cons of supporting physical isolation of signals versus virtual isolation (VLANs, MAC filtering)

P2P versus P2MP

Discussed pros and cons of each

NYPA Experience

- Complete digital substation design under way
- Partnering with Puerto Rico utility to assist in their IEC 61850 initiative
- Lab testing is determining feasibility and validate the concept
- Determine bandwidth for each application and configuration

Need to determine the priority between:

- Tutorial information versus Capturing End-User Feedback
- Prioritizing of User feedback/issues to send to WG10 resolution

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.

The working group met on Jan-16th with 18 members and 3 Guests.

In response to comments received from Eric Allen, chair presented a general block diagram schematic containing inputs and outputs and settings information. Further, mapping information was also presented between IEC 61850 model and this block diagram for signal types defined in IEC 61850.

The working draft 4 of excel spreadsheet was presented by the chair to the group highlighting the below mentioned aspects:

- Sheets contains logical model of all protection and protection related functions defined in IEC 61850 and named after the respective 4 letter acronyms defined in IEC 61850
- Columns describing the explanation of respective parameter (attribute)
- Columns containing comments of discussions from PSRC
- Sheet containing list of all parameter utilized in all protection & protection related functions. A column in this sheet further represent the corresponding logical node function where it is utilized.
- Mapping table between PSRC' model and IEC 61850 signal types
- Model sheet that allows viewing any model of a protection or protection related function, which automatically populates all parameters into PSRC's input-output-settings model.

Group discussed the application and usage of double point status and enumeration signal types and whether double point be considered different signal than binary signal/value.

Further, the group recommended utilizing binary value & analog value terms instead of binary signal and analog signal.

Confidentiality concerns were raised on whether the IEC 61850 7-4 draft model information can be shared to everyone. In this regard, chair mentioned that this the excel spreadsheet contains lot more information than IEC 61850 model and it is a working copy for preparing the report. The final version of the report will have the IEC 61850 model sections completely excluded and will be PSRC's model. Further, Christoph Brunner (chair of IEC Working group 10) and Alex Apostolov also supported the development activities at H31 as it is necessary to develop the models beyond what exists.

- Harsh Vardan from GE presented GE's model for PIOC function. Feedback was provided to Harsh and others on how and where to populate the excel sheet the information about custom attributes defined in vendor's private namespace.

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: 9

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 Tuesday, with 12 members in attendance.

Draft 9 was discussed. We received many comments and edit requests last year. At this meeting, we discussed many changes. We are targeting to get a revised draft to the working group for review. We have also asked our members to share this draft with their IT depts and provide feedback for the next meeting.

H35: XML Translation for COMTRADE

Chair: M. Adamiak

Vice Chair:

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.

Mark Adamiak reviewed DRAFT 11 of paper. Mark reviewed some 61850 channel id information.

Discussion about inheriting the fully qualified name, so that every channel doesn't have to have the complete name. C37.248 should be referenced here, according to Amir.

Discussion about keeping 16 bit bitstring size for reduced filesize (doesn't need to be 32 bit).

Discussion about embedding synchrophasors.

Amir thinks we should add a "goals" preamble, and that we should add resolution, in bits, information.

We discussed whether or not the XML Schema should map strictly to the earlier file formats.

We talked about whether or not to reference the active setting group. Mario takes the position that if the data is transient, it should be recorded with the rest of the transient data.

Amir makes the point that many event files do cite settings and/or active setting groups in the fault record.

Motion made to take report as is and submit to H for approval. Motion seconded and confirmed. Following that, we will work on a PAR. Bill Dickerson mentions that it might be worthy to add an Annex and Definitions section. Otherwise, people might be confused by all of the acronyms.

Action Items: Mark to do further writing for next revision. Mario to expand upon the XSD/conformance verifier tool.

H38: Design and Implementation of Time Synchronization Distribution Systems for Substation Automation (P2030.101)

Chair: J. Bougie

Vice Chair:
Output: Guide
Established: 2017
Expected completion date: December 2019
Current Revision: D11.6

Assignment: This guide practice covers the design, installation and monitoring of time synchronization systems in power utility substations. This includes time sources such as Global Positioning Satellite (GPS) and time distribution systems such as Inter-Range Instrumentation Group -B (IRIG-B), Network Time Protocol /Simple Network Time Protocol SNTP (NTP/SNTP), and Standard Profile for Use of IEEE Std. 1588 Precision Time Protocol in Power System Applications - IEEE STD

Chair informed the committee that the guide has been published.

There was not a quorum present to approve the previous meeting minutes. An email vote will take to approve these minutes

Agenda approved.

The WG will continue to meet for probably one more meeting with a goal of developing a summary paper and presentation for a presentation at the Sept PSRCC and various conferences. The Chairperson asked for volunteers to help with this work.

The chair will provide an PPT outline for development and has asked or help in developing more content.

The chairperson has also asked for help in making presentations.

Jim B will create a powerpoint and add people to the central Desktop so they can help with development

H40: Databases used in SAS

Chair: J. Bougie

Vice Chair:

Output: Guide

Established:

Expected completion date: December 2020

Draft: 1.5

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.

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.

The chair gave a brief of review of the purpose of this of this WG. He asked those in attendance for help with the various section.

Minutes were not approved due to lack of quorum.

Agenda was approved.

The chair reviewed the document looking for volunteers, Galina A volunteer to review the scope. Theo L volunteered to review database definitions, and Tony J volunteered to review Storage requirements and security. Nick F asked to be a CM and will be able to have co-workers help out. Galina stated the people from BPA and PGE are will to help and will provide contact information to the chair.

The chair will setup a web meeting to review the document with the new people.

H41: Revision of IEEE 1646 Communication Delivery Time Performance Requirements

Chair: D. Holstein

Vice Chair: T.W. Cease

Output: Standard

Completion Date: 2021

Draft: 2

Assignment: Revision to IEEE Standard 1646-2004

The WG met on Tuesday, with 6 members and 4 guests in attendance. A quorum (6 of 9) was present. This was the third official meeting. Attendees introduced themselves and affiliation.

Attendees signed the attendance list and indicated if they were a member or guest.

Action item 03-01: Update iMeet to include new members and guest with an invitation to register for P1646 [DH].

The call for patents was presented – no response.

The agenda was reviewed and approved without change.

Because we lacked quorum, past minutes were not reviewed and voted.

Those attending focused on the following topics:

There may be a need to change the title of standard to “IEEE Standard for Communication Latency Requirements for Electric Power Automation Systems.” A decision will be made later.

Members volunteered to prepare a new clause describing the latency model. This will be the sole subject of discussion at the next meeting in Cincinnati, OH.

Where possible, latency specifications need to be normalized to be frequency agnostic (e.g., ¼ cycle), not specified a a maximum time or range of times in seconds.

H44: Monitoring and Diagnostics of IEC 61850 GOOSE and Sampled Values Based Systems

Chair: Aaron Martin

Vice Chair: Qiayoin Yang

Established: May 2018

Expected completion date: January 2021

Draft: 0

Introduction – 18 Members, 3 Guests

New Working Group with new Par. No previous minutes.

Patent statement read – no comments

Policy statement read – No comments

Outline developed with focus on concept of monitoring and supervision goals.

It was agreed that outdoor equipment monitoring is outside of the scope of the guide.

Chair to send out iMeet invitation to all members with assignment tasks.

H45: Guide for Centralized Protection and Control (CPC) Systems within a Substation

Chair: R. Das

Vice Chair: P. Myrda

Secretary: M. Kanabar.

Expected Output: Guide

Established: May 2018

Expected completion date: January 2022

Draft: 0

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

The WG met on January 12, 2019 with 46 participants (39 in person and 7 remotely, with 25 members and 21 guests).

Minutes of previous meetings in September and December (web) as approved by email stands approved without any changes.

Chair started the meeting by discussing the IEEE patent policy and other guidelines for WG meetings.

We have an interesting presentation on “Smart substation control and protection SSC600” by Edgar Flores from ABB. Participants asked many engaging questions following the presentation and Edgar Flores answered the question in equally responsive manner. WG appreciates the effort by ABB to send a representative to present on a timely topic related to the guide work.

WG then went over the draft outline finalized during the web meeting in December 2018. Some members and guests volunteered to contribute on various sections of the guide. WG will have a web meeting in early March to discuss the allocation of more writing assignments.

Paul Myrda will be the new vice-chair of the working group and existing vice-chair Mital Kanabar will take up the role of Secretary with immediate effect as planned.

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

Chair: Matt Black

Vice Chair: Craig Preuss/TBD

Output: Produce a Recommended Practice for Human-Interfaces (HMI) used in Substation Automation Systems (PC37.1.3)

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

H46 met on Monday 1/14/19 at 13:30 PST with 24 total attendees: 11 members, 13 Guests. There were no remote attendees via Skype, as the Chair and Vice-Chair did not set-up an online meeting ahead of time. The goal for this meeting was to review the scope & other PAR related aspects of this working group as well as to address the negative votes received from the Main Committee regarding the formation of said Working Group.

After reviewing Patent and Copyright slides, the Working Group did a cursory overview of the Scope and Purpose of the Recommended Practice to be developed. It was acknowledged that the PAR should have been submitted prior to the first meeting of the working group; however, the P&P manual states that up to two meetings of the Working Group may be conducted prior to the submission of the PAR. The Chair has taken an action item to submit the PAR within the next two weeks. As of 1/16/18 The PAR is in the final stages of it's submission to IEEE-SA and will likely be submitted prior to the end of the Main Committee Meeting Tomorrow.

Following the above discussion a call was issued to find a Vice-Chair for the Working Group. Craig Preuss has volunteered and has filled this role for at least this meeting. Previously Xiangyu Ding has expressed an interest in either the Secretary or Vice-Chair positions. Mr. Ding was absent at this meeting so verification that he still has interest in said position. A discussion will be had off-line after the meeting to iron out the roles and responsibilities for Secretary and Vice-Chair. The Chair appreciates Craig's willingness to serve at least for this meeting as Vice-Chair.

The negative ballots from the Main Committee vote for formation of this WG were the following items of interest on the Agenda. The Working Group concluded that many of the negative ballots received may have resulted from a misrepresentation that the output from this WG was to be a Standard with mandatory conformance requirements instead of a Recommend Practice with optional conformance and suggestions instead of mandates being issued there-in.

Dean Oulette has agreed to be an IEC TC57 representative that has agreed to attend our WG H46 meetings with the PSRC and represent the interest of IEC for harmonization.

Following the meeting consideration was made due to WG feedback that perhaps the small screen HMIs on the individual devices should be removed from the Scope of PC37.1.3. This topic was discussed with the TF chair, and the SC chair and the decision was made to submit the PAR request as-is to IEEE SA and avoid returning the Main Committee/Subcommittee/Working Group for approval. Leaving this line in the scope allows that aspect of HMI to be at least explored. If a PAR modification becomes necessary due to the "snowballing" nature of the scope due to the inclusion, the WG may make the decision to modify the PAR at a later date.

HTF47: Impact of Digital Communications on Protection & Control Applications

Chair: M. Kanabar

Vice Chair: A. Riccardo

Secretary: D. Ouelette

Output: Recommendation for WG

Completion Date: May 2019

Draft: N/A

Assignment: to determine if working group should be formed on Impact of Digital Communications on Protection & Control Applications.

TF reviewed & discussed existing published IEEE reports to understand what is covered.

TF converged & agreed to the following Title & Assignment to propose for WG in H-subcommittee:

Title: Impacts of IEC 61850 and supporting technologies on protection and control applications in digital substations

Assignment:

Develop a report on impacts of IEC 61850 and supporting technologies on protection and control applications in digital substations.

Chair: Mital Kanabar

Vice-chair: Antonio Riccardo

Secretary: Dean Ouellette

Total 13 out of 17 attendees showed interest during the meeting; and I have 5 other members expressed their interest to join but they couldn't join due to conflicts with other meetings.

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).

The Task Force met for our second meeting as a task force in Garden Grove. We had an excellent group of seasoned synchrophasor experts and newcomers. There ensued a lively discussion of how to approach the problem, and a number of important points were made.

Discussions continued from where we left off in our first meeting, which was mostly a brainstorming session. This meeting produced some new concepts, and we are starting to move toward defining (a) work product(s) for the group.

Several assignments were made:

Jason Allnut will look into a better definition of the audience groups

Jason Allnut will look further into IEEE channels that might be useful to promote this work

A small group comprising Bill Dickerson, Mahendra Patel, Jason Allnut and Ken Martin will come up with some 'straw man' outlines of possible papers, presentations, webinars, etc.

We anticipate one more meeting as a task force before we will have a concrete proposal for the Subcommittee.

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

HTF40 met on Wednesday, January 16, 2019, in a single session with 30 guests.

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

1. WG H32 is still revising their report and is expected to cover the "tutorial" needed.
2. The title and potential scope of a WG based on HTF49 could be "Benchmark on industry experience in the Use of Packet-Switched Communication Channels for Protection".

Discussion of the scope indicated that it would be beneficial to have knowledge of any issues, concerns and lessons learned in utilities that have deployed this technology for pilot protection and teleprotection. The group could also address organizational aspects for IT/OT – system protection interfacing in regards to traffic path engineering, maintenance and notifications, monitoring, alarms, etc.

The group decided to have a task force meeting in May to further define a potential scope.

The chair will email meeting notes to participants.

HTF50: Requirements for Time Sources in Protection and Control Systems

Chair: J. Bougie

Vice Chair:

Output: Recommendation for a WG

Completion Date: 2019

Current Revision: N/A

Assignment: We were tasked with making a recommendation as to if we need to move forward with the Requirements for Time Sources in Protection and Control Systems

The WG met on Monday, with 8 members and no guests in attendance. (This was our first meeting so I made everyone a member)

The chair stated that is our first meeting and what is our output. Are there any standards for time sources?

There are no minutes as this is our first meeting
Agenda approved.

It was stated that there is not a standard for time clocks. There are standards that are used but none specifically for Time clocks. We discussed the need for something, either a report, guide or standard.

We discussed the applications that use a time clock (Testing, SOE, protection applications) and the need for a good and accurate time source is only going to grow.

Jim B will make a recommendation that a WG be formed to generate a report with the output as to what is needed for the Requirements for Time Sources in Protection and Control Systems (Complete)

Liaison Reports

IEC TC 57 WG 10, 17, 18, and 19 and related WGs

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 6, Ed 2, Amd 1: System configuration language
- Part 7-6: Technical report about guidelines for basic application profiles
- Part 90-6: Modelling for Distribution Automation

Code components are now available where applicable through www.iec.ch/tc57/supportdocuments. The namespace files for the published version of IEC 61850-7-4, -7-3 and -7-2 are available. They reflect the published (Edition 2) version incorporating mandatory TISSUES.

IEC TC57 / WG10 will meet next week in Pomona, CA. WG10 has currently the following projects:

1. Finalisation of Edition 2 of IEC 61850:
All parts except part 2 (Glossary) have been published as second Edition. The final version for part 2 has been sent to IEC for circulation.
2. Preparation of an Edition 2.1 of IEC 61850 for some of the major parts
7-2, 7-3, 7-4, 8-1 and 9-2 are circulated as FDIS in the next weeks; 7-1 has been circulated as CDV. An Annex with detailed discussions of compatibility between different versions of the standard explaining the impact certain changes have and listing explicitly all the changes concerned has been prepared.
3. Technical reports that are under preparation
Several TRs are being worked on, including modelling for FACTs, Travel or wave based fault location or alarm handling.
4. Work on technical specifications for mappings between IEC 61850 and Modbus data (TS IEC 61850-80-5) still ongoing.
5. Significant work ongoing on enhancing the engineering process to include as well the specification process and to include configuration of the communication network.

IEC TC57 / WG17 will meet in San Francisco at the end of the month and is working on the following topics:

1. WG17 is currently working on the revision of IEC 61850-7-420 to include modelling of grid codes.
2. New work on microgrids has started

IEC TC57 / WG18 is working on the following topics;

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

I: Relaying Practices Subcommittee

Chair: Brian Mugalian

Vice Chair: Jim Niemera

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 – a new signup sheet was passed to the attendees
2. Determine a Quorum (41 members total in I SC); 22 members and 16 guests, quorum was met
3. Minutes of the September 2018 meeting were Approved – Motion to approve was made by M. Swanson and seconded by M. Dood.
4. Coordination & Advisory Committee Meetings Items of Interest
 - a. Future Meetings:
 - i. May 2019 – Cincinnati, OH
 - ii. September 2019 – Denver, CO
 - iii. January 12-16, 2020 – JTCM – Hyatt Regency Jacksonville
 - b. **NEW** Policies and Procedures for: Power System Relaying and Control Committee Working Group were approved 2018 for use in 2019; approved version was sent to Subcommittee members by email for review and adherence. Three officers: Chair, Vice Chair, Secretary. PLEASE READ AND FOLLOW THE NEW PROCEDURES.
 - c. Working Group sign-in sheets – new policy
 - i. The following disclaimer is to be used on all sign-in sheets for our working groups; only Chair and Vice-Chair may maintain email addresses. Email addresses are no longer permitted to be placed on your sign-in sheet. Attendees must add their email address if they desire.

By choosing to attend and sign in to this meeting, you acknowledge and agree that your personal data will be documented for IEEE standards development purposes to comply with policies and procedures, legal and accreditation requirements, and evaluation of patent claims by patent offices. IEEE must capture your personal data for these purposes, and will provide information about activities related to standards development groups in which you participate. IEEE standards development participation is documented through various methods, e.g., rosters, submission documents, email reflectors, records of meeting attendance, responses to ballots, publicly available participation lists, and declaration of affiliations. See the IEEE Privacy Policy at <https://www.ieee.org/security-privacy.html>

- d. 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>.
- e. **Join.me** is available for conference calls/screen sharing – Contact Erin Spiewak and an account can be set up for the WG/TF Chair
- f. Looking for Webinars to publicize our PSRCC 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 Pratap Mysore, Russ Patterson, or Murty Yalla.
- g. Looking for presentations for the Main Committee meetings – please contact I-SC Vice Chair Jim Niemira. Many of our working groups have concluded their work and could be considered for **May 2019** or **September 2019**.

- h. Recording devices during meetings – may ONLY be used IF THERE IS NO OBJECTION. Recordings are typically used for generating minutes. Announce this at the start of the meeting if the meeting is being recorded AND INDICATE IN THE MINUTES THAT THERE WAS NO OBJECTION. This applies to in-person and on-line meetings. Recordings should be erased when no longer needed.
 - i. For **May 2019**, I Subcommittee will have a total of 15 WGs and TFs
5. Administrative Items
- a. IEEE Privacy Policy – Discussion, questions and answers, led by Erin Spiewak. IEEE-SA can provide email list service.
 - b. Working Group/Task Force roster template provided by IEEE – other attendance/roster sheets may be used if the WG leadership prefers, BUT ALTERNATIVE SHEETS MUST INCLUDE THE PRIVACY NOTICE/DISCLAIMER VERBIAGE FROM THE IEEE TEMPLATE AND THEY MAY NOT DISCLOSE PARTICIPANTS EMAIL ADDRESSES OR PHONE NUMBERS.
 - c. New procedure for PARs, new 2017 P&P (sent by email):
 - i. All PAR related activities must be approved by the PSRCC Main Committee members
 - ii. See examples provided of how to request at the Main Committee
 - iii. Includes creation of a new PAR
 - iv. Includes approval to proceed to IEEE-SA for creation of a balloting body or to proceed to sponsor ballot
 - v. Includes changes to a PAR scope and/or purpose
 - vi. 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.
 - vii. 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.**
 - viii. Motion to approve the new or modified PAR is done at the Main Committee meeting
 - ix. PSRCC is the Sponsor
 - x. myProject™ Volunteer User Guide – good stuff
https://mentor.ieee.org/etools_documentation/dcn/11/etools_documentation-11-0014-MYPR-myproject-user-guide.pdf
 - d. **Technical Report template for working group reports – please use for new reports**
 - e. From IEEE-SA: WG/TF Agendas and Minutes: “**The 14-calendar-day rule” – the Standards Association requirement in O&P.** Note, meeting minutes are “Draft” until approved.
 - f. Review Draft 1 of the PSRCC meeting agenda as soon as the meeting notice arrives in your inbox – to avoid meeting conflicts and multiple agenda revisions. Contact I-SC Vice Chair Jim Niemira for your requested changes – he will consolidate requests and forward to PSRCC Secretary Michael Thompson.
 - g. Make sure that on the Meeting Room Request (MRR) form for the **May 2019** meeting that you include “do not conflict with I50, D87, ...”
 - h. As Chair or Vice-Chair of WG or TF, please contact I-SC Chair Brian Mugalian and I-SC Vice Chair Jim Niemira **if you cannot attend your session.** Do this when the PSRCC meeting agenda is sent, or during the update phone calls we have.
 - i. 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 PSRCC website which is open to all.
 - j. All PAR related documents (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.
 - k. 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!
 - l. Email WG or TF Minutes *including membership list* to I-SC Vice Chair Jim Niemira Jim.Niemira@sandc.com . Send as soon as possible, not later than 1 week following the I-SC meeting so the WG/TF draft minutes can be included in the I-SC draft minutes.

- m. PSRC Website – Email items to post on the I web pages to I-SC Chair Brian Mugalian and I-SC Vice Chair Jim Niemira. Review your working group’s officers and assignment. We will review and forward to: webmaster@pes-psrc.org
- n. Working Group/Task Force Chairs and Vice-Chairs: please use the “documents” button on your web page to upload files, agendas, and minutes for use by others – this way we can include links in our correspondence.
- o. **iMeet Central** (formerly Central Desktop) is to be used for IEEE Guide/Recommended Practice/Standard documents with a PAR
- p. Subcommittee Chair/Vice-Chair will hold progress report conference calls with each WG and TF Chair/Vice-Chair in **April 2018**. I-SC Vice Chair Jim Niemira will set up the conference bridge for these calls.
- q. Task Force Proposal Submission Form – no new proposals
- r. 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 PSRCC meeting for announcement and distribution. The request for the SA certificates must be made at: <http://standards.ieee.org/develop/awards/wgchair/wgawards.html>
- s. 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.
- t. 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

6. Working Group Reports

I2: TERMINOLOGY REVIEW WORKING GROUP - DEFINITIONS FOR IEEE DEFINITION DATABASE (FORMERLY IEEE STD. 100)

Chair: M. Swanson

Vice Chair: F. Friend

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

Established Date: N/A

Expected Completion Date: On-going

Draft: N/A

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

The I2 working group, chaired by Mal Swanson, met on Wednesday, January 16, 2019 with 9 members (including 1 new – Mark Siira) and 1 guest.

Quorum was achieved and minutes from the September meeting in Minneapolis were reviewed and approved (Mark Schroeder motioned, Oscar Bolado seconded).

Liaisons have been assigned for all working groups with a PAR to facilitate the development of new terms during the working group process.

Updates were given on the status of each of the standards.

A change in our process was discussed. Previously it was noted the working group chair will send the working group approved draft to Erin Spiewak e.spiewak@ieee.org, IEEE SA, to begin the editorial review process in order to expedite the review process. It was confirmed that this is still the process.

Also of note, there was a miscommunication regarding the need to have IEEE defined words get permission to use because of copyrights. Only definitions used from sources other than IEEE need to cite the source.

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 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.

I4: INTERNATIONAL STANDARDS DEVELOPMENT WORKING GROUP

Chair: Eric A. Udren

Vice Chair: Norman Fischer

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

Established Date: 1990

Expected completion date: Meetings are continuing

Draft: N/A

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 15, 2019 with 7 members and 3 guests to review TC 95 standards activities. There were no comments on the September 2018 minutes. Main discussion points are as follows:

- 95/390/CD - IEC 60255-27 Ed. 3 **Product safety requirements** – the new Edition 3 CD requires review and comments. The Chair reviewed a major legal issue with the overall requirement that a relay should never cause a hazardous condition – comments and vote sent 9/14/18. Compiled comments supplied to WG - we are awaiting compiled comment responses and the next revision of the draft.
- 95/386/CDV - IEC 60255-26 Ed. 4 **Electromagnetic compatibility requirements** – comments and vote sent 9/21/18. Compiled comments supplied to WG. However, Murty reported that CDV has been rolled back to CD stage as the MT determines clear requirements for relay settings to be used during various type tests.
- 95/407Q - AHG 3 **Use cases of digital sampled values** (e.g. from MU) instead of analog inputs – Questionnaire about now starting a WG. US will vote in favor. The new TC 95 WG2 will aim to standardize response of relays to data transmission errors, configuration problems, and failures. After 14 meeting – I4 Chair learned that PSRC SC H is proposing a WG H47 to work on the same topic. We will need to coordinate this WG with the new IEC WG and establish cross-liaison.
- TC 95 held its **plenary meeting** in Frankfurt, Germany on November 9, 2018, at the end of a week of Maintenance Team or standards drafting team meetings. This gathering saw the highest US engagement and PSRC collaboration in these TC 95 meetings and projects since the 1970s. In-person attendees included the TC 95 Chair Murty Yalla, and Maintenance Team working members Alex Apostolov, Oscar Bolado, Normann Fischer, and Scott Hodge. This highlights the trend of growing collaboration over the last 5-7 years as Eric reported to PSRC in a 2017 presentation. 95/406/RM Minutes, 95/403DL Decision list, TC 95 Program of work, and TC 95 Strategic business plan supplied to WG in advance. Full meeting presentations were supplied separately. The next meeting of MTs and WGs takes place in Paris in March.
- 95/404/Q Questionnaire on proposed WG on **frequency measurement for DER** - TC 95 is looking at creating a new JWG with TC8 and other TCs/SCs on requirements for frequency measurements in DER and load controllers. 404/Q asks national committees about interest in and support of the project. The USNC will endorse the project and will be looking for participants. Our US TAG sees two issues for standardization – valid frequency measurement algorithms or requirements with appropriate response for variations in power system behavior; and fundamental application logic that is free of aberrations –

including timers, supervising quantities, and state retention or latches that impact application behavior of a F/ROCOF measurement implementation. The goal should be a functional standard with realistic test scenarios. After I4 meeting – UNSC support submitted including recommendations on work. NERC has been tied to this (Ryan Quint); the USNC supplied the NERC report on the 2016 California Blue Cut Fire event in which 1.2 GW of grid-connected PV dropped because of a normally-cleared 500 kV fault.

- 60255-132/167 **Functional standard for directional relays** – TC 95 plans to begin a new functional standard development for directional power and directional overcurrent relays.
- IEC 60255-187-1: **Functional requirements for restrained and unrestrained differential protection of motors, generators and transformers** – CDV has been rolled back to CD as the MT addresses significant editing issues.
- 60255-187-2: **Functional requirements for busbar differential protection** – The first draft is expected in 2019 – then PSRC will create a focused WG to review and support development.
- 60255-187-3: **Functional requirements for biased (percentage) differential relays for transmission lines** - The first draft is expected in 2019 –PSRC already has created WG D34 under Normann Fischer to deal with the CD when it arrives.

I26: MATHEMATICAL MODELS OF INSTRUMENT TRANSFORMERS

Chair: Mike Meisinger (S&C)

Vice Chair: Steve Turner (Electrical Consultants, Inc.)

Output: Report

Established Date: 2013

Expected Completion Date: N/A

Draft: 1.0

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

1. Introductions
2. Approval of minutes from September 2018 meeting

Dr. Sakis Meliopoulos joined the working group and will draft a summary section based upon his presentation from the September meeting last year. Amir Makki will draft a section on new transducers and technology. Steve Turner will assemble the report which will then be distributed to our members for review and balloting.

I29: REVISION OF C37.110 – GUIDE FOR THE APPLICATION OF CURRENT TRANSFORMERS FOR PROTECTIVE RELAYING PURPOSES

Chair: Joseph Valenzuela

Vice Chair: Michael Higginson

Output: Guide

Established Date: September 2014

Expected Completion Date: May 2019

Draft: 20190115

Assignment: Review and revise C37.110. Include microprocessor relay applications.

The working group convened with 19 attendees, including 7 members and 12 guests. The working group achieved a quorum.

The patent slides were reviewed, and no patent concerns were raised.

The working group reviewed edits that have been made by the team. There were a few additional editorial changes that must be made before sending to ballot.

The following changes need to be made prior to document submittal on IEEE myProject:

- Check for “error” text in word document
- Integrate Mathcad revisions from Jackie
- Make sure Section is not used elsewhere - Clause is the proper term

- Adjust verbiage around figures 34-36 to reflect voltage settings in new plots

Will Knapek motioned that we move to a balloting body in IEEE SA, Jeff Long seconded. The working group members in attendance unanimously approved sending it to IEEE SA ballot.

Alla Deronja and Mal Swanson advised of the new procedure for approval. We are to send the document for IEEE SA edit. It will be edited in parallel by IEEE editorial and the balloting body. Working group chair to work with Erin to ensure we follow the proper process. We are targeting completing this by the end of January.

Guillermo Weyer motioned to adjourn, seconded by Mal Swanson.

For next meeting, we would request a single meeting with room for 30 and a computer projector. Please avoid conflict with C26, C30, C38 and J15.

I30: REVISION OF C37.235 – GUIDE FOR THE APPLICATION OF ROGOWSKI COILS USED FOR PROTECTIVE RELAYING PURPOSES

Chair: Ljubomir Kojovic

Vice Chair: Robert Frye

Output: Guide

Established Date: 2014

Expected completion date: 2019

Draft: 7.0

Assignment: Revise C37.235

I30 met on Tuesday, January 15, 2019 with no members and no guests. A quorum was not obtained and no IEEE or C37.235 business was discussed.

The Chair and Vice Chair were not able to attend due to health and family reasons.

Outside of the meeting, through email, we are attempting to obtain approval of Draft 07 of the document so we can proceed to the Mandatory Editorial Coordination and subsequent balloting. If this is not successful, we will look forward to obtaining the membership approval at the May 2019 meeting.

We are on Draft 07 of the document.

We will need a room for 20 personnel for our next meeting.

This meeting should not conflict with I-38 due to vice chair of I-30 being the chair of I-38.

I31: IEEE 1613 –STANDARD FOR ENVIRONMENTAL AND TESTING REQUIREMENTS FOR DEVICES WITH COMMUNICATIONS FUNCTIONS IN ELECTRIC TRANSMISSION AND DISTRIBUTION FACILITIES

Chair: B. Mugalian

Vice Chair: Jerry Ramie

Secretary: Craig Preuss

Output: Standard

Established Date: February 5, 2016 (PAR approval date)

Expected Completion Date: December 31, 2020

Draft: 0.35

Assignment: N/A

WG I31 met with 24 local and 3 remote attendees (shown below). The working group voted unanimously to amend its proposed PAR changes with only the addition of requesting the Power System Communications and Cybersecurity Committee to co-sponsor the PAR.

The working group chair called the meeting to order at 8:08 am local time. A quorum was announced (10 of 18 members present). The patent slides were shown and no claims were made.

A motion to approve the September 2018 meeting was made by Mike Dood and seconded by Jerry Ramie. The motion carried unanimously via voice vote.

Under new business, the vice chair made a motion to reconsider the motion from the September 2018 meeting to approve a new title, scope, and purpose. The motion was seconded by Jerry Ramie. The motion carried unanimously via voice vote.

The vice chair made a motion to amend the previously approved title, scope and purpose to add Co-Sponsorship from the Power System Communications and Cybersecurity Committee (PSCCC). The motion was seconded by Jerry Ramie. The motion carried unanimously via voice vote.

The vice chair made a motion to take the amended motion to the subcommittee for approval. The motion was seconded by Mike Dood. The motion carried unanimously via voice vote.

Jay Anderson made a motion to adjourn. Jerry Ramie seconded the motion. The motion carried unanimously via voice vote. The meeting was adjourned at 8:28 am local time.

The proposed title, scope and purpose approved at the meeting:

Title:

IEEE Standard for Environmental and Testing Requirements for Devices with Communications Functions in Electric Transmission and Distribution Facilities

Scope:

This standard specifies ratings and service conditions, environmental performance and testing requirements for devices with communications functions installed in electric transmission and distribution facilities. Environmental and electromagnetic compatibility (EMC) immunity levels and type-tests simulating electric transmission and distribution facilities are described. Acceptance criteria for evaluating device functionality are provided.

Devices performing strictly protective relaying functions covered by the IEEE C37.90 family of standards are not covered by this standard. Where a device includes communication functions that support both protective relaying and non-protection functions, the most rigorous standard shall apply.

Purpose:

The purpose of this standard is to define the environmental and EMC conditions present in electric power transmission or distribution facilities and to establish a common reproducible basis for designing and evaluating devices to be installed in those locations.

The attendee list is below.

Attendee List

Members	
Craig Preuss	Black & Veatch
Jerry Ramie	ARC Technical Res.
Richard Worley	Dell Technology
Ken Fodero	SEL
Mike Dood	SEL
Jay Anderson	ComEd
Brian Mugalian	S&C
Claire Patti	PGE
Mario Ranieri	Electroswitch
Fred Friend	AEP
Mike Meisinger (remote)	S&C
Guests	
Jim Niemira	S&C
Andy Kunze	Enbridge
Patrick Chavez	NuGrid Power
Takaya Shono	Toshiba
Dave McGuire	Hubbell
Louis Garavaglia	G&W Electric
McPhalen Mgunda	NextEra Energy
Jay Herman	EPRI
Jeff Burnworth	Basler Elec. Co.
Chris Huntley	SEL
Tim Farrar (remote)	TRC
Jeff Pond	National Grid
Nikoi Nikoi	IEEE-SA
Erin Spiewak	IEEE-SA

Subsequent to the I31 WG meeting at the I-SC meeting, a Motion to Reconsider was made by Preuss on behalf of I31 WG to reconsider the earlier motion to revise title and scope changes of 1613 from the last ISC meeting for the purpose of adding co-sponsorship by EMC Society. Motion to Reconsider passed. A Motion to Amend was made by Preuss on behalf of the I31 WG to add co-sponsorship by the EMC Society to 1613. After some discussion, the Motion to Amend passed. Preuss made a Motion to seek approval from the Main Committee for the revised Scope and Purpose of 1613 as amended to include co-sponsorship by EMC Society; motion was seconded by Eric Udren. Motion passed.

Subsequent to the I-SC Meeting, at the Main Committee, Brian Mugalian requested, 'Mr. Chair, the Relaying Practices Subcommittee requests revised PAR title and scope approval for P1613 – IEEE Standard for Environmental and Testing Requirements for Devices with Communications Functions in Electric Transmission and Distribution Facilities. All of the necessary documentation required in the PSRCC Policies and Procedures Manual has been submitted by the Working Group to support this request.'

I32: A SURVEY OF PROTECTIVE SYSTEM TEST PRACTICES

Chair: Andre Uribe

Vice Chair: Don Ware

Output: Report

Established Date: May 12, 2015

Expected Completion Date: May 2019

Draft: 3.2

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

The Working Group met on Tuesday, January 15th, 2019.

The working Group voted to submit the survey as final to the Subcommittee for approval

Meeting adjourned

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: 1.8

Assignment: Produce formal definitions for terms commonly used to describe relay testing procedures and prepare a report for consideration by the I Subcommittee and future inclusion in the IEEE Dictionary.

Working Group I33 met on Tuesday January 15, 2018 with 6 members and 3 guests. Six members voted to approve the September 2018 meeting minutes.

The following items were discussed during this meeting:

The chair reported the status of our report in benefit of the members and guests attending. Since our last meeting the list of terms has been consolidated with input from WG members and we now have around 40 terms

Will Knapek is volunteering to act as liaison with I35 PC37.2 Standard for Electrical Power System Device Function Numbers, Acronyms, and Contact Designations and will help us avoid duplication with any of the testing terms that we may include in our report.

The WG started a review of the list of terms in the report and discussed the proposed changes submitted by contributors to the existing definition.

Assignments:

Zach Zaitz: Working on consistency in definitions

Eric Monson: Hierarchy in CIGRE docs

I35: PC37.2 – STANDARD FOR ELECTRICAL POWER SYSTEM DEVICE FUNCTION NUMBERS, ACRONYMS AND CONTACT DESIGNATION

Chair: Mike Dood

Vice Chair: Marc Lacroix

Output: Standard

Established Date: 2017

Expected Completion Date: December 2020

Draft: 0.2

Assignment: N/A

I35 met with 6 members, 1 corresponding member and 2 guests to discuss the final version of the document.

The patent slides were shown at the participants.

Announced that the PAR extension was approved for another 2 years.

Originally, the objectives were to add a few modifications.

Discussion on device number 21.

- The name now is “distance relay” while the function describes the use of impedance to trig the relay.
- Should we change the name “Distance relay” to “Impedance relay”?
- It is decided to change the title: “distance (impedance) relay”

The document will be finalized with the latest IEEE template and circulate via iMeet Central.

Next meeting will be in May.

Attendees list is below.

Attendees List

Members	
Mike Dood	SEL
Marc Lacroix	EMCREY Canada
Eric Thibodeau	Gentec
Craig Preuss	Black and Veatch
Anthony Newman	Ameren
Nilesh Bitimoria	Dominon Energy
Will Knappek – corresponding member	Omicron
Guests	
James K Niemara	S&C
Dolly Villagmills	Power Grid Eng.

I36: REVISION OF C37.90.2 – STANDARD FOR WITHSTAND CAPABILITY OF RELAY SYSTEMS TO RADIATED ELECTROMAGNETIC INTERFERENCE FROM TRANSCEIVERS

Chair: Jeffrey Pond

Vice Chair: Jeff Burnworth

Output: Revision of IEEE Std. C37.90.2

Established Date: September 2017

Expected completion date: September 2020

Draft: N/A

Assignment: Revision IEEE Std. C37.90.2 Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.

I36 met on Tuesday Jan 15, 2019 with quorum of 8 members and 8 guests

Reviewed SA - Patent Slides for Standards Development.

Minutes of the May 2018 meeting in Pittsburg were approved via email vote.

Minutes of September 2018 meeting in Minneapolis were approved.

The working group approved the motion with a 2/3rds majority that the EMC Society will be a co-sponsor and will participate in the ballot process of the revised standard. The participating group from the EMC Society is SDE-COM (Standards Development and Education Committed).

The working group reviewed the submitted editorial and technical changes to the existing IEEE C37.90.2 standard that were submitted by Jerry Ramie.

I37: REVISION OF C37.90 - STANDARD FOR RELAYS AND RELAY SYSTEMS ASSOCIATED WITH ELECTRIC POWER APPARATUS

Chair: Oscar Bolado

Vice-Chair: Marilyn Ramirez

Output: Standard

Established Date: January 2018

Expected Completion Date: N/A

Draft: 1.0

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

Working Group Meeting No. 4

Working group C37.90 met on Tuesday, January 15 at 4:30 PM with 4 out of 13 members and 6 guests present. The following items were discussed:

1. Meeting agenda was reviewed.
 2. IEEE-SA Patent Slides 0 to 4 were presented with no comments nor patent claims from the group.
 3. Minutes of the September meeting were reviewed. There was no Quorum to approve the meeting minutes.
 - a) September minutes will be approved via e-mail.
 4. PAR was presented. It has been approved by SA, with a PAR Expiration Date: 31-Dec-2022
 5. The Standard was presented re-formatted with the new template of the IEEE.
 6. A draft of Standard C37.1.1 was presented. To decide whether or not its content will be part of our document.
 7. Proposal Draft for new outline of the standard was presented. This is now posted on iMeet Central to be reviewed by the working group for additional input.
 8. Draft 2 (D2) of the standard will be created with the proposed outline to initiate writing assignments.
- 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: Robert Frye

Vice Chair: E.A. Udren

Output: Standard

Established Date: January 2018

Expected completion Date: December 2019

Draft: N/A

Assignment: Approved IEEE Standard C37.92, *Standard for Analog Inputs to Protective Relays from Electronic Voltage and Current Transducers*

I-38 met on Wednesday, January 16, 2019 with 5 members and 8 attendees total. Vice Chair Eric Udren hosted the meeting. Eric thanks WG member Ritwik Chowdhury for taking meeting notes.

After introductions, the Chair reviewed IEEE patent slides; attendees reported no patent concerns. A quorum was not achieved, and the September minutes could not be approved. If members miss 2 out of 4 meetings, they may be pruned.

Eric presented Robert's update regarding status of the PAR and the balloting process. There was a balloting body imbalance due to minimal utility participation – too many manufacturers and consultants. According to Erin Spiewak (IEEE-SA) we are imbalanced by 2 to 4 votes. A few options exist to solve this imbalance:

1. We could get 4 more people to sign up as another group that is not manufacturer or consultant (e.g. user).
2. We could raise the issue in the sub-committee meeting to help achieve more utility participation.
3. We could create a "General" category where members can sign up to restore the balance. This has been done in the past, but Eric hopes we will not have to resort to this.

Eric summarized the standard. One new attendee raised the claim that the IEC standards and C37.92 are inconsistent. It was asserted that the IEC standards dictate the use of a 2M ohms input impedance, whereas the IEEE specifies 10k ohms. This standard has been around since 1992, so this was surprising that no one has heard of this issue before. The attendee claimed this is because no one has developed a C37.92 compliant product. While neither value presents a significant technical challenge, the acting chair suggested that the attendee submit this comment as part of the balloting process on C37.92 now underway.

Eric ended the meeting by indicating that one of the objectives of this group is to encourage implementation and use of this standard, and make technical edits only as required during industry review. The WG will follow up with all the issues that get raised during the balloting process, including any validated inconsistencies between IEEE and IEC.

After the I38 meeting – Eric identified five utility balloters who will sign up when the balloting body is reopened by Chair Robert Frye in the following weeks.

ITF39: STANDARD FOR I/O REQUIREMENTS AND TESTING METHODOLOGY FOR INTELLIGENT ELECTRONIC DEVICES (IEDS)

Chair: Craig Preuss

Vice Chair: Angelo Tempone

Output: Standard

Established Date: January 2018

Completion Date: September 2018

Draft: 3.0

Assignment: Review report that needs to be submitted to the committee to initiate a Work Group based on the need expressed by the members of the Task Force in the subject of Standard for I/O Requirements and Testing Methodology for Intelligent Electronic Devices (IEDs).

ITF39 has disbanded. The I/O requirements will be included in the work of WG I37 for inclusion in C37.90.

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: Jeff Burnworth

Vice Chair: Bruce Mackie

Output: Standard

Established Date: Sep 2018

Expected Completion Date: Dec 31, 2022

Draft: N/A

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 ITF40 met on Tuesday, January 15 at 3:00am in a single session with 10 attendees.

After introductions, the IEEE patent slides were reviewed.

Minutes from the September 2018 meeting in Minneapolis were reviewed and approved.

A draft of a proposed scope, purpose and PAR was reviewed and approved by the Task Force.

The ITF40 task force concluded to recommend to the I Subcommittee of the PSRCC that a PAR be submitted to form a working group (I40) to revise IEEE Std C37.90.1™-2012 - IEEE Standard Surge Withstand Capability

(SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus. The Subcommittee approved the creation of a working group.

ITF41: REVIEW OF IEEE C37.90.3 - IEEE STANDARD ELECTROSTATIC DISCHARGE TESTS FOR PROTECTIVE RELAYS

Chair: Steve Turner
Vice Chair: Open
Output: Standard
Established Date: September 2018
Expected Completion Date: N/A
Draft: N/A

Assignment: N/A

Ten members attended the meeting. We opened with introductions then started our discussion. There is much interest to form a working group to revise the standard incorporating new recommended practices such as how to test communication pins (i.e., ANSI C63.16). Note the last revision occurred in 2001.

Here is a partial list of items that require revisions to update the standard:

- Section 3.2.3 – Review wave shape
- Section 3.2.4 – Figure 3
- Section 3.2.5 – test points should be the weakest points
- Section 3.2.6
- Section 3.4 - Add a sample
- Bibliography (e.g., IEEE 100 is no longer available)
- Definitions (coordinate with WG I2)
- Annex A
- Annex B
- Annex C should reference IEC 61000-4-2 Electrostatic Discharge Immunity Test Standard
- Annex D (Eric Udren will provide voltage levels for testing from the new draft for IEC 60255-22-2)

There was a motion to convert to a working group (I41) which was unanimously voted in favor of to proceed. Note that Subcommittee I met later in the week and it was voted to form a new working group.

The first action item is to obtain the PAR for review and draft a purpose.

We need members from utilities. We also need a volunteer to act as vice chairman.

Attended:

Steve Turner, ECI	Luis Garavaglia, G&W Electric
Brian Mugalian, S&C	Dave McGuire, Hubbell-RFL
Jim Niemira, S&C	Mario Ranieri, Electros witch
Jerry Ramie, ARC Technical	Jeff Burnworth, Basler Electric
Richard Worley, Dell	Jeff Pond, National Grid

ITF42: SCOPE REVISION AND NAMING OF THE I SUBCOMMITTEE

Chair: Brian Mugalian
Vice Chair: Not assigned
Output: Draft of Revised Scope
Established Date: 2019
Expected Completion Date: N/A
Draft: 1.0

Assignment: Review and revise the Scope of the I Subcommittee

ITF42 Task Force met on January 15, 2019 with four participants. A review of the previous revision of the scope was reviewed and the group determined that it would be submitted to the I Subcommittee members for review and comment. Comments due by January 31, 2019.

The Task Force will plan to meet at the May 2019 meeting to review any comments before putting the scope revision to a vote by the Subcommittee.

7. Liaison Reports

TRANSFORMERS COMMITTEE

Liaison: Fred Friend

The **next Transformers Committee meeting will occur March 24-28; Hilton Anaheim, California USA**. The following is the status of their work:

Approved New Standards:

PC60076-16 IEC/IEEE International Draft Standard - Power Transformers - Part 16: Transformers for Wind Turbine Application

PC57.161 Guide for Dielectric Frequency Response Test

Approved Revisions to Transformer Standards:

PC57.109 Guide for Liquid-Immersed Transformers Through-Fault-Current Duration

PC57.110 Recommended Practice for Establishing Liquid-Immersed and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents

PC57.119 Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings

Approved PARs for New Projects

PC57.167 Guide for Monitoring Distribution Transformers

PC57.168 Guide for Low Frequency Dielectric Testing for Distribution, Power and Regulating Transformers

PC57.12.200 Guide for the Frequency Domain Spectroscopy Measurement of Transformer Bushings (ENTITY PAR)

Approved PARs for Revision of Standards

PC57.12.70 Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers

PC57.149 Guide for the Application and Interpretation of Frequency Response Analysis for Oil-Immersed Transformers

PC57.154 Standard for Liquid-Immersed Transformers Designed to Operate at Temperatures Above Conventional Limits Using High-Temperature Insulation Systems

PC57.98 Guide for Transformer Impulse Tests

Approved PAR Extensions

PC57.93 Guide for Installation and Maintenance of Liquid-Immersed Power Transformers (December 2020)

8. Old Business

- a. No Old Business.

9. New Business

- a. Amended Motion to Revise scope and purpose of 1613 with added co-sponsorship by EMC Society to be presented to the Main Committee; refer to I31 WG report above for details.

Motion to Adjourn was made by Pond; second by Swanson. Meeting Adjourned.

J: Rotating Machinery Protection Subcommittee

Chair: Dale Finney

Vice Chair: Gary Kobet

Rotating Machinery Protection Subcommittee Scope

Evaluate and report on protective relaying concepts and practices applicable to generators, motors, synchronous condensers, associated auxiliary systems, and performance of plant protective systems. Develop and maintain related relaying standards.

J SC met with 23 out of 32 members and 17 guests, reaching quorum.
September 2018 J SC meeting minutes were approved.
10 J SC WGs met

J5: Application of Out-of-Step Protection Schemes for Generators

Chair: Sudhir Thakur

Vice Chair: Manish Das

Output: Report to the Subcommittee

Established: 2011

Status: 18th Meeting

Working Group Assignment: Produce a summary and full report to the "J" Subcommittee explaining the various schemes and setting guidelines in use for Out-of-Step protection for AC generators. The report should be in the format that could be used as feeder material into the next revision of C37.102-IEEE Guide for AC Generator Protection

WG Report

The Working Group met for a single session with 5 members and 9 guests present. The Vice-Chair of ran the meeting in absence of the Chair.

The Vice-Chair stated that the report has passed the subcommittee ballot with 84% approval. There was 1 disapproving vote with comments. Majority of the ballot comments have been addressed and the updated report uploaded to the old J webpage at <http://www.pes-psrc.org/old/j/j05/j05.html> (click on Documents).

The Vice Chair stated that the disapproving ballot had many comments; some unaddressed ballot comments were discussed during this meeting. The Vice Chair stated that the comments were helpful, and as many of the remaining comments will be addressed as possible.

Gary Kobet outlined cases where the PLU scheme and overspeed trips were intended to protection against out of step conditions and has concern about their performance. The Vice Chair will attempt to reach out to any GE contacts on this scheme, and the group agreed to consider adding some discussion in the report on why an Overspeed trip is not a good substitute for Out of Step relay trip.

Dale Finney will provide a visio file for the first 40 element in Fig 8.

It was decided to incorporate an additional description for the simple mho scheme.

Vice Chair will follow up with section authors for clarifications regarding comments on their schemes.

All comments are being planned to be addressed in the next 2 weeks, with revision targeted to be published on January 31, 2019.

A J5 summary paper is being prepared and is expected to be ready by the May meeting.

In absence of the Chair, the Vice Chair and J Chair will be leading a J5 presentation at Thursday's Main Committee Meeting.

J12: Improved Generator Ground Fault Protection Schemes

Chair: Dale Finney

Vice Chair: Manish Das

Established: Jan 2013

Output: Report to subcommittee

Status: 17th Meeting

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

WG Report

The WG met on Tuesday Jan 17, 2019 with 7 members and 7 guests.

There were no comments on the minutes from the September meeting

Nearly 75% of the ballots have been returned. Many ballot comments were reviewed and addressed with good discussion generated during the meeting.

J12 members are urged to review and return the remaining ballots as soon as possible.

The working group will have its 17th meeting in May 2019, with the need for a single session, computer projector and seating for 30 people.

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

WG Report

The working group met with 10 members and 12 guests present. A quorum was not achieved.

The working group will send a clean version of the draft report to ESCS and PSDP for comment. A conference call meeting will be arranged with each group if comments are received that require discussion to resolve.

Juan Gers reviewed a proposed example based on actual data for a generator in the ERCOT Interconnection. Sample simulations will be with and without controls modeled including governor, AVR and PSS, to demonstrate the impact on settings. Examples will include faults and other abnormal operating conditions for which consideration of generator controls is necessary to set the generator relays. The working group will consider providing a tool (such as an Excel spreadsheet) to translate the generator capability curve from the P-Q plane to the R-X plane.

The working group discussed references to NERC Reliability Standards. All discussion will be included in a new section at the end of the report. A brief description of four standards relevant to this report will include titles, purpose, and overview of requirements. The discussion will include guidance on consideration of the steady-state stability limit (SSSL).

Sandro Aquiles-Perez will assist Juan Gers with the example section of the report.

Charlie Henville will provide input on the governor controls section and the SSSL discussion.

Phil Tatro will assist with descriptions of the relevant NERC requirements.

Juan Gers and Phil Tatro will incorporate all comments received prior to this meeting and assignments from this meeting and distribute the report for working group review by mid-June, with comments due by the end of July.

The working group goal is to complete the report and submit for subcommittee balloting by the end of 2018.

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: 12th Meeting

Assignment: Investigate and report to the J Subcommittee on plant protection issues associated with black start.

WG Report

The working group held its thirteenth meeting on Tuesday, January 15th, 2019 with 4 members and 1 guests in attendance.

- I. Vice Chair kicked off the meeting at 4:30pm with introductions.
- II. Minutes from the September 2018 meeting were circulated and no comments were made.
- III. Status Update
 - a. Paper is complete and circulated for balloting.
 - b. 14 ballots have been received and 13 addressed. Dale Finney's comments were addressed during this meeting.
 - c. 6 more ballots needed to achieve the 75% balloting threshold.
- IV. Section Review. None
- V. General Discussion
 - a. Working reviewed and resolved Dale Finney comments. Resolution comments were added to his comments in Draft 7.
 - b. Discussion on how to handle balloting for retirees and other inactive members. Suggestion was to email them requesting their vote, and if no responses, they can be moved to non-voting status.
 - c. Derek Haas authored the section on Unbalance Protection, Vice-Chair agreed he should be listed as a Working Group member,
 - d. Dale Finney informed the Working Group that the paper would need to be reformatted in the IEEE PES online publication format. He will provide the template. It was agreed that the transfer to the new format should happen after the paper has been approved.
- VI. Next Steps
 - a. All members to submit their votes (approve, provisional approval, or reject).
 - b. Chair/Vice Chair will incorporate comments as necessary and forward to subcommittee.
 - c. There will be at least one more meeting to wrap up any pending comments.
- VII. Meeting adjourned at 5:15pm.

J-15: Investigation of the Criteria for the Transfer of Motor Buses

Chair: Wayne Hartmann

Vice Chair: Joseph Valenzuela

Established: 2015 (1/15)

Output: Report

Status: 12th Meeting (190116)

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

The WG met January 16, 2019 with 6 members and 12 non-members.

Chair reviewed a brief history and purpose of WG, including the focus of reviews, presentations and studies to effect the assignment.

Chair reviewed Draft 1 of the report with the group noting it was compiled the contributions from each member or team.

Assignments:

1. Each contributing member or team should review Draft 1 of the Report and their contributions to confirm proper transposition for Draft 1. Contributing WG members and teams to provide comments to the chair and vice-chair by email by April 5, 2019.
2. Chair with rationalize all transposition errors for Draft 2.
3. Chair and Chris Ruckman will add NEMA MG-1/ANSI C50.41 transfer limits discussion for Draft 2.
4. Chair add Introduction for Draft 2
5. Chair will add Conclusions from report draft contents into Draft 2.

J16: PC37.101, Guide for Generator Ground Protection

Chair: Nate Klingerman

Vice Chair: Sudhir Thakur

Established: 2016

Output: Guide

Status: 6th Meeting

The WG did not meet. The WG requests a single session with space for 35 people with a computer projector for January 2019 session. The WG also requests no conflict with other J meetings, especially J17 (C37.102).

J17 - Revision of C37.102 Guide for AC Generator Protection

Chair: Manish Das

Vice Chair: Gary Kobet

Output: IEEE Guide

Draft: 0

Established: May 2017

Status: 4rd WG meeting, Pittsburgh PA

Expected completion date: December 2021 (initial sponsor ballot by January 2021)

Assignment: Revise C37.102 Guide for AC Generator Protection

WG Report

Working Group J17 held its meeting in a double session on Tuesday, January 15, 2019. This was the seventh in-person meeting for this working group.

There were 25 out of 39 members present across both sessions; a quorum was reached. 23 guests attended the meeting. It should be understood that those members who have made no contribution and have not responded to requests for contribution will be removed from the membership.

Minutes from the May 2018 and September 2018 meetings were approved.

The IEEE patent requirement slides were presented, and attendees were given the opportunity to identify any known patent claims.

The Chair then began by initiating a review of comments received for subclauses 5.4, 5.5, 5.6, 5.7, 6.0, 7.0:

Subclause 5.4 Inadvertent energizing

- Editorial comments by Russ Patterson and Jun Verzosa were accepted.
- Subclause 5.4.2.1 Directional overcurrent was deleted. WG agreed scheme was obsolete.
- A reference to C37.119 Guide for Breaker Failure Protection will be added. Note that subclause 6.15 of C37.119 provides detailed information on breaker failure relaying applied to generators. Any reference to generator breaker failure protection in this (C37.102 subclauses 4.7 and 5.4) guide should be harmonized with C37.119 subclause 6.15.
- Russ Patterson reviewed reference B123 and noted that document said nothing about delaying inadvertent energizing protection by 0.1s. He offered a rewrite of the sentences referring to B123 that will be considered.

Subclause 5.5 Sub-synchronous Resonance

- Editorial comments by Steve Conrad and Rob D'Aquila were accepted.
- Add reference to textbook provided by Normann Fischer (**needs to provide**)

Subclause 5.6 Transmission Line Reclosing w/review of J7 output

- Editorial comments by Gary Kobet and Chris Ruckman were accepted.
- Add reference to paper provided by Normann Fischer (**needs to provide**).

Subclause 5.7 Synchronizing

- Section rewritten/reorganized by Mike Thompson.
- Ensure example manufacturer's slip frequency of 0.167Hz is correct, otherwise reword/remove before publication.
- This section will be harmonized/make reference to the work of the J task force/working group on Generator Synchronization.
- Information on voltage limits/difference will be added to one or both of the documents (to be determined).

Subclause 6.0 MGPS

- Editorial comments by Gustavo Brunello and Kelvin Barner were accepted.
- Subclause 6.2.1 Protective functions. Ensure device names are consistent in J12 report.
- Subclause 6.2.2. On redundancy, a guest suggested considering adding a reference to C37.120, which is currently being revised by Working Group C31.
- Subclause 6.3 will be harmonized with C37.233 Guide for Power System Protection Testing, subclause 6.9. Dennis Tierney and Doug Weisz will liaison with Working Group C26 on this.

Subclause 7.0 Protection Specification

- Editorial comments by Manish Das and Sungsoo Kim were accepted.
- Several comments/discussions on the figures, Meyer Kao will rework.
- Manish Das and Sungsoo Kim will re-review subclauses 7.2.2.4 Sequential tripping of steam turbine generators and 7.2.2.4.1 Performance of reverse power relay for sequential tripping to ensure there is no repeat material or conflict with the newly added material and subclauses within 4.5.5.3 Reverse Power Relay.

Claire Patti suggested the working group have a small group review the document for terms not appearing in the IEEE Dictionary that may need new definitions. It is noted the document does not presently have a definitions clause.

The Chair reported that work has already started on the sample calculations in Annex A, and WG is requested to review the new sample generator, GSU and system parameters chosen. The Chair will send this info to the WG via email, and review comments (via email is fine) is due by **1/31/2019**. It is expected that the revised Annex A will be reviewed in upcoming WG meetings.

For the May meeting, request a double session for 40, computer projector

Subclause Review Assignment Instructions:

- Any new review comments must be made in the latest C37.102 word draft found in iMeetCentral folder “C37.102/Drafts/Drafts in Progress” using “tracking on” and include your proposed new verbiage. In general, comments that don’t offer suggested verbiages will not be considered.
- Address comments in the below 3 files available in folder “C37.102/Comments from previous revisions”:
 - C37.102 -2012 Reaffirmation – ALL comments.xlsx
 - C37.102_Comments_Alla Deronja_20110509.docx
 - J3 Power Plant and Transmission System Protection Coordination – Final Report – 2012.pdf
- A copy of NERC TRD Power Plant Transmission System Protection Coordination, Revision 1, July 2010 is also available in the above folder.
- Coordinate with the Figures group if your subclause figures need to be updated.
- Address any formatting, editorial or other comments made by the IEEE-SA team (Daniella Martinez and Michelle Turner) in the C37.102 word document. Note that there’s one major change since the 2006 version which is that all figures have been renumbered to appear in the draft sequentially rather than by clause #.
- Each group must only upload a single commented word copy with input from all group members. Identify the clause/subclause # in the filename.
- All new uploads after the Jan 2019 meeting and prior to May 2019 meeting should be made into the folder “C37.102/Assignments/2019-04-01”.

Latest Subclause Assignments

Subclause	Description	Assignees
-----------	-------------	-----------

<i>Figures</i>	Accuracy & consistency of Figures throughout C37.102	Don Burkart, Jason Espinosa, Dale Finney, Meyer Kao
3.0	Description of generators, excitation systems, and generating station arrangements	Onur Usmen, Normann Fischer
4.2	Field Thermal Protection	Onur Usmen, Normann Fischer
4.4	Generator Rotor Field Protection	Onur Usmen, Normann Fischer
4.8	Excitation System Protection	Onur Usmen, Normann Fischer
4.1	Generator Stator Thermal Protection	Dale Finney, Nate Klingerman, Russ Patterson
4.3	Generator Stator Fault Protection (Excluding 4.3.3)	Dale Finney, Nate Klingerman, Russ Patterson
4.3.3	Stator GF w/ concurrent review of C37.101	Gers, Beckwith, Hartman, Klingerman, Finney, Nader
4.5.1	Loss of Field	Gary Kobet
4.5.2.	Unbalanced Currents	Russ Patterson, Bob Pettigrew, Sudhir Thakur
4.5.3	Loss of Synchronism	Jason Espinoza, Dennis Tierney
4.5.4	Overexcitation w/ concurrent review of C37.106	Will English, Jason Espinosa, Murty Yalla
4.5.5	Motoring	Kelvin Barner, Jason Espinosa
4.5.6	Overvoltage	Ryan Carlson, Prem Kumar, Manish Das
4.5.7	Undervoltage	Ryan Carlson, Prem Kumar, Manish Das
4.5.8	Abnormal Freq w/ concurrent review of C37.106	Jason Espinoza, Lifeng Yang
4.6	Backup Protection	Phil Tatro, Mike Thompson
4.7	Gen BF w/ concurrent review of C37.119	Phil Tatro, Mike Thompson
4.9	Power Transf Prot through mechanical fault detection	Don Burkart, Zeeky Bukhala
5.1	Current Transformers	Hasnain Ashrafi, Zeeky Bukhala
5.2	Voltage Transformers	Hasnain Ashrafi, Zeeky Bukhala
5.3	Protection during Startup or Shutdown	Sungsoo Kim, Ratan Das
5.4	Inadvertent Energizing	Russ Patterson, Jun Verzosa
5.5	SSR	Steve Conrad
5.6	Transmission Line Reclosing w/ review of J7 output	Gary Kobet, Chris Ruckman
5.7	Synchronizing	Randy Hamilton, Mike Thompson
6.0	MGPS	Gustavo Brunello, Kelvin Barner
7.0	Protection Specification	Manish Das, Sungsoo Kim
Annex A	Sample Calculations	Onur Usmen, Juan Gers, Ritwik Chowdhury, Nate Klingerman
Terminology Review	Review C37.102 for terms not appearing in IEEE Dictionary that may need new definitions	Claire Patti, TBD, TBD

NERC Standards Review Assignments:

NERC Document	Assignees
SPCS Technical Reference Document - Power Plant and Transmission System Protection Coordination - Revision 2	Arman Vakili
PRC-001-1.1(ii) System Protection Coordination	Luis Polanco
PRC-004-5(i) Protection System Misoperation Identification and Correction	Kelvin Barner

PRC-005-1-1b Transmission and Generation Protection System Maintenance and Testing	Kelvin Barner
PRC-006-2 Automatic Underfrequency Load Shedding	Mircea Rusicior
PRC-019-2 Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection	Juan Gers
PRC-024-2 Generator Frequency and Voltage Protective Relay Settings	Sudhir Thakur, Mircea Rusicior
PRC-025-1 Generator Relay Loadability	Sudhir Thakur, Ritwik Chowdhury
PRC-026-1 Relay Performance During Stable Power Swings	Meyer Kao

NERC PRC standards:

<http://www.nerc.com/pa/stand/Pages/ReliabilityStandardsUnitedStates.aspx?jurisdiction=United%20States>

Recent and Ongoing J Reports to be used as feeder into C37.102:

J Publication	Status	Assignees (WG Chair/Vice Chair)
J2 Protection Considerations for Combustion Gas Turbine Static Starting (2011)	complete (2011)	Mike Reichard, Zeeky Bukhala
J3 Power Plant and Transmission System Protection Coordination (2012)	complete (2012)	Phil Waudby, Sungsoo Kim
J5 Coordination of Generator Protection with Generator Excitation Control and Generator Capability (2007)	complete (2007)	Mike Reichard
J5 Application of Out-of-Step Protection Schemes for Generators (ongoing)	Ongoing, est. completion 2018	Sudhir Thakur, Manish Das
J6 Protection Issues Related to Pumped Storage Generation (ongoing)	complete (2017)	Joe Uchiyama, Dale Finney
J7 Avoiding Unwanted Reclosing on Rotating Apparatus (2017)	complete (2017)	Mike Reichard, Steve Conrad
J8 Tutorial on the Protection of Synchronous Generators (2011)	complete (2011)	Mike Thompson
J12 Improved Generator Ground Fault Protection Schemes (ongoing)	Ongoing, est. completion 2018	Dale Finney, Manish Das
J13 Modeling of Generator Controls for Coordinating Generator Relays (ongoing)	Ongoing, est. completion 2018	Juan Gers, Phil Tatro
J14 Plant Protection Issues Associated with Black Starting of Generators (ongoing)	Ongoing, est. completion 2018	Chris Ruckman, Zeeky Bukhala

All PSRC published publications: <http://www.pes-psrc.org/kb/published/reports.html>

J18 Investigate the effect sub-synchronous oscillations due to inverter based resources (IBR) on rotating machinery protection and control

Chair: Normann Fischer

Vice Chair: Rene Midence

Output: Report

Established: September 2017

Status: WG

WG Report

ATTENDANCE:

Total 20; Guests xx; Members yy (the new sheet does not have a column for this)

OVERVIEW:

The chair of the working group discussed the reasons why the working groups JTF2 and J18 should be combined into one. A presentation was used to explain and justify the fusion of both working group. This will be discussed in the J subcommittee meeting. The presentation discussed the different power system interaction phenomena such as SSR, SSO, SSTI, SSCI, TA (Torsional Torque amplifications) which are common to both working groups and addressed one way or another in their corresponding assignments.

The next task in hand is to define the working group assignment. It was agreed that Norman will prepare a draft of the working group assignment and will submit the members for review and approval. It was agreed that the title of the new working group will be: "Investigate the effect sub-synchronous oscillations due to inverter based resources (IBR) on rotating machinery protection and control".

The assignment for the working group should cover at least the following topics:

1. Describe the different types of SSO or SSR phenomena, what causes them and what effects these may have on the power system
2. How to detect this conditions and what mitigation techniques can be applied
3. Describe the consequential risks associated to the mitigation techniques
4. How much inverter based resources (IBR) penetration is required before it becomes an issue ??? (we may omit this from the scope)
5. Impact on existing rotating machinery protection
6. Engineering steps that can be taken to avoid the phenomenon to happen

A proposal of the assignment will be drafted and sent to the working group for review and approval.

A report that contain the reviews of the papers by members of the former JTF2 working group was distributed prior to the meeting for discussion by WG JTF2. The document was not fully discussed during the meeting as the meeting focused on discussing the fusion of WG JTF2 and J18.

J19 IEEE Std C37.106 Guide for Abnormal Frequency Protection for Power Generating Units

Chair: Ritwik Chowdhury

Vice Chair: Jason Espinosa

Output: Guide

Draft: 1.0

Established: January 2019

Status: 1st WG meeting, Garden Grove CA

Expected Completion Date: May 2021

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

WG Report

The working group met with 8 members (13 total members) and 9 guests. A quorum was achieved. The meeting minutes from September 2018 task force (JTF2) meeting was approved.

We went assignments submitted on Draft 1.0 from the September task force (JTF2) meeting:

1. 46: Zeeky investigated the two 46 levels that is discussed in the C37.106-2003 version. He indicated that the negative sequence capability of the generator is only specified for the range of frequencies the generator is designed for. Dale indicated that the concept of two 46 levels that the 2003 version might be related to electro-mechanical relays and perhaps the situation is different due to the frequency tracking in digital relays. There was some discussion on perhaps the 2003 version was alluding to the skin effect at the higher off-nominal frequencies. **Doug** will provide some information from an application he has worked on. **Zeeky** will also look for more information. **Ritwik** will add a sentence to why exceeding the continuous range does not likely severely impact as the frequency range is not too large.

2. References: Ritwik indicated that while the C57 standard provides specific guidance on the 110% no-load and 105% full-load (at HV) for the transformer, the C50 standard does not seem to provide specific information. Normann recommends looking at the manufacturer provided overexcitation curves. Ritwik thinks it's a good idea to reference the asymptote (similar to the transformer curve) if there is no information found. **Will** will assist with adding better references for the generator 105% limit. Zeeky indicated that he has had trouble with this number in the past.
3. Voltage Drop: Ritwik provided an updated voltage drop calculation that might be more useful. **Ritwik** will send out the calculations and latest draft to the working group for review as the podium review of the math was not very productive. There was discussion generated which indicated that perhaps the UAT curves should also be plotted. Dennis indicated that such curves are not often available and used. Ritwik and Normann indicated that likely the UAT's are smaller and hence their per-unit leakage inductances are smaller compared to the GSU. Dale indicated that this needs to be stated if so. **Ritwik** will add a few sentences adding the UAT to the example and indicating that the UAT does not need to be considered since the numbers work out to be smaller.
4. Load Shedding Sections: Daniel submitted his assignment on Section 6.3. There was no time for a detailed review. **Phil, Daniel and Jason** will work together on the Section 6.2 and 6.3 together.
5. Annex: Will and Jason submitted their assignments suggesting removal of the Annex. The working group agreed on the removal. But we should be careful that the regional criteria is captured adequately (Section 8.5 today), perhaps with the addition of some references as well. This is a topic for future discussion.

JTF1 Practices for Generator Synchronizing Systems

CHAIR: Jason Espinosa

VICE-CHAIR: TBD

Output: Report

Established: January 2019

Status: TF

Report

- The background and motivation for this working group was discussed
- The initial draft of the tables of contents was provided
- We started discussion on the objectives of this Task Force and decided that we should define the output, title and assignment of the working group so we can present at the j subcommittee meeting
- The objectives of the task force was then developed (output, title, assignment)
- We continued modifying and developing the Table of Contents
- A motion was made by Mike Thompson to approve the objectives of the task force, seconded by Ritwick Chowdhury. All attendees favored the motion with none opposed

Liaison Reports:

Electric Machinery Committee - M Yalla - Discussed changes to C50.13 and possibly C50.12. Need to be aware of potential changes to C37.102 and C37.106.

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

Marcos Donolo has been attending IAS/I&CPS meetings, but could not attend this meeting, and sent the following report:

The IEEE I&CPS is responsible for the IEEE color books containing recommendations for different industrial and commercial applications. As these books were written over 10 years ago, their content is becoming dated. IEEE and I&CPS decided that rather than updating entire books they would create recommendations to address individual chapters of each of the color books. To that end they have several working groups. IEEE is planning to add a note to the color book website saying that parts of each book had been superseded by the newer documents (P3X00X.xx).

At the May 2018 meeting, there were 8 special sessions to edit 9 of the newer P3X00X.xx documents and 5 working group meetings.

Special Session and working groups at the May 2018 meeting:

P3002.7 Recommended Practice for Conducting Motor-Starting Studies in Industrial and Commercial Power Systems

P3004.11 Recommended Practice for Bus and Switchgear Protection in Industrial and Commercial Power Systems

P3002.8 Recommended Practice for Conducting Harmonic-Analysis Studies of Industrial and Commercial Power Systems

P3001.9 Recommended Practice for the Design of Power Systems Supplying Lighting Systems in Commercial and Industrial Facilities

P3006.8 Recommended Practice for Analyzing Reliability Data for Equipment Used in Industrial and Commercial Power Systems

P3005.7 Recommended Practice for the Application of Metering for Energy Management of Industrial and Commercial Power Systems

P3007.1 Recommended Practice for the Operation and Management of Industrial and Commercial Power Systems

P3007.3 Recommended Practice for Electrical Safety in Industrial and Commercial Power Systems

P3005.4 Emergency and backup generators (chapter 10 from orange book)

Nuclear 1E WG - Prem Kumar

Prem Kumar did not make these PSRC meetings but sent the following report:

IEEE 741 (IEEE Standard for criteria for Protection for Class 1E) system have got a PAR to make a small change - are now going to revise just to add criteria for open phase in this revision to say that protection to detect at the 1E level should be provided (small change to existing change document)- an open phase on HV will reflect differently at 1E level (MV) depending on connecting transformer design.

They will later add new standard (probably in IEEE 742) to discuss schemes etc. how to implement- as this is an evolving issue, few years down the road NRC feedback and how different utilities have detected etc. can be accounted/addressed.

Old Business:

The SC voted on JTF1 assignment to create a Working Group on Generator Protection Synchronizing Systems. All votes were in favor – None were opposed

Normann Fischer presented on behalf of JTF2 Subsynchronous Oscillations.

A report was produced by JTF2 that compiles eleven reviews of technical papers on subsynchronous oscillations. A variety of papers were included. Some proposed mitigation solutions. Some of those solutions could be implemented in a protective relay.

Since the topics covered in the literature review tend to overlap the assignment of J18 it was proposed to revise the title and assignment of J18

Original Title

Impact of Renewables on Synchronous Generators

Revised Title

Impact of Subsynchronous Oscillations due to Inverter-based Resources on Rotating Machinery Protection and Control.

Original Assignment

Investigate the effect of inverter-based sources on rotating machinery protection and control

Revised Assignment

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

The SC voted on the proposal. All votes were in favor – none were opposed

New Business:

The J subcommittee welcomed Jason Espinosa as a member.

Mukesh Nagpal presented on a very interesting generator protection system misoperation.

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 16, 2019 in Garden Grove, CA with 25 of 31 members and 70 guests in attendance. A quorum was achieved. Jeff Barsch requested a motion to approve the September 2018 subcommittee meeting minutes. Mike Thompson made the motion, Stephen Conrad 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

- K1** **PC37.245 Guide for the Application of Protective Relaying for Phase Shifting Transformers.**
Disband WG; motioned by Brandon Davies, seconded by Paul Elkin. Motion unanimously approved.
- 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 at 11:00AM in Granada South. There were 4 members and 16 guests in attendance. We discussed the 1547 series of standards. NERC is hosting the next round of 1547 related activities at their Atlanta office. The dates are:

- P1547.1 WG meeting: Feb 26 all day and Feb 27 8am-noon.
- o **Objective: obtain WG approval (vote) to send P1547.1 to IEEE-SA for ballot**
 - P1547.2 (*Application Guide for IEEE Std 1547*) WG meeting: Feb 27 1-5pm and Feb 28 8am-noon.
- P1547.9 (*Guide for Energy Storage Systems ...*) WG meeting: Feb 28 1-5pm

To register for the meetings please see the following link: <http://www.cvent.com/events/ieee-p1547-1-p1547-2-p1547-9-meetings-february-2019/event-summary-d925c96b49a741e59786afa4db221d76.aspx>

Dr. Jens Boemer vice chair of 1547.2 and secretary of SCC21 instructed us that a PAR is being considered for 1547.3 which would be a guide for communications related to 1547-2018. He advised that cyber security might be included as part of 1547.3. He would like to receive PSRCC input on the effort.

Dr. Boemer also informed us that once 1547.1 has been completed, a PAR will be taken out to begin the next 1547 revision.

- 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 3 members, 3 guests, and 1 SC officer in attendance for the January 16, 2019 meeting in Garden Grove, CA.

The minutes from the Sept 12, 2018 K11 meeting were read and approved. The working group also saw the patent slides and no objections were noted.

Charlie then went over the report draft 7.20. The report was sent out to the working group after the September meeting but received no comments from the working members.

Draft 7.20 was then sent to Jeff Barsch who is the K SC chair for forwarding to the K SC for voting. Jeff identified a few items that needed to be cleared up. Once the working group has voted on new draft 7.30 and any issues cleaned up, then the report will be sent to the K Subcommittee for their consideration to allow the report to be posted to the PSRC webpage. The K Subcommittee Chair has requested that the Working Group provide a draft for balloting as soon as possible.

For the next meeting a single session for 30 plus PC projector is requested.

Respectfully submitted by

Charles Sufana K11 chair

3 Members that attended

Last Name	First Name	Membership	Company	Affiliation
Mezco	Alexis	member k11	TRC	TRC
Pickett	Bruce	member k11	ECF	ECF
Sufana	Charles	member chairman k11	Retired	Retired

3 Guests that attended

Last Name	First Name	Membership	Company	Affiliation
Kabra	Sunil	guest k11	Westinghouse	Westinghouse
Ranieri	Mario	guest k11	Electroswitch	Electroswitch
Saeed	Haythan	guest k11	Patterson Power Engineers	Patterson Power Engineers

1 K Subcommittee officer

Last Name	First Name	Membership	Company	Affiliation
Barsch	Jeff	K SC Chair	American Electric Power	American Electric Power

K12 P1032 Guide for Protecting Transmission Static Var Compensators

Chair: Satish Samineni

Vice Chair: Martin Best

Established: May 2013

Output: Guide for Protecting Transmission Static VAR Compensators

Expected Completion Date: December 2020(?) (I9 holds PAR which expired in 2018 - they need to obtain a new PAR.)

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 Working Group K12 met on Wednesday, January 16, 2019 concurrently with the FACTS & HVDC Stations Subcommittee Working Group I9. The I9 working group had an all-day meeting, and from the K12 WG there were 2 members and 1 guest who attended for portions of the meeting.

The current draft of the Guide is 19.2. Part of the I9 meeting was devoted to addressing comments that had been provided by the K12 WG.

The next K12 meeting will in May 2019 in Cincinnati, Ohio.

K16 PC37.91 Revision of IEEE Guide for Protecting Power Transformers

Chair: Will English

Vice Chair: Steve Conrad

Output: Revised IEEE C37.91 Standard -Guide for Protecting Power Transformers

Established: May 2014

Draft: 15th WG Meeting; Draft 14

PAR Expires: December 2019

Assignment: *To revise and update C37.91, IEEE Guide for Protecting Power Transformers to correct errors and address additional protection related topics.*

The working group met with **23** members out of 48 attendees, on January 16, 2019 at the Hyatt Regency Orange County, Garden Grove, CA jointly with PES-JTCM

The chair displayed and reviewed the required patent information slides related to the PAR activity of the WG and provided opportunity for participants to identify patent claims. No one acknowledged or identified having a patent claim.

Quorum was achieved throughout the meeting.

The minutes from previous meetings were called for approval by the chair
Minneapolis – September 2018 Motion Pat Carroll, Second Randy Crelin
Online -November 8, 2018 Motion Brian Boysen, Second Pat Carroll
Both meeting minutes were approved at this meeting motion carried.

The chair presented the agenda and asked for discussion and approval of the agenda. Paul Elkin motioned for approval and Don Lukach second motion carried.

The meeting dealt with resolving comments from the WG ballot.

Figure 4 was discussed. WG agreed to reverse the secondary side direction of current arrow and add polarity marks to relay.

Proposed revisions to figure 22 were discussed. WG agreed to use the figure as modified, except keep the original auxiliary CT and modify note 2 for application with a microprocessor relay.

Discussions on Clause 7.6.4 Breaker failure led to deleting most of the paragraph.

New material for Clause 7.2.3.1.1 Second- and fifth- harmonic restraint and 7.2.3.2.1 Second- and fifth-harmonic blocking, submitted by Tom Beckwith will be sent to the WG for comment and inclusion in the document. This will be done via email.

WG discussed the lack of references for time constants listed in Annex Clause C.7 Testing thermal relays, Pat Carroll to research and provide references.

Having no more business a motion to adjourn was made by Paul Elkin, second by Brian Boysen.

Next meeting requirements: Single meeting, room for 50 and computer projector.

K17 Geomagnetic Disturbances (GMD)

Chair: Qun Qiu

Vice-Chair: Luis Polanco

Meeting Dates: January 15, 2019, 4:30-5:45

Royal D –

Garden Grove, CA

1. K17 met on Tuesday January 15th 2019 with 18 participants (9 guests and 9 signed members).
2. Meeting minutes of the K17 September 2018 meeting was previously approved via email.
3. Chair presented the updated WG report and discuss latest comments.
4. The discussions focused on the CT saturation due to sequence harmonics, harmonics impact on transformer protection elements, etc.
5. Chair/vice-chair will follow up with team members to resolve any additional comments and to circulate within the WG members for approval due by the end of February 2019. It is expected to submit the final report to K Subcommittee members in March after approval by K17 WG members.
6. The next steps are to have May meeting for reviewing final report, discuss and resolve any comments by K Subcommittee members.
7. K Subcommittee Chair questioned the membership status of the K17 WG members. Based on the PSRC WG Policy and Procedures, membership status is maintained through consistent participation at meetings; if a working group voting member misses at least 2 of the last 4 meetings, he or she becomes a non-voting member. It was discussed if a K17 WG member failed to participate last four consecutive meetings, he or she becomes a non-member, hence, we

will update K17 voting member roster so we can circulate the final WG report to active voting members for approval.

8. For next meeting chair requests a single-session and a meeting room for 30 persons, with AV capabilities.
9. The WG report draft # is 7.0

K18 **PC37.108, Guide for Protection of Secondary Network Systems**

Time 1/14/2019: Monday 4:30-5:45 pm
Hyatt Regency: Room: Imperial S. Tower
Garden Grove, CA
Draft 2.17

Chair: Adi Mulawarman

Vice Chair: Roger Whittaker

Established: May 2015

PAR Approved: December 2015

PAR Expired: December 31st 2019

Assignment: To revise and update C37.108-2002 Guide for the Protection of Secondary Network Systems

1. Introductions/ Sign up sheet/Patent slides/ 50% Quorum? Yes.

Present patent slides, and ask, "Is there any patent issues?" Record answer in meeting minutes : "No".

18 attendees
9 out of _9_ members attended
1 new members added

2. Approve last meeting minutes from September 2018
1st Member name Jim Van de Ligt - motioned
2nd Member name Rafael Garcia - seconded

September 2018 meeting Minutes approved.

3. Status on PAR process/submittal/schedule

PAR Submitted for Approval : October 7th 2015

PAR Approved by RevCom : December 5th 2015

Expected Date of submission of draft to IEEE-SA for Initial sponsor Ballot : January 2018.

Projected Completion Date for submittal to RevCom : 08/2018

PAR will expire December 31st 2019

PDF of PC37.108 describing the accepted PAR form has been uploaded to our working folder.

4. Title, Scope and Purpose restatement from accepted PAR

Title : Guide for the Protection of Secondary Network Systems

Scope : Devices and protection schemes that are being used in secondary network system protections are discussed in this guide. These devices should act to sense the fault and initiate fault interruption locally or remotely, thereby minimizing damage and restoration time.

Purpose : This guide covers devices that are being used in secondary network systems protections schemes. These devices should act to sense the fault and initiate fault interruption locally or remotely, thereby minimizing damage and restoration time.

5. Update on assignments

- Roger W. submitted editorial/format changes to the draft. It is on D2.17
- Pdf of current document sent out per request from last meeting.

6. Go over the changes on D2.17

- Only a few responses received from the request to approve the technical content of the document. The chair will resent email request to the

member and solicit review request to get enough approval rating for WG approval.

- We went over suggested editorial changes removing “should/must/etc.” from the document. Some of the suggested changes are accepted, some were rewritten.
- Section 5.2.3 will require a figure inserted to explain location of arcing fault being discussed. The chair volunteered to insert the figure here.
- The meeting ends before we can finish reviewing all the editorial changes so the chair will arrange a web meeting before the May meeting to go over changes on subsequent chapters (start in 6.1.1.3) and also review and approve changes done in 5.2.3.
- The member of the WG are highly encouraged to call in to the web meeting as they do make a lot of good suggestion for improving the document at the face to face meeting but they are not very good responding to email request to do review and approve document.
- Don Lukach recommended deleting the year from the reference to IEEE standards.
- The latest draft after this document is 2.18
- Eric Udren requested to be added as a member into the WG.
- Membership rosters was updated per attendance record according to the new P&P rule. Voting membership went from 17 to 9. 50% of them were moved to non-voting member status.

PLEASE DOWNLOAD LATEST DRAFT FROM THIS LINK BELOW

<https://iee-SA.imeetcentral.com/psrcktf18/folder/5770883/#folder:4361073>

(If you need access email chair/v-chair of WG)

For the next meeting : room for 20 people and an overhead projector

K21 PC37.112 Standard Inverse-Time Characteristic Equations for Overcurrent Relays

Disband WG; motioned by Randy Crellin, seconded by Mike Thompson. Motion unanimously approved.

Chair: Randy Crellin

Vice Chair: Michael Thompson

Established: January 2017

Output: Standard

Draft: 3.0 (recirculated Draft 3.0)

Expected Completion Date: September 2018

Assignment: To pursue the renewal of C37.112

The working group did not meet during the January 2019 meetings. The C37.112 standard was originally written in 1996, reaffirmed in 2008, and scheduled for inactive status the end of 2018.

At the September PSRC meetings, the working group chair and the K Subcommittee chair met informally with Michelle Turner, the Manager of Content Production and Management, with the IEEE Standards Association, and discussed minor editorial issues. The necessary documents were then submitted to RevCom for their December 4th meeting.

In November, the working group chair responded to RevCom questions/comments and the draft was subsequently approved by the IEEE-SA Standards Board on December 5th. The document was then forwarded to the Standards Publications Department and assigned to an editor.

On January 3rd 2019, Julie Alessi, Program Manager Content Production and Management, with the IEEE Standards Association, indicated the document was being worked on, all formulas were changed from an uneditable graphics format to a new editable xml format, and the figures were sent out to be redone. It is anticipated the completed document will be sent to the working group chair for final review and approval by the end of January and published shortly thereafter.

The working group will not need to meet again and we request the working group be disbanded.

K22 PC37.234 IEEE Guide for Protective Relay Applications to Power System Busses

Chair: Abu Bapary

Vice Chair: Alla Deronja

Established: January, 2017

Output: C37.234 IEEE Guide

Draft 4.1

Expected Completion Date: December 2021

Assignment: Revise and ballot IEEE Standard C37.234 prior to its expiration in 2019.

The WG K22 met on Tuesday, January 15th with 20 voting members, 2 non-voting members, and 8 non-members.

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

The quorum was met so the September 11, 2018, face-to-face, October 18, 2018, webex, and December 13, 2018 webex meeting minutes were all approved as follows:

Motion: Brian Boysen; second: Steve Conrad; vote: approved.

During our two webex meetings in October and December of 2018, the WG slightly restructured clause 7 *Bus protection methods*, specifically, its first sub-clause 7.1 *Differential methods* to elevate the high-impedance differential method to a higher hierarchy for better visibility and reference by assigning its own dedicated sub-clause. A discussion at the present meeting revealed that this restructure was acceptable, and the WG approved it for final.

The other big technical topic the WG attempted to resolve was to come up with a single term for what is known as low-impedance, restraint, multi-restraint, percentage with restraint, percent differential, and percentage differential bus protection. We would include the chosen term in the definition clause, and reference the other terms used in the industry.

We conducted the electronic vote that revealed that the most of WG voting members support term *low-impedance* bus differential as it is very commonly used by the utility protection engineers. At this meeting, however, Mike Thompson reiterated his previous position that this term is too ambiguous and vague; it does not include the true protection principle in itself; and it is applicable to other differential methods such as differentially connected overcurrent and differentially connected overcurrent with (low impedance stabilizing resistor).

A discussion ensued. At the end of it, Mike motioned to:

1. Re-title sub-clause 7.1.4 *Low-impedance* to its original title *Percentage restraint*.
2. Search for term "*low-impedance*" in the guide and replace it by appropriate term.
3. No need to create another definition in clause 3 *Definitions*.

Claire Patti seconded this motion, and all the present voting members voted "yes".

The resolution of these technical issues resulted in reviewing of statuses of the previously made assignments that were on hold.

Mike Thompson, Claire Patti, and Hillmon Ladner-Garcia will review and revise clause 7.1 *Differential methods* to replace term "low-impedance" per the decision made at the meeting. Joerg Blumschein, Kent Ryan, and Abu Zahid will review sub-clause 7.1 afterwards.

As part of the clause 7.1 restructuring, the WG previously decided to merge two individual sub-sub-clauses into one in sub-clause 7.1.2 *Differentially connected overcurrent with stabilizing resistor* because 7.1.2 was not in line with the structure of other sub-clauses. However, at this meeting, we reverted our previous decision and decided to keep the 7.1. structure as is but rename sub-sub-clause 7.1.2.2 as its present title duplicates the title of 7.1.2.

Action items:

1. **Alla Deronja** will revise the guide draft by retitling sub-clause 7.1.4 and sending it to Mike, Claire, and Hillmon.
2. **Mike Thompson, Claire Patti, and Hillmon Ladner-Garcia** will review and revise clause 7.1 *Differential methods* to replace term “low-impedance”. A statement that “the relays performing a bus percentage differential function commonly called low-impedance bus differential relays” should be considered for addition.
3. **Joerg Blumschein, Kent Ryan, and Abu Zahid** will review sub-clause 7.1 after action item #2 is complete.
4. **Ratan Das** will review the IEC guide for 6.1.2 Current transformer relaying accuracy classes. (outstanding)
5. **Jay Anderson** will write a paragraph in sub-clause 7.1.3.3 *CT requirements* mentioning the methods described in the GE paper that allow to equalize CTs with different multi-ratios to apply the high impedance differential scheme. (outstanding)

New and outstanding assignments are requested by February 15, 2019.

Three monthly webex meetings will be scheduled for the mid-February, March, and April.

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

Regal South, Hyatt Regency Orange County, Garden Grove, CA
11:00 – 12:15 PM, Wednesday, January 16, 2019

Chair: Brandon Davies

Vice Chair: TBD

Established: January 2019

Output: Summary Paper for PC37.245 PST Guide

Expected Completion: January 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 K1 working group met at 11:00 January 16th at the JTCM in Garden Grove, CA with – 5 members present and 3 guests present.

This was the first meeting of the working group so no call for quorum was made.

The following was discussed:

- The group discussed the plan for the summary paper including format, development timeline and purpose.
 - The paper is intended to present at regional conferences as this will promote the C37.245 guide.
 - The group discussed the advantages and disadvantages of IEEE format vs. a transactions paper. The group was not sure limitations of presenting transaction papers at conferences and decided to bring this up at the K subcommittee meeting to get K Subcommittee input. Per discussion in K SC meeting, the IEEE format was preferred as it would not have restrictions for presentation at regional conferences.
 - The goal is to complete the paper in time for submittal for in the 2020 major relay conferences.
 - The group will also develop a supporting PowerPoint presentation.
- The group developed a preliminary outline and several new members took assignments, see attached. All writing assignments due 3/29/2019.

KTF25 PC37.99 Revision of IEEE Guide for the Protection of Shunt Capacitors

Converting TF to WG; motioned by Ben Kazimier, seconded by Gene Henneberg. Motion unanimously approved.

Chair: Meyer Kao

Vice Chair: Rick Gamble

Established: January 2019

Output: Recommendation to the K Subcommittee

Assignment: Determine the need for opening and revising the existing C37.99 IEEE Guide for the Protection of Shunt Capacitors

Working Group KTF25 met on Tuesday, January 15, 2019 at 1:30pm in a single session with 21 participants. After introductions, the chair discussed the purpose of the task force: to determine the need to revise C37.99-2012. The working group then reviewed the guide's table of contents and opened the floor for discussion about what might be missing from the guide.

Comments were made about the need to expand the bank overcurrent section to include discussion on stuck circuit switcher protection and other overcurrent protection, including using supervisory elements.

Discussion was held in regards to the 110% continuous voltage rating versus the trend of manufacturers' stating a 125% rating. It was noted that IEEE Standard 18 is the standard to follow, which states a 110% continuous overvoltage limit. Additional wording around this conflict could be added to the guide.

Another discussion that is not covered in the existing guide is IEEE 1036 recommends immediate trip of the capacitor bank when there is an external arc shorting a rack/unit, even though rest of capacitor units are within their 110% withstand limit.

The task force also discussed VT issues and commissioning issues that could be added to the guide.

With all the points above, the chair called the task force to a vote to open the guide for revision or not. The task force unanimously voted to open the guide. The chair will bring the results of the task force to the K Subcommittee, on a recommendation of forming a Working Group with assignment of revising the C37.99 IEEE Guide for the Protection of Shunt Capacitors.

KTF26 PC37.109 Revision of IEEE Guide for the Protection of Shunt Reactors

Converting TF to WG; motioned by Alla Deronja, seconded by Stephen Conrad. Motion unanimously approved.

Garden Grove, CA 1/15/2018 – 3:00 to 4:00 PM

Kamal Garg – Chair

Ilia Voloh – Vice Chair

Agenda: "Discuss: Update C37:109 2006 IEEE Guide for the protection of Shunt Reactors"

Investigate the need to revise the guide: Improve the document so propose a WG with an assignment to revise.

Decision: Group agreed to form a WG.

WG Title: "Revision of C37.109 2006 IEEE Guide for the protection of Shunt Reactors"

Proposed assignment for WG:

Revise C37.109 2006 IEEE Guide for the Protection of Shunt Reactors. The revised document will update the protection schemes and add informative annexes with examples.

1. 26 people in presence
2. Discussion about forming of working group, 109 was re-affirmed in 2012.
3. Old guide briefly reviewed, motion to form WG, 22 voted in favor, 0 opposing
4. Worked out assignment as above

Group had a quick review of the existing document and things can be improved. After discussion group agreed to revise the existing standards and came up with the language for the revision.

Also discussed some of other shunt reactor standards IEEE C37.105 2017, Shunt reactor switching IEEE C57.16 and C57.21 Shunt reactor testing etc.

5. Adjourn

Liaison Reports:

—

T&D Committee, Capacitor Subcommittee

Pratap Mysore

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

(see Pratap's report)

TX Committee

Fred Friend

<http://www.transformerscommittee.org/>

The next Transformers Committee meeting will occur March 24-28; Hilton Anaheim, California USA. The following is the status of their work:

Approved New Standards

P60076-16 IEC/IEEE International Draft Standard - Power Transformers - Part 16: Transformers for Wind Turbine Application

PC57.161 Guide for Dielectric Frequency Response Test

Approved Revisions to Transformer Standards

PC57.109 Guide for Liquid-Immersed Transformers Through-Fault-Current Duration

PC57.110 Recommended Practice for Establishing Liquid-Immersed and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents

PC57.119 Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings

Approved PARs for New Projects

PC57.167 Guide for Monitoring Distribution Transformers

PC57.168 Guide for Low Frequency Dielectric Testing for Distribution, Power and Regulating Transformers

PC57.12.200 Guide for the Frequency Domain Spectroscopy Measurement of Transformer Bushings (ENTITY PAR)

Approved PARs for Revision of Standards

PC57.12.70 Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers

PC57.149 Guide for the Application and Interpretation of Frequency Response Analysis for Oil-Immersed Transformers

PC57.154 Standard for Liquid-Immersed Transformers Designed to Operate at Temperatures Above Conventional Limits Using High-Temperature Insulation Systems

PC57.98 Guide for Transformer Impulse Tests

Approved PAR Extensions

PC57.93 Guide for Installation and Maintenance of Liquid-Immersed Power Transformers (December 2020)

Old Business:

None

New Business:

New WG P&P highlights

New member of K, Meyer Kao and Kamal Garg

A motion to adjourn was made by Mukesh Nagpal, seconded by Gene Heneberg and pas