



**POWER SYSTEM RELAYING COMMITTEE
OF THE IEEE POWER and ENERGY SOCIETY
MINUTES OF THE MEETING
September 11, 2014
Milwaukee, WI
Final- Approved**

I. Call to order/ Introductions Roger Hedding

Chairman Roger Hedding called the meeting to order at 8:00 am

After introductions, a quorum was verified and met. Main Committee Attendance sheet was routed.

II. Approval of Minutes & Financial Report Pratap Mysore

Motion to approve Minutes of the May 2014 meeting in Ft. Lauderdale, FL was moved by Bob Dempsey and seconded by Gene Henneberg and was approved unanimously.

The financial status of PSRC is in good standing.

III. Chairman's Report Roger Hedding

No report

IV. Reports of Interest

A. Report from the Vice- Chair – Mike McDonald

a. Technical Paper Coordinator's Report.

The 2014 PES General Meeting was held at the Gaylord National Harbor Resort and Convention Center at National Harbor, MD July 27-31, 2014.

The PSRC had 69 submitted Conference papers and an additional 8 Transaction Papers. After review, 29 papers were accepted for presentation and 40 were rejected during the review and acceptance process.

Thanks to all of those that reviewed papers.

b. Future Meetings

May 2015 San Antonio TX

Sept 2015 La Jolla, CA

In terms of future meetings, we are actively pursuing 2016 locations and if anyone has an idea of a good location please contact the Vice Chair or any of the Officers.

B. CIGRE B5 Activities Report - Adamiak – No update from previous meeting. May notes carried forward for information.

The CIGRE 2013 B5 (Protection and Automation) Colloquium was held in conjunction with the Brazilian Two of the three WGs were formed in Brazil have been populated:

- Analysis and comparison of fault location systems in Substation Automation Systems – B5.52

- WG B5.53 - Test Strategy for Protection, Automation and Control (PAC) functions in a full digital substation based on IEC 61850 applications – Alex Apostolov chair
- Protection and Automation Issues of Islanded Systems during System Restoration/Black Start – B5.54

I will be working to coordinate work on B5.54 with the similar PSRC WG: Plant Issues Associated with Black Starting of Generators - JTF9.

The 2nd Annual US CIGRE/EPRI-sponsored Grid of the Future Symposium – hosted by National Grid - was held in Boston, MA from October 20-22, 2013. The theme was "Technical Solutions to Regulatory Challenges". US CIGRE members have access to the papers presented there.

Early registration now open (till April 30) for the CIGRE Session 45 - August 24-30, 2014 in Paris! The B5 preferential subjects to be discussed are:

- IEC 61850 Clarify expectations between Users and Vendors
- New Protection schemes based on communication of information

The US has 26 papers accepted for the 2014 conference.

The 2015 B5 Colloquium will be held in Nanjing, China (date to be determined).

For more information, check out the “new” CIGRE B5 webpage: b5.cigre.org

C. IAS Power System Protection Committee - Mozina

The following are items of interest to the PSRC:

- **Color Book Reorganization Progress** – The IAS Industrial & Commercial Power System Dept. — I&CPS (responsible of the IAS color books) met on Oct. 6-9, 2015 in conjunction with the IAS General Meeting in Vancouver, BC. This group is updating and converting the color book chapters into individual IEEE standards. The major item of interest for the PSRC is the Buff Book (Protection and Coordination of Industrial and Commercial Power Systems). Some progress is being made with some of the 13 standards being submitted for IEEE standards balloting. The Buff Book standards are numbered 3004.1 through 3004.13 if you want to be part of the balloting body.
- **Arc Flash** –The Petroleum and Chemical Industry Committee (PCIC) of IAS is the sponsor of IEEE standard 1584, the key Arc Flash standard. The WG responsible for updating this standard normally meets twice a year, once before the start of PCIC conference and again in conjunction with IAS Electrical Safety Workshop (ESW). The next meeting of the WG will be held Jan. 25 before the start the ESW conference (Jan. 26-30, 2015) to be held in Louisville, KY. The result of extensive testing are now be incorporated into calculation formulas for incident energy. The calculations for medium voltage have been determined and work continues on low voltage calculations.

D. IEC Report - Eric Udren

TC 95, Measuring relays

TC 95 drives IEC measuring relay 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.

At this time, all of the type testing, physical design, and safety standards for relays are stable and there are no projects running. There is high activity in development of functional standards specifying required response behavior for relays used in various specific protection applications. Recent completions are 60255-121, Functional Requirements for Distance Relays, and 60255-149, Functional Requirements for Thermal Relays. This work has been carried out in Maintenance Teams led by Dr. Murty Yalla, working for the US National Committee.

The ten-year term of TC 95 Chair Lily Yaping of China is running out. TC 95 has nominated Dr. Murty Yalla as the new Chair. The US National Committee will naturally support this elevation and honor for Murty. It's a reward for years of hard work. Murty's term runs for five years, with provision of possible extension for another five years.

The US National Committee and Murty will host the next Plenary Meeting of TC 95 in Largo, FL on Friday, December 5, 2014. Anyone interested in attending the TC 95 plenary meeting as part of the USNC delegation should contact Eric Udren or Murty Yalla for agenda and attendance requirements – this is a restricted meeting.

There will be other TC 95 working meetings that week at the same venue:

- Ad Hoc Working Group (AHG) 2, *New protection requirements for the smart grid*, Monday, December 1.
- Maintenance Team (MT 4), *Measuring relays and protection equipment – Functional standards*, is writing the first draft of IEC 60255-187-1, *Functional requirements for biased (percentage) differential relays - Differential protection for transformers, generators and motors* will meet Tuesday-Thursday, December 2-4.

TC 57, Power systems management and associated information exchange

TC 57 WG 10 continues development of parts of IEC 61850. Notably, all of the base parts have now been published in Edition 2 versions except the Glossary Part 2, whose development work continues with the next WG 10 meeting in Tokyo in December. The WG is working on UML machine-readable description of the data models that will lead to what is being called Edition 2.1 – this should improve standardized behavior of products and interoperability, as well as simplifying product development. There is a long list of new parts under development – the list will keep on growing and our industry creates new applications for power system protection, control, & monitoring – see the full detailed TC 57 Liaison Report from WG 10 Convenor Christoph Brunner under the Relaying Communications Subcommittee H report below.

E. Standard Coordinators Report – Phil Winston

The status of standards activities that have taken place since the May 2014 meeting of the PSRC are as follows:

RevCom Activity:

Standards Approved; Standards submitted for approval; Standards due for 10 year review

None

Ballot Activity:

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

PC37.103	Guide for Differential and Polarizing Relay Circuit Testing
PC37.113	Guide for Protective Relay Applications to Transmission Lines
PC37.114	Guide for Determining Fault Location on AC Transmission and Distribution Lines
PC37.238	Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications
PC37.240	Standard for Cyber Security Requirements for Substation Automation, Protection and Control Systems
PC37.243	Guide for Application of Digital Line Current Differential Relays Using Digital Communication
C57.13.3	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases-Invitation

NesCom Activity:

PARS approved:

PC37.94 revision	Standard for N Times 64 Kilobit Per Second Optical Fiber Interfaces Between Teleprotection and Multiplexer Equipment
PC37.249 new	Guide for Categorizing Security Needs for Protection and Automation Related Data Files

New or Modified PAR submitted; PAR Extensions (applied for); PARs Requested for Withdrawal; or PARs Administratively Withdrawn

None

PARS expiring at the end of 2014

PC37.114	Guide for Determining Fault Location on AC Transmission and Distribution Lines
PC37.240	Reserved for Standard for Cyber Security Requirements for Substation Automation, Protection and Control Systems
PC37.241	Guide for Application of Optical Instrument Transformers for Protective Relaying
PC37.243	Guide for Application of Digital Line Current Differential Relays Using Digital Communications

PARS expiring at the end of 2015

PC37.113	Guide for Protective Relay Applications to Transmission Lines
PC57.13.3	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases

PARS expiring at the end of 2016

PC37.103	Guide for Differential and Polarizing Relay Circuit Testing
PC37.119	Guide for Breaker Failure Protection of Power Circuit Breakers
PC37.237	Standard Requirements for Time Tags Created by Intelligent Electronic Devices - COMTAG(TM)
PC37.245	Guide for the Application of Protective Relaying for Phase Shifting Transformers

PAR/Standard Submittal Deadlines & Standards Board Meeting Schedule:

Submittal Deadline	Meeting Date
October 20, 2014	December 10, 2014
December 19, 2014	January 30, 2015 (telecon)
February 13, 2015	March 26, 2015
April 24, 2015	May 15, 2015 (telecon)
July 17, 2015	August 27, 2015
September 4, 2015	October 16, 2015 (telecon)
October 23, 2015	December 4, 2015

F. C0: DATA ACQUISITION, PROCESSING, AND CONTROL SYSTEMS SUBCOMMITTEE

Chair: C. Preuss

Vice Chair: Vacant

Secretary: Vacant

Working Group Reports (See below)

- A. We had limited success using the join.me conferencing service provided by IEEE-SA.
- B. New working groups
 - a. C18 P1613.2 AC surges on phone lines will not be created.
 - b. C19 met jointly for the first time with PSRC H22 Security for Protection and automation Related Data Files
 - c. C0 is interested in becoming joint with PSRC H23 Guide for Naming IEDs (COMDEV). A working group chair will be appointed.

- d. C0 is interested in becoming joint with PSRC H27 Standard file format for IED configuration Data (COMSET). A working group chair will be appointed.
- C. C0 is tracking PSRC TF K15 Centralized substation protection and control
- D. IEEE 1686 will not require amendment
- E. SG C01 is working on a recommendation on how to split C37.1 into separate C37.1.x standards, such as one for databases
- F. C0 is working with PSRC WG C23 to integrate NASPI data archival material into the expected new working group from SG C01.
- G. The SUBS C5 chair reported that a discussion with the PSRC I WG vice chair resulted in an agreement to not seek joint sponsorship for this update to C37.2 since there are some PSRC members involved in the SUBS WG C5.

C1: IEEE 1686 Standard For Substation IED Cyber Security

Chair: S. Sciacca
Vice Chair: M. LaCroix
Secretary:
Output: Standard
Expected Completion Date: Done

Did not meet.

C2: IEEE 1613 Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations

Chair: J. Tengdin
Vice Chair: L. Smith
Secretary:
Output: Standard update
Expected Completion Date:

Did not meet.

C2: IEEE 1613.1 Environmental and Testing Requirements for Communications Networking Devices Installed in Transmission and Distribution Facilities

Chair: J. Tengdin
Vice Chair: J. Ramie
Secretary:
Output: Standard Update
Expected Completion Date: TBD

Met to discuss the update of the standard to include any devices in T&D facilities, whether or not they have a communication port. Chair is working with T&D and PSRC Committees to establish a joint working group.

C3: IEEE PC37.1.1 Standard for Input and Output Requirements and Testing Methodology for Intelligent Electronic Devices (IEDs)

Chair: C. Preuss
Vice Chair:
Secretary: C. Bryant
Output: Standard

Reviewed work to develop requirements for the physical inputs and outputs of IEDs, focusing first on digital inputs/outputs, DC analog inputs/outputs, and AC analog inputs. The ISA presented material on their upcoming standard on Human Machine Interfaces (HMIs)

C4: IEEE PC37.237 Time Tagging for Intelligent Electronic Devices (IEDs) – COMTAG

Joint with PSRC
Chair: M. LaCroix
Vice Chair:

Output: Standard

C4 met jointly with PSRC H3. See the PSRC report.

- C5: IEEE PC37.2 Draft Standard for Electrical Power System Device Function Numbers and Contact Designation**
Chair: M. Dood
Vice Chair: B. Ackerman
Output: Standard update
Established:
Expected Completion Date:

Reviewed the PAR in order to update it and avoid expiration by end of 2014. Discussed the options available for inviting the PSRC to support the C5 effort already underway. The C5 chair was going to reach out to one of the PSRC I Subcommittee officers for advisement.

- C6 Standard for Serial SCADA Protection Protocol (SSPP) (P1711.1)**
Chair: D. Whitehead
Vice-Chair: A. Wright
Output: Standard
Established:
Expected Completion Date:

Discussed harmonizing the language in P1711.1 and P1711.2. Talked about pulling the introduction out of the old 1711 and putting it in the new P1711.

- C7 IEEE 1588 Profile for Power System Applications**
Chair: T. Tibbals
Vice Chair: M. Dood
Output: Standard update
Established: 2013
Expected Completion Date:

Subs C7 met jointly with PSRC H24. Please see PSRC report.

- C8 IEEE 1615 Recommended Practice for Network Communications in Substations**
Chair: Open
Vice Chair:
Secretary:
Output: Standard
Established: 2011

Reviewed present draft and plan for moving forward, including coordination with the output report of PSRC H12.

- C9: IEEE 1646 IEEE Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation**
Chair: J. Tengdin
Vice Chair: D. Holstein
Output: Standard
Established:
Expected Completion Date:

The C9 working group did not meet.

- C10: IEEE PC37.240 Standard for Cyber Security Requirements for Substation Automation, Protection and Control Systems**
Joint Chair: T. Tibbals
Vice Chair:
Output: Standard joint with PSRC H13
Established: 2008
Expected Completion Date: End of 2014

Met joint with PSRC H13. See PSRC report.

- C11: PC2030.101 IEEE Recommended Practice for the Design and Implementation of Time Synchronization Distribution Systems for Substation Automation**
Chair: J. Bougie
Vice Chair:
Output: Standard
Established: 2012
Expected Completion Date:

Reviewed present draft and discussed system maintenance concepts.

- C12: IEEE 1815 IEEE Standard for Electric Power Systems Communications - Distributed Network Protocol (DNP3)**
Chair: R. Farquharson
Vice Chair: A. West
Output: Study Group recommendation for PAR or not
Established: TBD
Expected Completion Date: TBD

1. Reviewed DNP3 technical committee work resulting in the DNP technical committee recommending that a PAR be developed to revise IEEE 1815.
2. A formal vote by the study group will take place soon.

- C13: IEEE C37.115 IEEE Standard Test Method for Use in the Evaluation of Message Communications between Intelligent Electronic Devices in an Integrated Substation Protection, Control, and Data Acquisition System**
Chair: J. Tengdin
Vice Chair:
Output: Standard
Established:
Expected Completion Date:.

The C13 working group did not meet.

- C14: IEEE P1815.1 Draft Standard for Exchanging Information between networks Implementing IEC 61850 and IEEE Std 1815 (DNP3)**
Chair: L. Smith
Vice Chair: R. Farquharson
Output: Standard
Established: 2010
Expected Completion Date: 2013

Continued work with finalizing the review of comments from ballot.

- C15: PC2030.100 Recommended Practice for Implementing IEC 61850 Substation Automation Systems**
Chair: R. Liposchak
Vice Chair:
Output: Standard
Established: 2012
Expected Completion Date: 12/2016

Reviewed the present status of the draft and moved out expected completion date due to lack of draft development.

- C16: PC2030.102.1 Interoperability of IPSEC Utilized within Utility Control Systems**
Chair: Vacant
Vice Chair: B. Smith
Output: Standard
Established: 2013
Expected Completion Date: 2015

The WG reviewed the present draft and working group comments on the draft.

- C17: P1711.2 Standard for Secure SCADA Communications Protocol (SSCP)**
Chair: M. Hadley
Vice Chair:
Output: Standard
Established: 2013
Expected Completion Date: 2014

The WG reviewed the present draft and a new draft will be available by the end of September, with comments due by the end of October. Testing was discussed, especially the possibility of getting ICAP involved. PAR still needs updating for name to 1711.2. The chair will look into use cases for the new 1711.

- C19: Security for Protection and Automation Related Data Files**
Chair: D. Holstein
Vice Chair:
Output: Standard
Established: 2014
Expected Completion Date: TBD

Met joint with PSRC H22. See PSRC report.

G. NERC Report - Bob Cummings

May 2014 marked the 10th anniversary of the formation of the NERC System Protection and Control Task Force (SPCTF), which was our first foray into System Protection.

Thanks to several PSRC members, the SPCTF has become tremendously successful and was elevated to NERC subcommittee status as part of the NERC System Protection Initiative in 2007. The SPCS has become one of the most prolific technical groups at NERC, producing more than 30 technical reference and white papers on system protection. Their work in technical guidelines justification has led to significant improvements to several key NERC Standards on system protection.

NERC's work with PSRC on system protection guidelines and standards is a tremendous success and we look forward to the continued collaboration.

1. System Protection and Control Subcommittee (SPCS) Activities

- a. Power Plant and Transmission System Protection Coordination: The SPCS has revised this report to address input from the IEEE PSRC J3 working group and stakeholder comments. The report was posted for a 45-day public comment period. The SPCS is addressing the comments and will submit a revised report for NERC Planning Committee approval in December.
- b. Order No. 754: The Section 1600 Request for Data or Information associated with FERC Order No. 754 is in progress. NERC is presently reviewing the protection system single point of failure data for facilities 200 kV and above with members of the SPCS and the System Analysis and Modeling Subcommittee (SAMS). Single point of failure data for buses operated at 100-200 kV is

due September 30. SPCS is planning to submit a final report for NERC Planning Committee approval in December.

- c. Loadability Considerations for Unit Auxiliary Transformers
The SPCS is developing a report addressing load-responsive protective relays applied on the low-voltage side of a unit auxiliary transformer. This request is related to minority comments on NERC Reliability Standard PRC-025-1, Generator Relay Loadability.

2. Protection-Related Standards Activities

- a. Protection System Maintenance and Testing:

PRC-005-3 – This version of the standard addresses the FERC directive in Order No. 758 to include certain autoreclosing relays in the maintenance and testing standard. FERC issued a Notice of Proposed Rulemaking (NOPR) on July 17 proposing to approve the standard, but requesting information from stakeholders regarding the proposed scope of PRC-005-3 and whether the standard should include maintenance and testing of devices that supervise autoreclosing. Comments on the NOPR are due September 29.

PRC-005-4¹ – The Protection System Maintenance and Testing drafting team is revising the standard to address the FERC directive in Order No. 758 to include sudden pressure relays and other devices that respond to non-electrical quantities that affect reliable operation of the Bulk-Power System. An initial ballot and comment period ended on June 3. The draft standard achieved an approval of 47.89%. The drafting team has responded to comments and revised the standard. The standard is posted for a 45-day formal comment period through September 12, with an initial ballot during the last 10 days.

- b. Protection System Misoperations: A comment period and final ballot of PRC-004-3 concluded on August 7. The draft standard achieved an approval of 79.75%. The NERC Board of Trustees adopted the standard on August 14 and the standard is pending filing with regulatory authorities.
- c. System Protection Coordination: A formal comment period and additional ballot of PRC-027-1 concluded on December 31. The draft standard achieved approval of 65.71%. However, FERC raised significant concerns on the last posted draft that warranted further discussions with FERC staff to obtain input for the drafting team. The drafting team will meet to discuss the feedback and suggestions to move the standard forward.
- d. Generator Relay Loadability: FERC approved PRC-025-1 (Generator Relay Loadability) and associated changes to PRC-023-3 (Transmission Relay Loadability) on July 17. PRC-025-1 establishes loadability criteria for relays applied at the terminals of generators, generator step-up transformers, unit auxiliary transformers, and on collector systems for dispersed generation. Modifications to PRC-023-3 resolves potential gaps or overlap between the two standards.
- e. Disturbance Monitoring: The draft standard uses a results-based approach to establish requirements for Dynamic Disturbance Recording (DDR), Fault Recording (FR), and Sequence of Events Recording (SOER). A formal comment period and ballot of PRC-002-2 concluded on June 25. The draft standard achieved approval of 52.29%. The drafting team has responded to stakeholder comments. The revised standard is posted for a 45-day formal comment period through October 21, with an additional ballot during the last 10 days.
- f. Protection System Response to Power Swings: This project responds to a FERC directive in Order No. 733 that NERC establish a standard addressing protection system response to stable power swings. The drafting team is using an SPCS report, *Protection System Response to Power Swings*, as a reference document. A formal comment period and ballot of PRC-026-1 concluded on June 25. The draft standard achieved approval of 17.02%. The drafting team has

¹ The Standards Applicability for Dispersed Generation Resources drafting team is working in parallel to review the applicability of Reliability Standards that apply to a Generator Owner or Generator Operator to recognize the unique technical and reliability aspects of dispersed generation resources.

responded to stakeholder comments. The revised standard is posted for a 45-day formal comment period through October 6, with an additional ballot during the last 10 days.

- g. Special Protection Systems: This project will revise the definition of Special Protection System (SPS)/Remedial Action Scheme (RAS) and revise several SPS-related Reliability Standards. A formal comment period and initial ballot of the revised definition of RAS (proposed to replace SPS in the NERC glossary) concluded on July 25. The revised definition achieved approval of 58.88%. The drafting team has responded to stakeholder comments. The revised definition is posted for a 45-day formal comment period through October 14, with an additional ballot during the last 10 days.
- h. Undervoltage Load Shedding: This project consolidates four existing standards into one revised standard, PRC-010-1 and proposes a new defined term, Undervoltage Load Shedding Program (UVLS Program). The drafting team is coordinating with the Protection System Misoperations and SPS drafting teams. A formal comment period and ballot of PRC-010-1 concluded on August 8. The draft standard achieved approval of 76.37%. The drafting team has responded to stakeholder comments. The revised standard is posted for final ballot through September 18.
- i. Underfrequency Load Shedding: This project addresses a FERC directive to make explicit that the Planning Coordinator must establish a schedule when UFLS program changes are required, and will assess whether any other changes are necessary. The revised standard is posted for a 45-day formal comment period through October 8, with an initial ballot during the last 10 days.
- j. Standards Applicability for Dispersed Power Producing Resources: This project has been initiated in response to a stakeholder-submitted (Standards Authorization Request (SAR) to review applicability of NERC Reliability Standards to dispersed power producing resources. The drafting team has posted a white paper to inform industry of proposed applicability changes and revised three high-priority standards. The high priority standards include PRC-004 and PRC-005. Initial ballots of revisions to PRC-004-2.1a and PRC-004-3 concluded on August 26 and the standards achieved approval of 81.79% and 81.75% respectively. These standards are posted for 45-day formal comment periods through October 22, with additional ballots during the last 10 days. Final ballots of revisions to PRC-005-3 and PRC-005-X concluded on September 5 and the standards achieved approval of 85.32% and 86.01% respectively. The standards will be submitted to the NERC Board of Trustees for adoption and then filed with the appropriate regulatory authorities.

V. ADVISORY COMMITTEE REPORTS

Chair: Roger Hedding
Vice Chair: Mike McDonald

B1: Awards and Technical Paper Recognition

Chair: Oscar Bolado
Vice Chair: Solveig Ward

16 Service Awards were presented.

B2: Fellows Awards

Chair: C. Henville
No report.

B3, Membership Activity Report
Chair: M. Swanson

Assignment: Assist in searching for new attendees, Requesting support from attendees' employers.

Attendance during the Milwaukee meeting was 210, which is considered a healthy number for us.

15 new attendees were in our Newcomers Orientation meeting on Tuesday.

No management support letters were written. As a further note, if any attendee needs stronger management support for PSRC participation, we encourage them to let us know.

B4: O & P Manual and WG Training

Chair: M.Sanders: O&P Manual:

Did not meet.

Chair: R Hunt: WG Training:

No report

B5: Bibliography and Publicity

Chair: T.S. Sidhu

Vice Chair: M. Nagpal

No Report

B8: Long Range Planning

Chair: Bob Pettigrew

No report.

B9: PSRC Web Site

Chair: Russ Patterson

The PSRC will have a new web site soon, though with a link to the old web site.

VI. Items from the Main Committee meeting:

No Items to report

VII. SUBCOMMITTEE REPORTS

C. SYSTEM PROTECTION SUBCOMMITTEE

Chair: J. O'Brien

Vice-Chair: G. Henneberg

Scope: Evaluate protection system 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.

The C System Protection Subcommittee met on Wednesday, September 10, 2014 in Milwaukee, WI with 23 (of 41) members and 32 guests in attendance. Quorum was achieved.

Minutes of the May 2014 C Subcommittee meeting were approved.

C subcommittee welcomes three new members: Roy Moxley, Tony Johnson, and Keith Hauser.

Advisory Committee Items of Interest

- The revised PSRC web site is now accepting material such as meeting minutes via submittal through the site. Actual posing will be handled by the webmaster. Formatting will be the same for all similar functions, e.g. WG access pages.
- Jim O'Brien reminded all WG chairs to provide both your Sept 2014 meeting minutes and WG membership list to Gene Henneberg by September 26

11 Working Groups and 1 Task Force met at this meeting.

Reports from the Working Groups

C2 Role of Protective Relaying in the Smart Grid

Chair: Apostolov, A.

Vice Chair: Moxley, R.

Output: Report to PSRC

Assignment: Identify the functions and data available in Protective Relaying Devices (PRD) that are used at different functional levels and different applications and can be used within a Smart Grid. Describe the use of interoperable data formats for protection, control, monitoring, recording, and analysis.

7 Members and 10 guests in attendance.

We reviewed the last working draft of the report. We worked to clean up the membership roster in order to have sufficient positive ballots. With final editorial changes on style (UK vs US) and paragraph spacing, the report will be ready to submit to the subcommittee.

C4 Guide for Phasor Data Concentrator Requirements for Power System Protection, Control, and Monitoring (PC37.244)

Chair: Antonova, G.

Vice-Chair: Gharpure, V.

Output: Guide C37.244

Assignment: Develop a guide for performance, functional, and information communication needs of Phasor Data Concentrators for power system protection, control, monitoring, and information management. The Guide will include system needs for PDC applications, configuration, and testing procedures.

Working Group C4 met on September 9, 2014 in Milwaukee, WI in a single session with 9 attendees (6 members and 3 guests). The group completed its assignment; the main task is to produce a summary paper.

Chair presented the status of summary paper. 75% approval was achieved. A number of comments was received and addressed. The draft with resolutions to these comments was distributed. It was suggested to confirm that resolutions are acceptable, prior to submitting the paper to publication.

Next step is paper submission to the Transactions on Smart Grid, as agreed. Contact information for each co-author is required for this. A request to be issued by the Working Group officers.

C5 Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PC37.242)

Chair: Rahmatian, F.

Vice chair: Myrda, P.

Output: Guide C37.242

Established: May 2010

Estimated Guide Completion: March 6, 2013

Assignment: Develop a Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMU) for Power System Protection and Control

Scope:

The document provides guidance for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMU) applied in Power System Protection and Control. The following are addressed in this Guide:

- Considerations for the installation of PMU devices based on application requirements and typical bus configurations
- Techniques focusing on the overall accuracy and availability of the time synchronization system
- Test and calibration procedures for phasor measurement units (PMUs) for laboratory and field applications
- Communication testing for connecting PMUs to other devices including Phasor Data Concentrators (PDC)

Purpose:

This guide is intended to be used by power system protection professionals for PMU installation and covers the requirements for synchronization of field devices and connection to other devices including Phasor Data Concentrators (PDC)

Notes:

The Working Group met on September 09, 2014 in a single session. The session was chaired by Farnoosh Rahmatian. There were participation from 4 members and 8 guests.

The IEEE-SA Patent Slides were presented – there were no comments from the participants.

All participants introduced themselves.

The minutes of the January and May 2014 meetings were considered, but not approved due to lack of quorum.

Session Chair updated the attendees on presentation of C37.242 material as part of an IEEE Tutorial on Synchrophasors, including IEEE-PES ISGT February 2014, IEEE PES T&D April 2014, and IEEE PES GM July 2014. No other tutorials are planned.

After a short review and discussion of the need and intent of a summary paper, the attendees felt like preparing a Transaction paper may still be the best approach. The outline was reviewed and section leads were tasked to provide first draft of each section (one page) by Sep 30th, 2014.

The meeting adjourned at 10:15 AM.

C16 Relay Scheme Design Using Microprocessor Relays

Chair: Lascu, R.

Vice Chair: Seegers, T.

Output: Report

Established: September 2008

Expected Completion: September 2014

Assignment: Write a supplement to the existing 1999 relay trip circuit design paper as an IEEE-PSRC report to address microprocessor relays. The report will exclude AC voltage and current inputs, GOOSE, internals of relays, and IRIG and communication issues. It will include signaling between protective elements such as relays, breakers, etc. primarily as it applies to trip and control circuits.

The working group met with 6 members and 10 guests in attendance.

The document was approved and submitted for publication this summer.

The working group discussed preparations for presentations following the final approval of the report. Kevin Donahoe submitted a preliminary power point file to get things rolling.

Tony Seegers will present at the January 2015 main committee meeting.

Kevin Donahoe has submitted an abstract for the Texas A& M conference.

Bruce Mackie will submit the report to the Georgia Tech conference.

We are looking for someone to submit and present at the Western Protective Relay Conference and any other appropriate venues. Anyone interested is asked to contact the chair or vice-chair of the working group. This activity will be conducted off-line

The chair will submit a motion to the subcommittee to disband the working group.

C17 Fault Current Contributions from Wind Plants

Transmission and Distribution Committee (T&DC): Reigh Walling, Chair

Electric Machinery Committee (EMC): Ron Harley, Chair

Power System Relaying Committee (PSRC): Dean Miller, Chair

Gene Henneberg, Vice Chair

Output: Report

Established: 2008

Completion date: 2013

Joint WG Assignment: To characterize and quantify short circuit current contributions to faults from wind plants for the purposes of protective relaying and equipment rating, and to develop modeling and calculation guidelines for the same.

C-17 WG Assignment: To support the activities of the Joint Working Group on Fault Current Contributions from Wind Plants.

Dean Miller chaired the session.

The Joint Working Group met in Milwaukee, WI on Tuesday September 9, 2014 with 10 members and 17 guests. Introductions were made and the assignment for the working group was presented. Minutes from the May and July meetings were discussed and approved.

The report is posted on the PSRC website and will be added to the Wind and Solar Plant Collector Design Working Group's website.

The tutorial will be presented during the 2015 JTCM on Monday, January 12, 8 -12. The application for the inclusion of the tutorial during the July 2015 PES General meeting in Denver, CO has been made.

The PowerPoint files for the seven presenters for the tutorial are either started, nearly completed, or completed.

The PowerPoint files are to be emailed to Dean by October 1. Pdf versions of the PowerPoint files will be posted on the working group web site. The working group members are to review the presentations and get any comments back to Dean by November 1. The presenters are to have the final PowerPoint files back to Dean by December 1.

Sukumar presented a draft set of slides for the Type I & II Wind Turbine Generator Response.

Jim presented a draft set of slides for the Wind Plant Protective Relaying.

An application was submitted to present the report at the Texas A&M Relay Conference. Rafael Garcia will be making the presentation if the application is accepted.

An application will be submitted to present the report at the George Tech Relay Conference.

Next meeting for the Joint Working Group is in conjunction with the JTCM, January 12-15, Garden Grove, CA.

C18 Transmission to Generation Interconnection Protection Considerations (PC37.246)

Chair: Deronja, A.

Vice Chair: Houser, K.

Output: IEEE Guide PC37.246

Established: September 2011

Expected Completion: December 2017

Assignment: Write an IEEE Guide for Protection Systems of Transmission to Generation Interconnections.

Scope:

This Guide documents accepted protection practices for transmission to generation interconnections. It is intended to cover the protection system applications at the interconnections between transmission systems and generation facilities greater than 10 MVA. This Guide does not cover distributed energy resources.

Purpose:

This Guide provides guidance to those who are responsible for the protection of electrical interconnections between transmission systems and generation facilities greater than 10 MVA. It is not intended to supplant specific transmission or generator owner practices, procedures, requirements, or any contractual agreement between the transmission and generation owners.

Working group C18 met on September 10, 2014, with 9 voting members, 2 non-voting members, and 5 guests for a total of 16 present. Two guests joined the working group as members. The quorum was not reached, so minutes from the May 2014 meeting will be approved by email.

The meeting chair displayed the IEEE patent slides as required for the working group with PAR related activities.

The Working Group proceeded to review the latest Guide's draft 1.1. The draft was converted to the IEEE standard format over the past summer. The status of the latest writing assignments was reviewed. Most of the writing assignment were received. Several were received later and will be incorporated to create Draft 2.0.

Comments on the current draft: Should under-voltage relaying be considered? Save comments for the "Editing" Review process comments.

The chair suggested to eliminate from the Guide the following clauses; since there was no quorum at the meeting, the vote to eliminate these clauses will be taken via email.

1. Subclause 4.2.1.1.3 *Specific protection requirements to assure power system stability* as there is no contribution to this subclause received and no one volunteered to provide one. The material Joe Uchiyama provided does not belong to this subclause and will be moved to Section 5.
2. Section 8 *Interconnection Examples* because it was felt that there are several examples currently exist in document and we do not need a separate section.
3. Clauses 5.3-5.7 because they repeat the material already provided in PC37.234 IEEE Guide for Protective Relay Applications Power System Buses. A proposal is to reference PC37.234 in the Guide and replace these clauses with new clause 5.3 *Typical Interconnection Configurations*.

The working group agreed that there is enough material to start the review and editing of the Guide. We will start from Section 4. Two review teams were formed for this section.

Clause 4.2.1 *Transmission Owner* review team is as follows:

Nathan Gulczynski [Lead] (ngulcznski@atcllc.com)

Abu Bapary (asbapary@aep.com)

Jerry Johnson (geraldjohnson@basler.com).

Clause 4.2.2 *Generation Owner* review team is as follows:

Nef Torres [Lead] (neftaly.torres@centerpointenergy.com)

Joe Uchiyama (juchiyama@usbr.gov)

Rich Young (rich.young@ieee.org).

Review Teams to complete their review and submit comments/recommended changes to Chair (aderonja@atcllc.com) by December 1, 2014.

Chapters 5, 6, and 7 review will be assigned during next meeting. Please consider volunteering to review these chapters if you have not contributed to the writing of some/any of these sections.

The remaining outstanding and new writing assignments are as follows:

4.1 *General design approach*. Mike Jensen, Keith Houser, and Tony Johnson are asked to contribute material on solar generation.

4.2.2.1.6 *Wind and solar generation inverter data* (including maximum fault current output, PF capability, voltage output; how the inverter is programmed to respond to faults). Mike Jensen, Keith Houser, and Tony Johnson are asked to provide the material for solar generation.

4.2.2.1.7 *Collector system configuration and impedances for wind and solar generation facilities*. Mike Jensen, Keith Houser, and Tony Johnson are asked to provide the material for solar generation.

5.2.4 is to be generalized and refer for details to 7.3.8. Also remove term NUG [Non-Utility Generation]). Alla Deronja will work with Mukesh Nagpal to resolve.

7.8 *Additional considerations*. It was observed that this information, appearing to be out-of-scope, may be essential when it becomes the Primary Protection. Dale Frederickson will finish working with Mike Jensen to assure that we do not cross the line into other out-of-scope information.

7.9 *Setting Considerations for Renewable Energy Sources*. Mike Jensen, Keith Houser, and Tony Johnson are asked to address the solar generation.

Galina Antonova will review the C37.95 section on the generator protection portion to assure no overlap with the present Guide. She will also review ***NERC Requirements for Setting Load-Dependent Power Plant Protection: PRC-025-1*** by Chuck Mozina for the applicability to the Guide.

5.3 *Typical Interconnection Configurations*. Joe Uchiyama will write new clause 5.3 by moving the material from subclause 4.2.1.1.3 and adding more material as necessary.

Additional action items for WG Chair:

1. Check with Standards Association and, if deemed acceptable, email the 2014 IEEE-SA Standards Style Manual to be used to maintain consistency while editing the Guide.
2. Incorporate the latest received additional contributions into Draft 2.0 and post to Central Desktop by October 1, 2014.
3. Email Will English's original contribution to the Review Team led by Nathan Gulczynski.
4. Email *NERC Requirements for Setting Load-Dependent Power Plant Protection: PRC-025-1* paper by Chuck Mozina to Galina Antonova.

C19 Standard for Phasor Data Concentrators (PDC) for Power Systems

Chair: Gharpure, V.

Vice Chair: Kanabar, M.

Output: Standard, **Output:** IEEE Guide PC37.???

Established: May 2013

Expected completion date:- TBD

Assignment: Develop an IEEE standard for Phasor Data Concentrators for power systems.

Attendees: 20 (6 members and 14 guests attended the meeting. A copy of the sign-up sheet is appended)

Introductions were performed.

Patent/IP slides were shown.

There was no quorum. Previous minutes will be confirmed electronically.

WG C19 PAR, Assignment, Purpose, and Scope were presented

The WG's task status was presented.

- The project duration and the web meeting / teleconference frequency and schedule.
- The WG started with the functions in the PDC Guide. The WG has taken the approach that the essential data transfer / validation type functions are to be included in the standard, while the application dependent data processing functions are to be excluded.
- Format and coordinate conversion – only conversion to floating point / polar coordinates has been included as mandatory. Rectangular / integer format had been the original format used by the first PMUs, as this was the easiest and efficient for the microprocessors in use then. Since then, the industry is moving towards the use of floating point / polar format as more powerful processors / DSPs are available. Thus this was deemed to be a necessary function for all PDCs.
- Magnitude and phase adjustment – only the phase adjustment was required, as different systems use different phase nomination for the same phase, and it would be useful for application functions to receive the correct phase information. This adjustment is not intended to be used for minute phase adjustments such as may be required due to calibration errors, but only due to differences in phase rotations or nominations. Magnitude adjustment was not deemed necessary. It was pointed out that the C37.118 standards require the magnitude to be in primary units, and thus any conversion may be considered to be violating that requirement.
- For both of the functions described above, the issue of traceability was discussed. In a multi PDC chain, it would not be immediately apparent where the change had occurred. However, this can be resolved by examining the individual PDC settings.
- Data retransmission requests – these are not currently supported by the 118 standards, although these were deemed to be necessary. This function can be implemented using user defined command codes, and should be included as an informative annex. This could become the standard at the next update, depending on how it gets used.
- The informative annex approach can be used for other functions as well, if the WG considers them necessary. One possibility mentioned was the assignment of data quality for individual signals. This will be examined by the WG during its deliberations.
- Cyber Security – This is deemed to be a system level function, and not a PDC specific function. An analogy given was EMC requirements – these are determined by the environment the device is used in, and not a device function per se. So it would be with cyber security. The device hosting the PDC function would need to meet the cyber security requirements of the system. However, it was also suggested and agreed that layered access control would be required. A simple password protection is not adequate.
- Application functions, such as a historian have been excluded from the list of essential PDC functions, even from the Guide. The PDCs are required to furnish data to application functions, including a historian. However, the historian (or any other application function) is not an essential PDC function per se.
- Protocol conversions are not required, since a PDC can function for a single protocol alone.
- In response to a question, it was explained that advanced functions not deemed essential (and thus not included in the standard) are not forbidden. Vendors can implement them and claim a better PDC.
- There have not been any contributions from 61850-90-5 experts to this document. It will be necessary to seek their opinion explicitly
- The functions in the Guide, currently not supported by the standards (IEEE C37.118.2-2011 and IEC/TR 61850 (90-5)), were also excluded.

Discussion on PDC Functions

C20 Impact of DC Transmission on Protective Relaying

Chair: Mooney, J.

Vice Chair: Tualla, I.

Output: Report to the PSRC

Expected Completion Date: May 2015

Working Group Scope: Develop a report to the PSRC describing voltage source converter (VSC) HVdc systems and their effect on the performance and requirements on local AC system protection.

The Working Group met with 35 attendees; 5 members and 30 guests. Eight guests decided to

join the working group bringing the working group membership to 17.

Dr. Brian Johnson from the University of Idaho presented material on Voltage Source Converter controls and operation titled "VSC-HVDC Transmission: Basic Behavior in Normal and Faulted Conditions". Some of the topics covered were:

1. How does the VSC system respond to AC faults?
2. What happens on the AC system when there is a DC fault?
3. What harmonics are generated and how are harmonic levels controlled?
4. Background material on VSC development and HVDC historical perspective.

The presentation was very well received and will be sent out to the working group members and it will be posted on the PSRC website.

One of the working group members provided a list of in-service and planned VSC systems. This was briefly discussed and the list will be sent out to the working group members. It is interesting to note that the majority of these systems are not in the US.

The working group chair asked those in attendance to consider taking a writing assignment to begin development of the report. A follow-up email will be sent.

C21: Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes (SIPS)

Chair: Hu, Yi

Vice Chair: Henneberg, G.

Output: IEEE Guide PC37.250

Established: September 2013

Expected Completion: December 2018

Working group C21 met on Wednesday, September 10, 2014 in Milwaukee, Wisconsin in single session chaired by Yi Hu and Gene Henneberg with 13 members and 11 guests attending. Five of these members, including one corresponding member, joined at this meeting. The meeting was started by display IEEE Patent Policy slides and inform all attendees to inform WG any known potential patent issues.

The May 2014 meeting minutes had been approved electronically, and no further questions were raised from the meeting attendees. WG Chair Yi Hu reviewed the status of the follow-up action items from May meeting:

- January and May meeting minutes were circulated and approved electronically
- Reached out to WG members for signing up various sections for the development of the guide – many members responded and signed up for a number of sections / subsections, but the WG is still far short on the original goal to have all sections / subsections to be signed up by this session
- A preliminary guide development schedule has been drafted

WG Chairs reviewed and discussed the drafted development schedule and the sign up status. The need to have all sections signed up will be important for WG to meet the development schedule.

WG members and attendees revisited the need to provide background information for this document. It was agreed these should be included and the draft outline already has the relevant subsection titles for such contents. Bob Cummings of NERC volunteered to provide some relevant input to this guide.

WG members and guests in attendance discussed a special situation face by the WG. Phil Beaumont and Fumio Kawano had provided some inputs to the guide, and indicated that there are additional materials available that could be used as initial input to the guide. At issue is that the materials are in Japanese that needs substantial efforts to translate into English. WG Chairs checked with IEEE whether any translation support could be provided – the response indicated that such service is not available. After the discussion, it was agreed that

- The WG should reach out to WG members to collect as much as possible original materials that are in English to minimize the need for translation
- Using google translate to do an initial translation and have WG members with subject matter expertise to edit the initial translation into initial input was proposed as a way to dealing this situation
- It was agreed that WG Chairs should reach out to them to obtain some sample materials and use google translate to do an initial translation, and provide a few sentence summary to enable WG members to decide if the material is suitable for the guide, and whether further efforts need to be put in to convert them into initial input to the guide – this will be an action item for WG Chairs

Gene Henneberg and Bob Cummings provided a summary overview of the NERC efforts in clarifying the SPS / RAS definition and updated the related standard activity. A whitepaper has been produced and is in the second revision for public comments. The document will be circulated to WG members and guest along with September meeting minutes for review and comments. The NERC web site for the RAS definition and standards drafting effort is at

http://www.nerc.com/pa/Stand/Pages/Project-2010-05_2%E2%80%93Special-Protection-Systems.aspx

and the NERC white paper is at

http://www.nerc.com/pa/Stand/Prjct201005_2SpclPrctcnSstmPhs2/System_Protection_and_Control_Subcommittee_SPCS_20_SAMS-SPCS_SPS_Technic_02182014.pdf

The action items are summarized as follows:

- WG Chairs to send September meeting minutes to WG members for approval
- WG Chairs to send the NERC whitepaper (and the web link) to all members and guests for comments and the approved September meeting minutes
- WG Chairs to reach out to WG members for signing up more sections / subsections, and for providing initial input for signed sections / subsections
- WG Chairs to reach out to Phil and Fumio to obtain some materials (and a brief summary) that in their opinion is relevant to this guide, and circulate to WG members to obtain feedback if WG should make further efforts to get these materials into the guide as initial input

C23: Coordination of Synchrophasor Related Activities

Chair: Anthony Johnson (Anthony.johnson@sce.com)

Vice Chair: Allen Goldstein (allen.goldstein@nist.gov)

Output: Coordination with other industry groups

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 PSRC in sync with the changes and needs in the industry with respect to the development and usage of PMU devices. Formalize transfer process of PRSVTT developed documents to PES PSRC including making recommendations which PRSVTT activities should be transferred to IEEE reports, guides and standards.**
- **Make recommendations to PSRC for assignments that would require the creation of working groups in PSRC and also recommend what the output of those working groups might be (Guides, reports, etc.) based on the needs of the industry.**
- **Coordinate related activities with other IEEE PES committees.**

Meeting Agenda

1. Introductions
2. Approval of the May 2014 meeting minutes – Deferred to email approval.
3. NASPI Update
 - a. October 22-23, 2014 - [NASPI's October 2014](#) meeting will be held in Huston, TX, October 22-23, in conjunction with CIGRE's Grid of the Future Symposium

4. IEEE Workgroup Activity

	Title	Status
C19	Standard for Phasor Data Concentrators (PDC) for Power Systems	In Progress
H11	Revision of C37.118 Synchrophasor Standard Joint with IEC	In Progress
H21	Development of standard Mapping between C37.118 and IEC61850-90-5	In Progress

5. Discussion on Data Archival

Data Archival: Naspi is developing a guide and proposes bringing it to IEEE. This committee has identified a sub committee:

C37.1 Standard for SCADA and Automation. Annex E: Database (6 pages)

C37.1 standard is under revision. WG C0 is planning to take the document and break it into multiple (5 or 6) standards. C37.1.1: IO requirements for IEDs. C0 has a study group on databases.

A possible recommendation is to create a guide or standard to cover databases. The NASPI work may dovetail... The schedule is not known but may be a couple of years out so if this work is urgent then Substations C0 may not be the WG to take this on.

Tony: The status of the document. The people involved would be good resources.

Farnoosh: This document is a "lithe" document. The best value is the table of contents and it is currently light on content. This has applications in control center (most) substations (least) and power system operations (theoretical). Farnoosh believes there is no-one in operations interested in doing this.

The SCADA document includes elements beyond substations and no-one has complained about the group going outside substations. The database section C37.1 goes outside the substation.

Tony: Likely the historian would be defined as a function and divorced from the hardware.

Allen: Is it possible for the C0 meeting to be scheduled not to conflict? Answer: C0 has an agenda to take the recommendations and decide, January may not be a good time to do this. Typically Substations has no task forces but form a working group to create a PAR. C0 meets on Wednesday afternoon and we can discuss this work then.

In January - the study group will take up most of the time.

Tony: Lets plan on scheduling a time in January to have a joint C23/C0 meeting. We will announce it at the October NASPI meeting so interested parties can attend in January.

6. PMUs in multifunction devices

Jim: Document is in its final review. Question is that something that PSRC would take over and prepare a guide/report (or Industry Connections).

Tony: This document may not be appropriate as a PSRC guide but a report.

Allen: the advantage of a report is that it is searchable on the IEEE XPLORE website and available for fee or for free depending on the ICAID applicant.

The WG could learn the ICAID process and bring it to NASPI in October then start the process of making the NASPI report into an IC report.

7. Other updates

8. Future work

9. Adjourn

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

Chair: Sukumar Brahma

Vice Chair: George Bartok

Output: TBD

Assignment:

[see notes below]

Request a room for 30 with a computer projector. Please avoid conflicts with C-17 and CTF25.

WG C24 met on Tuesday from 3 – 4:30 pm with 9 members and 10 guests. There was an editorial change made to the draft assignment. The final assignment of the WG C24 is as follows:

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.

CTF 24 minutes from the May 2014 meeting were approved.

The attendees discussed the fault characteristics of different types of wind turbine generators (WTGs), and idiosyncrasies introduced to their fault response due to control designs. The large dc offset existing in fault response of Type 1 and Type 2 WTGs that may impact circuit breaker selection, need for detailed and aggregated models of wind farms, and parameters necessary to capture the responses of Type 3 and Type 4 WTGs were also discussed.

Clause 5.3 of Guide 1547.8 includes the requirement that power sources should be type---tested to determine the maximum instantaneous value of fault current contribution for three phase, single phase to ground and phase to phase faults for the time periods: 0 to 1 cycles, 1 to 4 cycles, 4 --- 30 cycles, and 30 cycles until the fault is cleared. It was discussed if these time frames would meet our requirements and it was the general opinion that they would.

The WG is inclined to first develop a set of performance parameters that would facilitate accurate steady state short circuit models, without having to deal with the control strategies implemented by individual manufacturers.

The WG expects to have presentations from EPRI, ASPEN, ELECTROCON, and GE in the January 2015 meeting

CTF-25 Task Force for on a Guide for Protection of Wind Plants

Chaired by: Dean Miller

Note Taker: Gene Henneberg

The TF met September 9 at PSRC meeting in Milwaukee, WI with 13 attendees

TF Assignment: Discuss the potential for forming a working group to develop a guide for protection of wind plants.

The primary purpose of this discussion was to determine the interest in developing a IEEE Guide on wind plant protection. Many of the components of wind plants, e.g. transformers, buses, etc already have applicable Guides. Therefore the discussion migrated toward production of a Report, rather than a Guide.

Several attendees do have design experience with wind plant facilities.

Tentative topics for the report may include at least:

- Collector transformer
- Collector bus
- Tie line to the transmission or distribution system
- Collector lines
- Grounding transformers
- Generator step up transformer
- Arc flash

The attendees indicated a significant interest in forming a working group. Martin Best and Keith Houser volunteered to serve as chair and vice-chair respectively, subject to the usual PSRC officer approval.

OLD BUSINESS

The C37.117 Underfrequency Guide is up for re-affirmation. This was briefly discussed at the New Orleans meeting, though not resolved. Jim O'Brien urged C Subcommittee members to review this Guide and be prepared at the Milwaukee meeting to either for a Task force to work toward re-affirmation or let it expire.

IEEE-SA has a new category of document, Industrial Connection. A new Task Force, CTF27, was proposed and approved to convert this Guide to an IC paper. Joe Mooney will chair the task force at the January 2015 meeting, but does not wish to continue as chair of the Work Group.

The C37.233 Testing Guide is also up for re-affirmation. A Task Force for this purpose was discussed. Several other PSRC working groups anticipate continuing to use this Guide as part of their work. A new Task Force, CTF26, was approved to raise interest and prospectively become a working group to develop the necessary PAR to reaffirm this Guide. Gene Henneberg will chair the task force at the January meeting, but does not wish to continue as chair of the Working Group.

NEW BUSINESS

A suggestion was made for a task force to investigate the impact of PV (photo voltaic) inverters on protection systems. Similar to the recent work of C17, Fault Current Contributions from Wind Plants. Joe Mooney (C20 chair) suggested that, since the technology is very similar to the present work of C20, that this investigation occur within the C20 working group and that the C20 assignment would be appropriately modified.

D: LINE PROTECTION SUBCOMMITTEE

Chair: G.L. Kobet

Vice Chair: K. Zimmerman

Scope: Investigate and report on the relaying techniques and systems used for 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, September 10, 2014 at 1:30 p.m. with 25 members and 31 guests present.

Following introductions, a count of SC membership was made, and it was determined a quorum was present (27 out of 45 members present).

Minutes from the May 2014 meeting in Fort Lauderdale were approved.

The Chair reviewed items of interest from the Advisory Committee: The Chair also welcomed Jeffrey Barsch as a new member of the D Subcommittee.

Working groups gave reports on their activity.

Reports from the WG Chairs:

D3: Considerations in Choosing Directional Polarizing Methods for Ground Overcurrent Elements in Line Protection Applications

Chair: Meyer Kao

Vice Chair: Elmo Price

Output: Report to the Line Subcommittee of the PSRC

Established: September 2009

Expected completion date: MAY 2014

Assignment: Prepare a report to the Line Subcommittee of the PSRC on identifying different polarizing methods, address issues related to the application of different methods, and make recommendations in choosing the polarizing method.

D3 working group did not meet in Milwaukee.

The chairperson will work with the vice-chair and creating a presentation. Gary Kobet will also assist with the presentation. A draft of presentation will be distributed to the members of the working group for discussion at the January 2015 meeting.

The D3 working group will meet at the next PSRC meeting in January 2015.

D6: AC Transmission Line Model Validation

Chair: Tony Seegers

Vice Chair: Sam Sambasivan
Established: January 2009

The D6 working group met on Tuesday, September 9, 2014 at 8.00 a.m. with 4 members and 5 guests present.

WG Assignment The WG will prepare a report to the main committee on the processes, issues, problems and methodology of validating software model parameters for AC transmission lines used for relaying. The report will not include details of relay curve models or other similar relay modelling. The report will also not include specific EMTP modeling.

The report has been completed, approved and posted on the PSRC web site. The members in attendance discussed the possibility of presenting the report at various conferences. A paper on a similar topic was presented at some conferences a couple of years ago. The decision was made to not pursue any presentations beyond the PSRC main committee. The chairman or vice-chairman will present the report at a future PSRC main committee meeting upon request. The working group chairman will make a motion to the subcommittee to disband the working group

D19: PC37.113, DRAFT Guide for Protective Relay Applications to Transmission Lines

Chair: Rick Taylor

Vice Chair: Don Lukach
Established: September, 2011
Expected Completion Date: September 2014
PAR Expiration Date: 2015

Scope: Concepts of transmission line protection are discussed in this guide. Applications of these concepts to various system configurations and line termination arrangements are presented. Many important issues, such as coordination of settings, operating times, characteristics of relays, impact of mutual coupling of lines on the protection systems, automatic reclosing and use of communication channels are examined. Special protection systems, multi-terminal lines and single phase tripping and reclosing are also included. The impact that system parameters and system performance have on the selection of relays and relay schemes is discussed as well.

WG Draft Guide (Draft 7.0)

The D19 working group did not meet. Draft 7.0 is in balloting.

D26: Revision of C37.114 Fault Location Guide

Chair: Joe Mooney
Vice Chair: Randall Cunico
Output: IEEE Standards Guide
Established: 14 Jan, 2010
Expected Completion Date: December 2014

Assignment: Update and revise C37.114: IEEE Guide for Determining Fault Location on AC Transmission and Distribution Lines to include new developments in fault locating methods and techniques.

After introductions, the chair reviewed the IEEE Patent Policy and attendees were provided the opportunity to respond. There were no responses.

There were 16 attendees with 10 members (9 Balloting & 1 Corresponding) and 6 guests. There are 17 balloting members on the Working Group so a quorum was achieved but the WG chair did not notice until after the meeting due to some late arrivals.

Minutes from the May 2014 and this meeting will be approved via email.

The chair reviewed the recent balloting progress to date and brought the status up to date. Initial balloting was closed on May 8, 2014. The ballot met the 75% returned ballot requirement. The guide received a positive response with a 95% approval rate; 80 total votes, 76 approved, 4 disapproved. There are a total of 219 comments.

All comments were reviewed, addressed and the guide was recirculated. One negative ballot was changed to approve. One balloter who had previously approved the guide submitted a new comment.

The chair proposed rejecting this new comment for the following reasons:

1. The comment was on a section that was not previously commented on. New comments are not accepted as part of the recirculation process.
2. The content was meant as an example application. It serves that purpose.

All working group members in attendance agreed with rejecting the new comments. After the meeting the working group chair discussed rejecting the comment with four more WG members and they all agreed to rejecting the comment.

The chair will send the balloter the reasoning for dismissing the comment and then send the guide to RevCom for SASB Submittal prior to the October 20 deadline.

There are no plans for future meetings. A resolution will be submitted to disband the working group at the January meeting.

D27: Guide for the Application of Digital Line Current Differential Protective Relays Using Digital Communications PC37.243

Chair: Solveig Ward

Vice Chair: Bruce Mackie

Established: September 2010

Output: IEEE Guide PC37.243

Assignment: Write a “Guide for Line Current Differential Protective Relay Applications” to present practical line current differential schemes including operating principles, synchronization methods, channel requirements, current transformer requirements and external time reference requirements; provide specific guidelines for various application aspects including multi-terminal lines, line charging current, in-zone transformers and reactors, single-pole tripping and reclosing as well as channel and external time sources requirements; include backup considerations, testing considerations and troubleshooting.

Scope: This guide presents practical line current differential schemes using digital communication. Operating principles, synchronization methods, channel requirements, current transformer requirements, external time reference requirements, backup considerations, testing considerations and troubleshooting are included. It also provides specific guidelines for various application aspects including multi-terminal lines, series compensated lines, mutual coupled lines, line charging current, in-zone transformers and reactors, single-pole tripping and reclosing, as well as, channel and external time source requirements.

Par expiration date: Dec 31, 2014

WG D27 met on Tuesday, September 9, 2014 at 9:30am CDT in a single session with 7 voting members and 16 guests. A quorum was not achieved so the past minutes will be approved via email.

After introductions, the patent slides were shown and reviewed. The minutes for the January and May meetings will be sent to members via email for approval.

The scope of the PAR was reviewed.

134 comments were received from the initial ballot. Some of the comments were reviewed during the meeting with the following highlights:

- The group reviewed the first 56 comments with recommendations given for most of the comments though some decisions were tabled to the next meeting.
- Phil Beaumont created a revision to a couple of sections in the document as a result of the comments. These revisions will be forwarded to the commenters to determine if the revision satisfies their concerns.
- Joe Uchiyama and Craig Palmer will revise two of the figures.

- Mark Schroeder and Bruce Mackie will review document per comments for multiple uses of the words “ensure”, “maximize”, and “minimize.”
- Two words were added to the definition section and will be sent to the Terminology working group.

The plan was discussed to have webinars scheduled to review some of the comments before the January meeting. In addition, an extension will be requested for the PAR.

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 Breaker Protective Relay Applications to Distribution Lines

Draft :1.2

Expected Completion Date: 2018

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 in Milwaukee, WI on Wednesday, September 10th 2014, 8:00am Eastern time.

There were members 15 and guests 4. The attendance list is attached.

The working group minutes from the May meeting were presented and approved.

The patent slides were presented. Mike Meisinger disclosed that there is a patent on pulseclosing.

The working group reviewed the comments submitted by the review teams for sections 4, 5 and 6 of the draft.

The review was completed through section 6.1 and will continue starting with section 6.2 in January.

There was discussion of whether a trademark term is required for the term pulseclosing. Claire Patti will see how it was handled in other guides.

Don Lukach will revise sections 6.1.1 and 6.1.2 to address sensitivity of overcurrent pickup settings.

Bruce Mackie will work with Don to revise section 6.1.2 to define the distribution system being discussed and qualify the “typical” values discussed.

Jack Jester will add a sentence or two to 8.13 on single phase tripping and lockout based on residual current.

Fred will also lead the group including Joe Xavier, Chris Walker, and Mike Meisinger to rework section 4 to address the submitted comments.

The working group discussed replacing the term distributed resources with distributed energy resources. We agreed that distributed energy resource (DER) is the current term and agreed to use the current definition from the IEEE dictionary.

Writing Assignments:

Assignments were made to add or revise the following sections:

- Karl Zimmerman and Pat Carroll agreed to write the section on fault locating to reference the fault locating guide.
- Fred will also lead the group including Joe Xavier, Chris Walker, and Mike Meisinger to rework section 4 to address the submitted comments.
- Don Lukach will revise sections 6.1.1 and 6.1.2 to address sensitivity of overcurrent pickup settings.
- Bruce Mackie will work with Don to revise section 6.1.2 to define the distribution system being discussed and qualify the “typical” values discussed.
- Jack Jester will add a sentence or two to 8.13 on single phase tripping and lockout based on residual current.

All new writing assignments are due October 31. Word format is preferred.

Old Business:

Mike Meisinger recommended adding a section on intentional miscoordination. It is suggested that it be included in section 7. This section will be assigned at a later date.

It has been noted that the existing guide is inconsistent in the use of terminology. It was pointed out that it uses both sense and detect. We will maintain a list these terminology issues and address them as we work through the guide.

- Sense vs. detect
- Line vs. phase , such as double-line and two-phase
- High side vs. high voltage
- Load capability vs line rating

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

Chair: Normann Fischer

Vice chair: Kevin W. Jones

- Met with 14 members and 11 guests.
- Kevin presented and explained a possible power system model for simulating the OOS phenomena on. The model was accepted by the group.
- The selected power system will be modelled by Joe Mooney using RSCAD software. Once Joe has completed the model and taken care of any modelling issue then the same power system will be modelled in two different software packages. Demetrios Tzouvaris will model the power system in powerworld and Manish Patel will do the same in PSSE. Kevin W Jones will provide the model data, including AVR and Governor models
- All writing assignments have been allocated, however I newer member wish to contribute the are more than welcome to contact one of the authors
- At the next meeting Gene Henneberg will discuss his excel spreadsheet used for OST tripping and blocking.
-

D30: Tutorial on Application and Setting of Distance Elements When Subjected to Distorted Waveforms on Transmission Lines

Chair: Karl Zimmerman

Vice-Chair: Ted Warren

Established: Jan 2014

Assignment: Write a tutorial on the application and setting of mho and quadrilateral distance elements on transmission lines when subjected to distorted waveforms or other unique applications.

The working group met in Milwaukee on September 9, 2014 with 7 members and 19 guests.

The WG Chair gave an update on the progress of writing assignments, which were to provide system examples of distance element applications and settings on lines with distorted waveforms. Writers were finding it difficult to find system examples that were not already part of the D25 Working Group technical report. As a result, the WG had a discussion on the assignment – is there enough or too much material available to write a tutorial or should we change the assignment or even disband the WG?

After some discussion, the WG adapted the assignment to include “when subjected to distorted waveforms”.

Randy Crellin suggested we create a simple survey, using IEEE resources. Kevin Jones and Will Knapek agreed to create a short questionnaire, which would seek field operations or simulations, correct or incorrect, in which distance elements were subjected to distorted waveforms caused by: CVT transients, CT saturation, transformer inrush, series-compensated lines, the impact of ferroresonance, transients from faults, or other phenomena. The survey would be purposely short and ask if users would be willing to receive a follow up e-mail for additional system data.

We would follow up by requesting the data in a raw COMTRADE format and request system parameters, including actual source and line impedance data, inputs (CTs, CVTs, etc.) and relay performance, including application and setting considerations, etc. Since many users already make this effort (through NERC, etc.), we believe there are probably good cases to share and the end user information would be kept confidential and

anonymous. We hope this effort will provide enough data for the WG to proceed with the tutorial and show some educational and useful test case studies.

After the subcommittee, Charlie Henville, Normann Fischer and a few others expressed concern at the course change of the working group. For example, Charlie expressed an interest in addressing mho and quadrilateral performance and system conditions that might cause over-reach of Zone 1 elements. Post meeting, the Chair followed up with Charlie Henville and others, and it was determined to have 2 to 3 presentations at the next WG meeting to discuss several distance element related application issues to help re-calibrate the WG assignment.

SC Motions to be made to Main Committee

Coordination Reports

T&D Committee / Distribution Subcommittee

The T&D Committee / Distribution Subcommittee met during the PES General Meeting in Washington, DC, 27-31 July 2014. The next meeting will be January 12 – 15, 2015 at the JTCM in Garden Grove, CA.

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

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

Developing a Smart Distribution Application Guide, P1854

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.

Panel sessions are being planned for the 2015 GM in Denver, CO.

Volt-VAR Control Task Force

Work continues on P1885 'Guide for Assessing, Measuring and Verifying Volt-Var Control Optimization on Distribution Systems'

Dr. Murty Yalla is leading an effort to develop a tutorial

Distribution Management System (DMS) Task Force

Discussion continued on DMS issues and the output for the Task Force.

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

The PAR for P1806 "Guide for Reliability Based Placement of Overhead and Underground Switching and Overcurrent Protection Equipment" was resubmitted by the new Chair.

Scope: To provide guidance for the placement of switching and overcurrent protection devices on non-network distribution circuits through 38 kV.

Purpose: This guide provides criteria for placement of switching and overcurrent devices on the distribution system including feeder and branch line equipment.

A joint panel session is being planned with the Reliability Working Group for the 2015 GM in Denver, CO.

Old Business

None

New Business

We received a response from John Tengdin about the IEEE device numbers for out-of-step relays (68, 78). John's position is the definitions are fine and there is no need to revise. Following discussion at the SC Chair Coordination meeting, the D-SC Chair will work with the Chair of the Rotating Machinery Subcommittee J to submit proposals to the Substations Committee Working Group C5 for revised definitions that will clarify their use.

General Discussion

None

Line Protection operations of interest

None

The meeting was adjourned at 2:45 p.m.

H. RELAYING COMMUNICATIONS SUBCOMMITTEE

Chair: Eric Udren

Vice Chair: Eric Allen

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

The Subcommittee met on September 10, 2014 with 25 members of 37 total, comprising a quorum. 32 guests were also present. Minutes of the May 2014 Ft. Lauderdale, FL meeting were approved without objection.

The SC welcomed Chris Chelmecki, Randy Hamilton, Mike Dood, Jay Murphy, Bruce Pickett, Dan Reckerd, and Yi Hu as new members.

Two members – Dac-Phuoc Bui and Juergen Holbach – accepted that their membership status be suspended due to an extended period of non-attendance. Suspension of membership status for non-active members is essential to meet quorum requirements at PSRC meetings and conduct business. If and when suspended members are able to resume regular attendance, their membership status will be reinstated.

The Chair presented several announcements:

- At the conclusion of WG meetings, WG Chairs should wait in the meeting rooms they are using until the chair for the next meeting arrives so as to not leave any of the projectors unattended.
- The PSRC website has been remodeled. There is a mailto: button at the bottom of pages for making changes and updates to the WG pages.
- Working groups are strongly encouraged to limit meetings at PSRC conferences to single sessions. Working groups are asked not to use time slots at PSRC conferences to hold meetings that are only around 15 minutes in length; if a meeting is scheduled, it should fill all or most of the 75 minute time slot.

WG business:

None; see WG reports.

Old business:

All members of utilities are requested to report any information they have on experience with the use of IEC 61850 to the Chair. A TF on feedback on IEC 61850 will be formed. The Chair reported that a chair for the TF has been identified along with interested members.

New business:

None

Reports from the WG Chairs

H1: PC37.236 Guide for Power System Protective Relay Applications over Digital Communication Channels

Chair: Marc Benou

Vice Chair: Ilia Voloh

Output: Guide

Established: 2006

Expected completion date: December 2013

Assignment: Develop a summary paper of C37.236.

The H1 working group did not have an official meeting.

The goal remains to add a real world case involving problems using audio FSK over digital lines. The chair will contact Bryan Donaldson to find out if he is willing to participate.

The chair will create a paper and distribute it to the members and guests to review and comment. Craig Palmer has volunteered to help write the paper.

Status: Draft 1

H3: Time Tagging for Intelligent Electronic Devices (COMTAG)

Chair: W. Dickerson

Vice Chair: J. Hackett

Substations C4 Co-Chair: M. Lacroix

Output: Standard

Established: 2006

Expected completion date: December 2016

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.

The WG met on Tuesday, with 11 members and 6 guests in attendance, with a quorum for the first time in recent memory. After calling attendance and verifying a quorum, the meeting was called to order by Chair Bill Dickerson.

The patent policy slides were shown, and no issues were identified. Minutes from the preceding meeting in Ft. Lauderdale were approved – Allen Goldstein moved approval; Eric Allen seconded; approved unanimously with one abstention.

Old Business: The WG then discussed several technical issues, the most significant of which was how to handle inclusion of the difference between TAI and UTC time scales. This issue was agreed in the meeting: the offset will be recommended ('should') with a view to making it mandatory in future revisions. Not all methods of time distribution provide this information.

New Business: We discussed methods to use reserved bits in the IRIG-B time code to transmit this information. The chair provided a draft proposal for comment. PTP and NTP (version 4) can provide this information already. The WG agreed to continue the discussion by email.

The WG approved accepting the markup changes to the draft standard, in accordance with new P&P rules – Ken Martin moved acceptance; Allen Goldstein seconded; approved unanimously with one abstention. The draft number will now be 0.4.

Ongoing work assignments include: (1) Mark Adamiak, to prepare (a) an annex showing how COMFEDE, C37.239, can be extended to include all of the required time tag attributes; and (b) discussion of correction for internal IED time delays. (2) Marc Lacroix to prepare an annex showing both XML and tabular formats for required data elements. (3) Members to review the draft and comment.

The draft will be circulated to the DNP committee for comments, since DNP also implements time transfer. Marc Lacroix and Craig Preuss will handle this.

Once business was complete, Eric Allen moved to adjourn.

H6: IEC 61850 Application Testing

Chair: C. Sufana

Vice Chair: B. Vandiver

Output: Report

Established: 1999

Expected completion date: December 2014

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 12 members and 15 guests present for the Sept 9, 2014 meeting.

The minutes from the May 2014 meeting were reviewed and approved with no comment.

Contributions were received just prior to the meeting and distributed to the WG and guests. Aaron Martin provided a write up and power point on use of VLAN's as a test isolation tool in IEC 61850 networks. Chris Chelmecki provided excerpts from a white paper on "Standardized Testing Philosophies and Methods: How they are applied to the SCE C-RAS System," Southern California Edison, Oct. 2008. It was recommended that a test case could be extracted and used for the paper. Mouad Oubidar provided a submission for section 5.3, Identifying the various scenarios of IED configurations that need to be tested and how.

Each of these were presented and discussed by the attendees with comments on what parts were appropriate for inclusion. The authors will be contacted for clarifications and required edits. Section 5.1 & 5.2 could be provided by Yuchen Yu at EPRI based on a paper he co-wrote and presented at Georgia Tech; Charlie will contact him for a possible contribution.

Remaining writing assignments are requested to be provided by November 16, 2014.

H9: Understanding Communications Technology for Protection

Chair: R. Midence

Vice Chair: A. Oliveira

Output: Report

Established: 2005

Expected completion date: June 2013 (Completed)

Assignment: Develop a paper and tutorial based on the report.

The Working Group H09 met in Room Kennedy Roosevelt, Hotel Pfister, Milwaukee, WI, USA on September 8th, 2014 at 15:00 pm. Seven (7) members and ten (15) guests were present.

Discussion

The meeting was run by the vice-chair.

The vice-chair provided updates on the tutorial informing that the tutorial had been offered to the following conferences/Shows:

- PAC World America
- DistribuTech
- WPRC

With no response from the respective conference committees.
And also to:

- IEEE General Meeting 2015 and Innovative Smart Grid Technologies (ISGT) Conference

The IEEE committee for both conferences had contacted René Midence and promised to provide an answer to the offer by the end of September.

The other item discussed in the meeting was the promotional paper.

It was decided that the group should not pursue to shrink down the current 32 page version of the paper. It was also suggested by the group the possibility of breaking the paper down in few sessions to make it more accessible.

The vice-chair promised to discuss this possibility with the chair and with the chair of the H subcommittee.

The group would be informed about the outcome of the discussions and requested to work on the task, if necessary.

Two participants volunteered upfront to collaborate with the work on the promotional paper:

- Jim Niemira
- Alex Lee

The next task for the working group now is to determine the right strategy for the promotional paper and work on it accordingly.

H11: C37.118.1 Standard for Synchrophasors for Power Systems

Chair: K. Martin

Vice Chair: A. Goldstein

Output: Standard

Established: 2006

Expected completion date: December 2017

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.

WG H11 met on Wednesday, September 10, 2014 at 9:30 AM in a double session with 11 voting members and 23 corresponding members & guests. Attendees introduced themselves and the IEEE patent rules were reviewed.

The current status was reviewed:

The Working Group summary paper was submitted to Transactions on Power Delivery. They are mainly interested in archival papers with new and unique content, so acceptance into that journal is generally not best for WG papers. The paper was returned with 4 pages of reviewer comments in August. Responses to reviewers and paper updates have been drafted and will be submitted by September 18.

The paper on the C37.118.2-2011 standard was rejected by Transactions on Power Delivery but accepted by Transactions on the Smart Grid and published July 2014. The paper was presented at a session hosted by Power System Instrumentation and Measurement Committee (PSIM) on July 31. PSIM members are interested in investigating the benefits and detriments of using reporting rates of 120/s and higher. This work is open to participation from WG H11 members.

The existing draft 1 CD of IEC/IEEE 60255-118-1 was reviewed for correctness by several WG members. The draft was edited to correct the few differences and circulated to the WG. No further comments have been received, so that will be accepted and the amendment changes will be edited into the CD. Ratan and Shanshan volunteered to help with the editing.

At the May meeting several task groups were formed to examine the high priority issues for standard improvement that were identified at the January meeting. A web meeting was held in August to discuss these proposals and prepare for this meeting. More definitive progress was made on these proposals as follows:

Environmental requirements: Proposal to eliminate all environmental requirements from the normative part of this standard. Discussion followed on citing particular environmental standards or allowing users to decide what to use. Recommendation: Add a statement to the introduction indicating user must specify environmental testing, remove the temperature requirements from the normative part of the standard, and add an informative annex indicating the performance requirements that should be used when testing a device hosting a PMU for environmental acceptability.

Following some discussion, the WG voted unanimously for this approach.

Rate Reduction: To simplify testing, we would like to reduce the number of reporting rates at which tests are required. It was proposed to eliminate 12, 15, and 20 FPS from the required rates. The discussion extended to whether any rates should be mandatory--why not just specify rates required for compliance testing as "supported" rates and let the user choose which rates the PMU must be certified for. Counter arguments include the fact this puts more burden on the user. Recommendation: Change the "required" rates to "supported" or "permissible" and require that the PMU support one or more of those rates.

Following some discussion, the WG voted 10 approve 1 disapprove.

Add higher reporting to listed rates: Proposed that we examine 100/200 (50 Hz) and 120/240 (60 Hz) FPS rates and extend the performance requirements. The discussion noted that at least one utility has implemented and experimented with 120/s and that little other information is known about performance expectations. We don't know whether our present requirements are compatible with higher rates, and what the real benefits are. For now, we do not feel we know enough about higher rates to make requirements for their performance. Dan, Jay, Harold, Bill, and Jerry volunteer to form a Task Force to study higher reporting rates.

Decision tabled pending information gathering.

Ambiguous statements in the standard: Test and reference conditions, Response and delay time, Clarification for annex C synchronization, overshoot and undershoot and a few others. Most of the clarification is proposed as edits of the current work. This will be done in markup in the CD once the amendment and standard have been combined.

Clarification of the verification requirements: Proposal to set TUR requirement of "minimum of 4" to at least 10 was revised to simply eliminate section 5.5.3 "Compliance Certification".

Proposed change was approved by all voting members still at meeting (7).

The next WG meeting was discussed. It may be possible to hold a meeting with a TC95 meeting. Next meetings are in Florida (USA) in December and Chendu (China) in April. We probably won't have much ready by either date. Might be most useful to have a F-F meeting when we are ready to resolve comments from a CD circulation. For now, plan web meetings and another meeting at JCTM (with PSRC) in January.

Meeting adjourned at 12:15 (on time).

Chair will get CD update completed, target by 30 September.

H12: Configuring Ethernet Communications Equipment for Substation Protection and Control Applications

Chair: E.A. Udren

Vice Chair: R. Beresh

Output: Report

Established: 2008

Expected completion date: December 2014

Assignment: Develop a report to assist protection engineers in configuring Ethernet LANs and networking equipment when the network traffic includes critical protection messaging such as IEC 61850 GOOSE messaging. Topics include switch and router configuration, VLANs, security, priority queuing, traffic monitoring and control, and topology choices and redundancy.

The Working Group met on September 10, 2014 with 12 members and 9 guests. The Chair circulated a clean revised Draft 7 shortly before the meeting, and reviewed the few remaining issues to get to a version suitable for a WG vote.

- Didier Giarratano volunteered to review Section 10 on Security.
- Deepak Maragal agreed to update Section 14.2 according to IEC 61850-3 Edition 2 environmental requirements.
- Eric to insert material from Eric and Herb Falk on 61850-90-5.
- Eric to insert material on UCAIUG PICS for switches – shared by Herb at the prior meeting and explained in minutes of that meeting.
- Deepak Maragal suggested addition of use cases; the schedule does not support the development of major new sections now. This could go into 1615 as explained below.

All WG members are to review the draft and provide comments by October 25.

The Chair should have a version ready for WG vote by November 29.

The latter part of the meeting focused on a discussion with Kevin Easley of Substations C8 on sharing of material from the H12 report for use in the revision of IEEE 1615. Since the report focuses heavily on protection applications, and since P&C communications run on the same Ethernet networks, the revision of 1615 should become a joint PSRC/Substations C8 project.

H13: Understanding Requirements and Applications of the Substation Cyber Security Standards (Joint Working Group Substations Committee C10 & PSRC H13)

Chair H13: S. Sciacca

Chair C10: Tim Tibbals

Vice Chair H13: C. Preuss

Output: Standard

Established: 2008

Expected completion date: December 2013

Assignment: Prepare a standard on “Cyber Security Requirements for Substation Automation, Protection and Control Systems.” This document provides technical requirements for substation cyber security. It presents sound engineering practices that can be applied to achieve high levels of cyber security of automation, protection and control systems independent of voltage level or criticality of cyber assets. Cyber security includes trust and assurance of data in motion, data at rest and incident response.

No report.

H17: Establishing links between COMTRADE, IEC 61850 and CIM

Chair: C. Brunner

Vice Chair: A. Apostolov

Output: Report

Established: 2010

Expected completion date: December 2013

Assignment: Develop a standards approach to link IEC 61850, CIM and COMTRADE so that the COMTRADE channels can be associated to a node in the power network.

No report.

H21: Information Mapping between IEEE C37.118.2 and IEC 61850-90-5 systems

Chair: Yi Hu

Vice Chair: A. Goldstein

Output: Report

Established: September 2012

Expected completion date: December 2016

Assignment: Create an IEEE report documenting the mapping between IEEE C37.118 and IEC 61850-90-5 standards.

Working group H21 met on Tuesday, September 9, 2014 in single-session chaired by Yi Hu and Allen Goldstein with 21 people (6 members and 15 guests) attending.

The working group reviewed the progress of the following subtasks:

- The conceptual architecture subtask team is led by Mark Adamiak, who is not present to update the group
- Allen Goldstein started gathering the documents and finding the information. There are currently no volunteers to help the TF and Allen will need to focus efforts in another area for a few months. Plans to re-start this effort and put together a task force after January 2015. Allen Goldstein emphasized that there is a need for information dissemination regarding how the coding could be done for 61850-90-5, and asked for those interested to participate in this subtask activity
 - o It is difficult to go through all relevant standard parts to understand how the coding should be done. Also some questions remain as to how to communicate configurations, start/stop data streams, etc. using the 61850-90-5 protocol
 - o The information will become an informative annex for the report
 - o Dean Ouellette agreed to join the efforts
 - o SISCO has an open source code base that can be accessed through UCAIug website

WG discussed the possible IEEE C37.118.2 and 61850-90-5 future directions that may directly affect this report:

- There is no plan to dual logo the data transfer protocol between IEC and IEEE – separate C37.118 standard to two parts is to facilitate the dual logo of the synchrophasor measurement requirements standard (C37.118.1)
- Ken martin: C37.118.2 was split from C37.118.1 with an idea that it will continue to be supported and revised
 - Allen: Proposed to revise and extend C37.118.2 when it approaches renewal date
 - Should C37.118.2 be updated to address some known issues and add more functionalities?
 - o How to handle large data set – both data and configuration?
 - Will it make sense to send the time-aligned large data set around the network?
 - There is an effort (Bob Braden at UC) looking into data sets over 65K in size. Does it make sense to transmit such large data sets?
 - o Make updated C37.118.2 a complimentary protocol to 61850-90-5; and let users to select
 - o Regarding concerns that UDP may cause more collision
 - Network switches should be able to handle the priorities and collision avoidance. User experience has not shown this is a problem
 - o If so, then the two should be compared with each other to help users to decide
 - Vahid: Manufacturers lead customers to where they think the customers should migrate. In other groups, we talk about customization. The end users are not interested in multiple protocols. Much work is being done in centralized protection. Yet some are trying to promote a one-of-a-kind application.
 - The WG does not aware any known plan to further develop the 61850-90-5 by IEC TC57 WG10 – It is a Technical Report and the understanding is that it will be merged into the future edition of core parts of the 61850 standard to become integrated part of the standard (Double-check WG10 members to confirm)
 - Current 61850-90-5 implementation uses C37.118.2 configuration to communicate the configuration information – mainly it is already implemented

The action items are as follows:

- Follow up with subtask force to work on specific topics as planned
 - o Conceptual architecture and use cases – Mark lead
 - o IEEE C37.118.2 and IEC 61850-90-5 encoding details – Allen lead
- Request WG members sign up for different sections to submit initial inputs

H22: PC 37.249 Guide for Categorizing Security Needs for Protection Related Data Files (Joint Working Group Substations Committee C19 & PSRC H22)

Chair: Caitlin Martin

Chair C19: Denis Holstein

Vice Chair: Dylan Jenkins

Output: Guide

Established: September 2012

Expected completion date: January 2019

Assignment: Develop an IEEE Guide on security for data files used for configuration, management, and analysis of protective relaying systems.

Working group met with 8 members and 3 guests.

After introductions Dylan Jenkins began the meeting by explaining the update on the WG PAR acceptance and recent NESCOM meeting.

PSRC H22 PC37.249 is now conditionally approved, contingent on minor changes to the Joint Sponsorship Agreement with Substations.

In order to pass the following clarification was added: "The working group will not be working specifically on cyber security. We are categorizing the various types of data files used for relay protection systems and identifying the risk of compromise or corruption for each type. The aim is for the guide to be used by cyber security professionals to help them define the appropriate security measures for each type."

T.W. Cease then provided an overview of the work performed in CIGRE B5 and D2 that relates to H22/Subs C19's objectives.

The C19 report is now available and will be made available to the working group as a reference.

Erin Spiewak advised that the best method to distribute the document would be through IEEE "Central Desktop". Dylan is to liaise with Erin to how to learn set up an account.

The group discussed whether a broad brush approach to securing all files should be taken or whether different security philosophies will be needed based on the risk of that particular file. The WG agreed that this strategy needs to be assessed

The group then reviewed IEC 62351-11 (security for XML files) and the PSRC WG18 report.

The next steps for converting the WG18 report into a guide were agreed.

Dylan and Caitlin Martin will begin by putting the report into the guide format and highlighting the sections that are likely to require more detail or clarification, for example the security recommendations in Annex A.

Dylan will also work with Steven Kunsman to map the assessment matrix in PC37 240-D14 to each of the file types defined in the WG guide.

Kevin Easley stressed that the type of devices that the files reside in needs to be considered. For example protection settings in a nuclear generator relay are more critical than a distribution feeder. How to do this classification is not yet clear, but will need to be discussed at the next meeting.

This guide template will then be circulated to the working group for review and will be the basis for discussion at January 2015 meeting

H23: Guide for Naming Intelligent Electronic Devices (COMDEV)

Chair: R. Cornelison

Vice Chair: E. Allen

Output: Guide

Established: January, 2013

Estimated Completion Date: January, 2017

Assignment: Develop an IEEE Guide for naming Intelligent Electronic Devices (IEDs) based on the report of Working Group H10 and the impact on COMTRADE and other data exchange standards.

The Working Group met on Tuesday September 9, 2014 with 6 members and 2 guests which did not constitute a quorum.

Draft 1.5 was distributed prior to and at the meeting.

We decided that the device name should be dynamic such that the components of the name can vary depending on both the device type and the application in which the name is used.

H24: Investigate Need to Update C37.238 (Joint Working Group Substations Committee C7 & PSRC H24)

Chair: G. Antonova

Chair SubC7: Tim Tibbals

Vice Chair: Bill Dickerson

Output: Standard

Established: January, 2013

Estimated Completion Date: May, 2014

Assignment: Develop a revision of the IEEE Standard C37.238-2011 "IEEE Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications" based on the list of issues brought forth in close coordination with IEC TC57 WG10 and other technical committees with similar interests. The goal is to bring it to the IEEE Sponsor Ballot by January 2014.

Working Group H24/SubC7 met on September 10, 2014 in Milwaukee, WI in a single session with 30 attendees (10 members, 20 guests). After introductions, the co-chair presented IEEE IP policy slides and asked to identify any potential pattern issues related to this work. None were identified. The quorum was achieved. May 2014 meeting minutes were approved.

Co-chair provided an update on project status.

- IEEE Sponsor ballot completed on August 2, 2014.
- 75% approval level was not achieved, so whole document will be open to comment in the recirculation.
- 243 comments were received. 45% of these comments are repeated TC 57 WG10 comments.

WG H24/SubC7 and WG10 leadership team came up with recommendations on resolving TC57 WG10 comments. These proposals were distributed to the Working Group prior to the meeting, and were presented by the Co-Chair at the meeting. Discussion on these recommendations followed. Updates were provided to each item summarizing Working Group input received at the meeting. Discussions will continue via teleconferences.

H25: Review of C37.94

Chair: M. Benou

PSCC Co-Chair: Roger Ray

Vice Chair: D. Jenkins

Output: Standard

Established: September 2013

Estimated Completion Date: December 2015

Assignment: Revise IEEE Standard C37.94-2008, *IEEE Standard for N Times 64 Kilobit Per Second Optical Fiber Interfaces Between Teleprotection and Multiplexer Equipment*.

H25 met with 7 members and 6 guests. After introductions, the present status of the working group was reviewed. The PAR was approved by IEEE-SA in June.

There were two technical decisions left to be made before the new WG could start writing the new draft. After reviewing the results of a survey made to manufacturers and users, it was agreed that the singlemode TX and RX levels will be the same as the multimode fiber levels that are part of the original C37.94 standard. The wavelength shall be 1310 +/- 40nm.

The second point of discussion, was the removal of the ST connector type for the singlemode portion of the revised standard. It was agreed to remove the ST requirement from the singlemode interface only. Multimode connections will still use ST connectors.

Dylan Jenkins has agreed to write the first draft of the revised standard. New sub-sections for sections 7, 8, and 9 will be added to discuss singlemode requirements separately. Annex A will be for multimode

fiber only. A new Annex B will discuss the same material as Annex A, but for singlemode. The current Annex B and C will be moved down a letter and become Annex C and D.

The introduction, scope, and purpose, need to be updated to match the PAR and the changes in the revised standard.

IEEE has promised to send a Word version of the C37.94 standard so that we may proceed with the changes.

Also discussed were issues of non-conformance. The group has determined that any non-conformance is an issue that should be dealt directly with the vendor and the user.

The goal of the WG is to have the first draft completed in time for the January meeting.

Draft 0

H26: COMTRADE Conformity Assessment

Chair: R. Cornelison

Vice Chair: J. Gosalia

Output: Report

Established: September 2013

Estimated Completion Date: January 2015

Assignment: Develop a plan that can be used to test COMTRADE files for conformity to the IEC 60255-24 Ed 2.0 and IEEE Std C37.111-2013 standards.

The Working Group met on Tuesday September 9, 2014 with 6 members and 5 guests and as such did not have a quorum.

Draft 3.1 of the Report was distributed prior to and at the meeting. Comments from draft 3.1 were discussed and resolved. Final assignments were made and are due by the end of October. We hope to have the report approved by the working group by late November and sent to subcommittee chair for dispersal to subcommittee members in December for review with a vote to approve the report at the January meeting.

H27: Standard File Format for IED Configuration Data (COMSET)

Chair: C. Chelmecki

Vice Chair: Dylan Jenkins

Output: Standard

Established: September 2013

Estimated Completion Date: September 2017

Assignment: Develop a standard XML based file format for exchange of protection and control configuration data between engineering tools and asset management tools. The modeling and naming conventions should be based on the definitions and extension rules defined in IEC 61850.

The Working Group met on September 9, 2014. There were 8 members and 9 guests present. After introductions, the group discussed the draft PAR created by Chris and Dylan.

- There was a discussion on what is the correct term for '3rd party tools'. Group agreed to leave as is.
- Discussion on whether dual logo should be considered with IEC.
- Not enough members to hold quorum, therefore Chris will clarify the remaining items with Eric Udren and then send the PAR out for voting.
- Eric later directed us to simply explain that there may be interest within IEC TC 57 to adopt our standard to fill in gaps within IEC61850.
- Chris later contacted Erin Spiewak(IEEE SA) on the question of copyright. Erin directed us that using IEC terms is permissible, but if we use definitions or other text directly copied from IEC work, the group will need to contact the IEC to get formal permission (Can contact Erin for more details if necessary).

Chris then presented the summary spreadsheet that outlines all the different vendors support for feeder protection functions and sought ideas of how to break down the work of condensing the list into common elements and review.

- Comment on whether there will be differences in elements for vendors across products not reviewed by the group. Chris' view is that it should be the vendor's responsibility to review proposed models and propose modifications if required.
- Need to map the ANSI codes to the IEC logical nodes and break the elements into categories for further analysis. Two volunteers taken (Bharadwaj and Deepak.) IEC 61850-7-4 (table 4) should be used as a reference.
- Members will break into teams. Chris will propose a list that has a spread of vendors and users.
- Discussion of whether we need to define the minimum functionality for a feeder relay. Volunteer taken to propose this.

HTF28: XML COMTRADE Conformity Assessment

Chair: M. Adamiak

Output: Recommendation on formation of a Working Group

Established: January, 2014

Estimated Completion Date: September, 2014

Assignment: Investigate the creation of an XML-based format for COMTRADE.

No report.

HTF29: Conformity Test Plan for PC37.240

Chair: S. Sciacca

Output: Recommendation on formation of a Working Group

Established: January, 2014

Estimated Completion Date: September, 2014

Assignment: To explore the feasibility of developing a test plan for conformity assessment of the C37.240 standard.

No report.

Liaison Reports

PES Substations Committee

C. Preuss

C0, the Data Acquisition, Processing, and Control Systems subcommittee, reported:

- A. We had limited success using the join.me conferencing service provided by IEEE-SA.
- B. New working groups
 - a. C18 P1613.2 AC surges on phone lines will not be created.
 - b. C19 met jointly for the first time with PSRC H22 Security for Protection and automation Related Data Files
 - c. C0 is interested in becoming joint with PSRC H23 Guide for Naming IEDs (COMDEV). A working group chair will be appointed.
 - d. C0 is interested in becoming joint with PSRC H27 Standard file format for IED configuration Data (COMSET). A working group chair will be appointed.
- C. C0 is tracking PSRC TF K15 Centralized substation protection and control
- D. IEEE 1686 will not require amendment
- E. SG C01 is working on a recommendation on how to split C37.1 into separate C37.1.x standards, such as one for databases
- F. C0 is working with PSRC WG C23 to integrate NASPI data archival material into the expected new working group from SG C01.

G. The SUBS C5 chair reported that a discussion with the PSRC I WG vice chair resulted in an agreement to not seek joint sponsorship for this update to C37.2 since there are some PSRC members involved in the SUBS WG C5.

PES Communications Committee

D. Nordell

No report

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

C. Brunner

No report

I. RELAYING PRACTICES SUBCOMMITTEE

Chair: J. Pond

Vice-Chair: B. Mugalian

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 relays and relay systems. Evaluate and report on pertinent aspects of protective relaying not addressed by other PSRC Subcommittees. Maintain applicable protective relaying standards.

The I Subcommittee met on September 10, 2014 with 24 members in attendance – a quorum was achieved.

- Approved minutes of ISC meeting held in Ft. Lauderdale FL in May 2014
- Coordination & Advisory Committee Meeting Items of Interest:
 - PSRC website is being updated by Russ Patterson which is an opportunity to get the I Subcommittee website updated. Working Group Chairs should provide their pertinent information to Jeff Pond and Brian Mugalian Russ Patterson and Rick Gamble will be responsible for posting information for your working group
 - Future PSRC Meetings
 - January 2015 – JTCM Garden Grove CA
 - May 2015 – San Antonio TX
 - September 2015 – La Jolla CA
- Administrative items:
 - Chairs are to send out working group and task force agendas two weeks prior to meeting
 - Mike McDonald recommended to not hold a working group or other meeting if the entire time slot is not going to be used, instead plan on conference calls or WebEx meetings to address issues between meetings
 - Roger Hedding indicated to not hold double sessions
 - Standards Association membership is required for working group chairs and vice-chairs
 - Working group rosters and attendance reports must include affiliation. The sign in sheets may be scanned and forwarded to the Sub-Committee Vice-Chair for update of the PSRC directory which occurs in September
 - Always use the IEEE Patent Slides at the start of the working group meeting
 - Email items to post on the I web pages to Jeff Pond and Brian Mugalian

Reports from the WG Chairs

I2: Terminology Review Working Group

Chair: M. Swanson

Vice Chair: F. Friend

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

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, September 10, 2014 with 9 members, including one new member: John Tengdin, and 2 guests.

Minutes from the May meeting in Ft Lauderdale were reviewed and approved.

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 giving attention that acronyms also have a definition.

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.

All working group chair are reminded the database is available to them for use during their document development. The IEEE staff reviewed the new process for accessing the database. All IEEE members have access to the dictionary database through their MyProject account (click on "Dictionary Database" from the dropdown menu).

Output from a working group in the form of a report does not need review of terms; however, any Standards work with a PAR must be submitted for review and approval from I2.

I4: IEC Advisory Working Group

Chair: E.A. Udren

Vice Chair: M. Yalla

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

Established: 1990

Expected completion date: Meetings are continuing

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

The WG met on September 9, 2014 with 5 members & 2 guests to review TC 95 standards activities.

There are no standards projects requiring review attention at this time. See below for ongoing standards development activities.

- 95/325 Administrative Circular is a big deal! The ten-year term of current TC 95 Chair Lily Yaping of China is ending; TC 95 has nominated Dr. Murty Yalla as the next Chair of TC 95 for a five year term, with possible extension for five more years. Congratulations to Murty – this is a reward for his years of hard work and effective results for TC 95 functional standards development.

The US National Committee will host the next plenary meeting of TC 95 in Largo, FL on December 5, 2014. Arrangements are handled by Murty Yalla and his Beckwith Electric support team. Attendance is restricted - anyone interested in attending the TC95 plenary meeting as part of the USNC delegation should contact Eric Udren or Murty Yalla for requirements and registration information. Other meetings will take place in Largo that week – see below.

- 95/326 has registration information and links for the December Plenary meeting.
- 95/324 Draft Agenda gives the list of discussion topics for the December 5 Plenary.
- 95/323 gives information on other TC 95 meetings taking place the same week in Largo:
 - Ad Hoc Working Group (AHG) 2, New protection requirements for the smart grid, is meeting Monday, December 1.
 - Maintenance Team (MT 4), Measuring relays and protection equipment – Functional standards, is writing the first draft of IEC 60255-187-1, Functional requirements for biased (percentage) differential relays - Differential protection for transformers, generators and motors. MT4 will meet Tuesday-Thursday, December 2-4 for drafting work. Contact Murty Yalla for participation. The group is driving for completion of a Committee Draft (CD) by the end of 2014.

Finally, the WG reviewed a presentation of the status of TC 57 WG 10 developments for IEC 61850, provided by Christoph Brunner.

I5: Schematic Representation of Power System Relaying

Chair: Kevin Donahoe

Vice chair: Rich Young
Output: Report
Established: 2008
Expected Completion: 2013

Assignment: Report on common practices in the representation of protection and control relaying. The report will identify methodology behind these practices, present issues raised by the integration of microprocessor relays, and the internal logic, external communication configurations, and detailed approaches to these issues.

The report was approved last May except for a few comments. These comments were addressed and a final version was presented to the commenter and approved. This final version will be provided to the subcommittee for publishing. The chair, Kevin Donahoe, volunteered to present the paper at the January 2015 Main Committee Meeting.

It was moved at the Subcommittee meeting that the working group be disbanded and the motion passed.

17: Revision of C37.103 Guide for Differential and Polarizing Circuit Testing

Chair: Gary Kobet
Vice Chair: Alex Lee
Output: IEEE Guide
Established: May 2012
Expected completion date: December 2016

Assignment: Revise and update the IEEE Guide C37.103 – Guide for Differential and Polarizing Circuit Testing

Working Group 17 held its meeting in a single session on Tuesday, September 09, 2014. This was the eighth meeting for this working group.

There were 6 members present and a quorum was reached. Eight guests attended the meeting. Membership stands at 10 members and 3 corresponding members. The IEEE patent requirement slides were presented, and attendees were given the opportunity to identify any known patent claims.

May 2014 meeting minutes were reviewed. Meyer Kao motioned to accept the May 2014 minutes and seconded by Alex Lee.

Draft 5.0 was submitted to IEEE-SA in early June 2014. Comments from the Mandatory Editorial Coordination (MEC) were reviewed, with most incorporated on July 2, 2014. The balloting group was formed as of July 5, 2014 with 61 balloters. The ballot opened July 22, 2014 and closed August 21, 2014, with an 86% response rate, 92% approval, 3% abstention, and 94 comments.

At this meeting, four outstanding MEC comments were reviewed as follows:

Section 7.1, page 8: Delete “Primary injection of current can be used to test the differential connections to ensure correct response during internal and external faults. “

Section 7.3, page 12: Retain and no changes required: “It is advisable to have the differential trip in service for initial energization of the protected equipment, and then disable the trip circuit for this test (disabling the trip circuit should only be done after considering any possible risk to the protected equipment from such an action).”

Section 10.2.2 page 24: Retain and no changes required: “by opening test facilities in the last relays just prior to the wye point.

Section 14.4 page 43: Retain and no changes required: “An important consideration encountered when testing the ground differential current circuit is taking precautionary measures with polarizing and neutral current circuits. Circulating current through the neutral ground differential element during testing also circulates current through all the elements in the neutral and polarizing circuits.”

Also at this meeting, the first 17 out of 94 ballot comments were reviewed as follows:

Section 8.2 page 15: Figure 9 Remove vertical line on breaker 52-6

Section 14.2.2 page 41: Revise Typo Impedance value from 2.61% to 3.61%

General Comments: A list of symbols used in the drawings should be added. Working Group response “No symbols list required”.

General Comments: Symbols used in the drawings should be consistent... Working Group will contact Rene Stoll to check drawing symbols for consistency.

Section 5.3 page 5: Remove and delete. “This is due to electrostatic coupling even with no primary current flowing in the current transformer.”

Section 5.4.2 page 5: Figure 1. Working Group will revise or re-work Figure 1 to show voltage and current circuits separately.

Section 7.2 page 18: Revise (I_{S1}) to (I_{S1}) subscript S1

Section 7.2 page 21: Revise (I_{S2}) to (I_{S2}) subscript S2

Section 9.1.3 page 19: “A three-phase current source is connected to the three phases of the circuit breaker or transformer bushings, switching device, or bus at the open end of the high-voltage system. At the other end of the high-voltage system, the phases are tied together and grounded (see Figures 13 and 14).” Working Group will revise Figure 13 and 14 to show transformer not generator.

Section 13.1.1 page 36: Working Group will bring Figure 31 from Page 37 to Page 36

Section 14 page 38: Revise Figure 34 to show fault current flow I_N and $3I_O$. Working Group suggested using Figure 34A to show I_N and Figure 34B to show $3I_O$

Section 14.1 page 39: Revise “voltmeter” one word to “volt meter” two words.

Section 14.2.1 page 40: Revise “The test setup in for the left-hand figure in Figure 36 requires only a low voltage AC source to simulate an external fault to the ground differential protection zone.” Working Group will fix this sentence to “The test setup shown in the left-hand figure in Figure 36 requires only a low voltage AC source to simulate a fault

Working Group requested the members to review the remaining 77 general comments. WebEx meetings will be conducted in the coming months to discuss and review the remaining comments.

I8: Revision of C57.13.3 – Guide for Grounding of Instrument Transformer Secondary Circuits and Cases

Chair: Brian Mugalian

Vice-Chair: Bruce Magruder

Established: 2009

Output: Revision of IEEE C57.13.3-2005

Expected Completion Date: 2013

Assignment: Revision to IEEE C57.13.3 to include other types of transformers and other than North American grounding practices

Working Group I8, Revision of C57.13.3 - Guide for Grounding of Instrument Transformer Secondary Circuits and Cases, was held in Louis, The Pfister Hotel, Milwaukee WI on September 9, 2014. Eight members and three guests were present. A quorum (>50% or 12 members) was not achieved. The May 2014 meeting minutes could not be approved, and an email will be sent after the meeting to the working group for approval.

Draft 7.2 completed the second IEEE-SA ballot recirculation with 100 percent approval on September 5, 2014. The draft and figures will be forwarded for approval by RevCom at the December 2014 IEEE-SA SB meeting by the deadline of October 20.

It was determined that a summary paper will not be created.

The Working Group will not meet in January 2015. A request to disband I8 will be made at the January Relaying Practices Subcommittee meeting.

I11: PC37.241 – Guide for Application of Optical Current Transformers for Protective Relaying

Chair: Harley Gilleland

Vice-Chair: Bruce Pickett

Established: 2010

Output: Guide PAR PC37.241

Expected Completion Date: 2014

Assignment: Develop Guide for “Application of Optical Instrument Transformers for Protective Relaying”

The Working Group met on Sep 10, 2014 in a single session. The session was chaired by Farnoosh Rahmatian. There were participation from 8 members and 6 guests. We had quorum.

The IEEE-SA Patent and Copyright slides were presented – there were no comments from the participants.

All participants introduced themselves.

The minutes of the January and May 2014 meetings were approved.

Bruce updated the attendees on the status of the WG leadership. Farnoosh Rahmatian is now the Chair as Harley is having mobility issues. Harley will continue be involved with the WG.

Farnoosh led an overall review of the document; updated the current Draft-4 to rev 4.1.

- Discussed current revision of the Guide and asked for WG members to complete review of the document by **Sep 30, 2014.** **Action** – WG members.
 - Chapter leads to review their corresponding chapters thoroughly.
- WG members are particularly encouraged to identify anything that might be old or obsolete.
- A few questions were addressed.
 - Sections 4.1-4.8 would be edited to move the chapter references in parenthesis from the section title into the body of the sections, using cross-references. **Action** Farnoosh.
- WG members were asked for comments and any revisions to be submitted by email to Farnoosh.

Action: Farnoosh will apply (done on Sep 10, 2014) for PAR extension.

I12: Quality Assurance for Protection and Control (P&C)

Chair: Andre Uribe

Vice Chair: Mal Swanson

Established: 2011

Expected Completion Date: 2014

Assignment: “To develop a special report outlining the best practices of quality control for protection and control design drawing packages from conception to final “as-built”.

The Working Group I-12 met on Tuesday, September 9th, 2014, Milwaukee, WI in single session chaired by Andre Uribe with a total of **11 attendees** (8 members and 3 guests).

May meeting minutes were reviewed.

The I12 working group covered the following:

1. Reviewed and finalized 5 out of 16 sections of the paper
2. Agreed that we have completed a final draft.
3. No tasks were assigned except for making the corrections discussed during the meeting.

I21: Analysis of System Waveforms and Event Data

Chair: Jerry Jodice

Vice Chair: George Moskos

Output: Report

Established: 2012

Expected Completion Date:

Assignment: Prepare a report that will define a process for identifying and analyzing a fault incident. The process will include data collection, analyzing techniques, and methods of reporting.

Working Group I21, met on Sep 09, 2014.
There were 6 Members and 13 Guests in attendance.

Contributions for 19 topics and signature waveforms have been received and integrated into the first draft of the Report.

In the first draft topics conform to a template for uniformity.

The first draft was sent to all contributors for review. After sending multiple e-mail reminders, no responses were received. It was suggested that telephone follow-up would be more successful. The chair agreed to call all contributors within one week.

Report topics and contributors are:

Section 2.0 - Rafael Garcia – Circuit Breaker Re-strike
Section 3.0 - Amir Maki - Arcing
Section 4.0 - John Boyle – Fault Magnitude and Time
Section 5.1 - John Boyle – Carrier System Review
Section 5.2 - John Boyle – Carrier Holes and Current Reversal
Section 5.3 - Elmo Price – Carrier Holes in Directional Comparison Blocking (DCB) Scheme.
Section 6.0 - Yanfeng Gong – Breaker Clearing Time
Section 7.1 - Ken Behrendt – Transformer Inrush
Section 7.2 - Amir Makki - Transformer Inrush
Section 7.3 - Dean Sorensen – Transformer Inrush
Section 8.0 - Amir Makki – Capacitor Bank Ringing
Section 9.0 - Elmo Price – Voltage Transformer Saturation and Ferroresonance
Section 10.0 - Karl Zimmerman – Capacitive Voltage Transformer (CVT) Transient
Section 11.0 - Mansour Jalali – Unbalance Condition and Negative Sequence Current
Section 12.0 - Yuan Liao – Evolving Faults
Section 13.0 - Yuan Liao – Fault Location
Section 14.0 - Dean Sorensen – Breaker Anti-Pump Control (XY Logic) Defeated
Section 15.0 - Eric Allen – Time Synchronization of Unsynchronized Recordings
Section 16.0 - Dan Sabin – Power Quality Monitor Case Studies on Disturbances
Section 17.0 – Amir Makki – Harmonics Analysis

Working group objective: complete reviews and provide the final version of the report at the I Subcommittee January 2015 meeting.

I22: End of Useful Life Assessment for P&C Devices

Chair: Bob Beresh

Vice Chair: Bruce Mackie

Output: Report

Established: 2012

Expected Completion Date: 2014

Assignment: Prepare a PSRC report on the criteria for determining the end of life for protection, control, and monitoring devices including electromechanical, solid-state and microprocessor-based devices.

WG I22 met on Tuesday, September 9, 2014 at 4:30pm CDT in a single session with 10 members and 11 guests.

After introductions, the current version of the document was reviewed, especially the new sections.

Roy Moxley volunteered to add to the section on Early Adoption. The review of the document included the section on quantifying the end of life derating factor.

The link to the document will be sent to the group and all are expected to review the document and send their comments to the Chair and Vice-Chair.

I23: Revision of C57.13.1 – Guide for Field Testing of Relaying Current Transformers

Chair: Bruce Magruder

Vice-Chair: Will Knapek

Output: Revision of Guide for Field Testing of Relaying Current Transformers

Established: May 2013

Expected Completion Date: 2018

Assignment: Review of IEEE C57.13.1 to determine whether a revision is needed

Working Group I23, Revision of C57.13.1 - Guide for Field Testing of Relaying Current Transformers, was held in Louis XIV room, Pfister Hotel, Milwaukee, WI, on September 10, 2014 at 9:30 am. Five members and six guests were present and a quorum was not met. Two Guests requested membership to the WG.

Patent Conflict slides were shown.

May 2014 minutes reviewed and to be approved by email.

Comments that were received since last meeting were discussed. Drawings submitted were reviewed. Several comments made the drawings. Comments were added to the submitted document. Burnworth Suggested Revisions to C37.13.1 5_22_2014.docx

A new section on "Modern Test sets" will be added. Don Sevcik and Will Knapek will work on this.

Alex Lee will send email with review of Section 7.

Will Knapek and Alex Lee will work on Section 16.

Gordie Halt and Craig Bryant will add to the Demagneizing CT section that Rene Aguilar was working on.

I24: Use of Hall Effect Sensors for Protection and Monitoring Applications

Chair: Jim Niemira

Vice-Chair: Jeff Long

Output: Develop a Report on the Use of Hall Effect Sensors for Protection and Monitoring Applications. The report will discuss the technology and compare with other sensing technologies.

Established: January 2013

Expected Completion Date: September 2014

The Working Group I-24 met on Tuesday, September 9, 2014, at Milwaukee, WI in single session chaired by Jim Niemira with a total of **17 attendees** (6 members and 11 guests). Quorum was met.

Meeting was brought to order at 3:00 pm. The IEEE patent slides were presented and reviewed.

Mark Taylor motioned to accept the minutes from the last meeting and Phil Zinck seconded the motion. The minutes were accepted.

It was noted that several writing assignments are still missing from Amir Maki, Joe Perez, Jeff Long, George Semati and Vessalin Skedsnik.

Jim Niemira suggested including information in the report regarding IEC 61850 Process Bus on how measurements from the Hall Effect sensors might be digitized and sent to multiple intelligent electronic devices over a communications network.

John Buffington will work with Jim Niemira to tailor the presentation given by Vincent Mosser into practical applications for the protection and control audience.

Bruce Picket suggested creating a table listing advantages and disadvantages of Hall Effect sensors vs. other current sensing technologies. He suggests working with Itron to develop this table.

Gerry Johnson would like more sections dedicated to real life P&C applications. Mark Taylor discussed DFR (digital fault recorder) applications and Phil Zinck discussed GIC (geomagnetically induced currents) applications.

Final writing assignments are due September 26. The chairman will follow up with those who have not yet submitted their assignments.

The report will be compiled, formatted, and distributed to the group by first week in October.

Web-based meeting will be scheduled for October 15 to discuss and wordsmith the report.

I25: Commissioning of Substation Protection and Control Devices

Chair: Rafael Garcia

Vice Chair: Kevin Donahoe

Output: Report: Provide guidance in the commissioning of power system protection systems

Established: January 2014

Expected Completion Date:

Working Group I-25 met today Sept. 10, 2014 in Milwaukee, WI with 16 members and 4 guests.

The assignment of the working group was discussed and Don Ware went over his contributions to the report on validating relay settings. The WG also discussed including a section on lessons learned and providing protection system check list to the report. A teleconference is being set up for early November to help speed up the process of completing the report. The goal of the WG is to supplement IEEE C37.233, which addresses all types of testing. The WG also has the goal of completing at least the first draft of the report by the September 2015 meeting. We expect to meet in January 2015.

I26: Review and Expand Transaction Paper on Mathematical Models of Current, Voltage, and Coupling Capacitive Voltage Transformers

Chair: Mike Meisinger

Vice Chair: Alex Lee

Output: Report: Revise Transactions Paper

Established: January 2014

Expected Completion Date: December 2018

Assignment: Recommendation to update or expand Mathematical models of instrument transformers [1] and transducers, including interface electronics such as merging units, for use in both off-line and real time EMTP studies. In addition to improved models for conventional CT's, PT's and CVT's there are now new transducer types such as optical, Hall effect, Rogowski coils.

1. "Mathematical Models for Current, Voltage, and Coupling Capacitor Voltage Transformers." , Working Group C5 of the IEEE PSRC, Chairman D. Tziouvaras, Vice-chairman P.G. McLaren, et al., IEEE Transactions on Power Delivery, January 2000, Vol. 15, No. 1, p62.

Working Group I26 held its meeting in a single session on Tuesday, September 09, 2014. This was the third meeting for this working group.

There were 6 members present and a quorum was reached. 12 guests attended the meeting.

Dean Ouellette presented Current Transformer model using EMTP and RTDs. Also presented methods to obtain Current Transformer required parameters and Jiles-Asherton CT modeling.

I27: Investigation of Protective Relay Self-Monitoring Capabilities

Chair: Bob Beresh

Vice Chair: Yuchen Lu

Established: 2014

Output: Report

Assignment: Prepare a technical report to the PSRC main committee on the enumeration, performance and efficacy of self-monitoring capabilities within protective relays in order to determine the extent and degree of self-monitoring.

Expected Completion Date: 2015

ITF27 met on Tuesday, September 9, 2014 in a single session with 24 members and guests attending.

After introductions, the background to this WG was discussed as well as the need for this work. The second draft of the document was reviewed with extensive discussion on the definition of self-monitoring. Various manufacturers volunteered to contribute information on the self-monitoring practices currently used in their devices. The need for more relevant descriptors for the internal components of a microprocessor relay was mentioned (for example, is the term "CPU" obsolete and is it sufficiently descriptive of all the internal processing functions of a relay today?) Perhaps references to more detailed or accurate processing blocks, I/O, memory, etc. are required?

Roy Moxley volunteered to be the secretary of the WG and assist in recording notes and providing support to the chair and vice-chair. Numerous assignments were handed out.

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

Chair: Joseph Valenzuela

Vice Chair: Jeff Long

Output: Revision of the Guide

Established: September 2014

Expected Completion Date: January 2018

The Working Group I-29 met on Tuesday, Sept 9th, 2014, at Milwaukee, WI in single session chaired by Joseph Valenzuela with a total of **20 attendees** (9 members and 11 guests). Quorum was met.

Meeting was brought to order at 1:30 pm.

It was agreed at the last Joint Task Force meeting that there was sufficient need for the Guide to be revised.

Joseph Valenzuela suggested breaking up the document into manageable sections for review in order to determine what areas of the Guide were in need to update.

The following members have been assigned to review the following sections prior to the next meeting and give a report on their findings:

Section 1: Gordie Halt

Section 2: Charles White

Section 3: Charles White

Section 4: Gordie Halt, Lee Bigham and Kevin Donahoe

Section 5: Mike Higginson and Alex Lee

Section 6: Jack Wilson, Phil Zinck and Alla Deronja

Section 7: Eric Monson and Alla Deronja

Annex A: Tapan Manna and Will Knapek

Annex B: not assigned at this time

Annex C: Charles White

Annex D: Jack Wilson

Annex E: All members to check their sections to ensure the referenced materials in Annex E are still applicable to the guide.

It was noted by Brian Mugalian that the current revision of the Guide expires in 2018.

Erin Spiewak indicated we need to submit the PAR by Oct 20th in order to have it approved and ready for the working group to officially begin work on the new revision of the Guide by the January PSRC meeting.

Charles White made a motion to keep the existing Scope of the Guide for the PAR. Jack Wilson seconded the motion. The motion passed.

The PAR will be valid for four years. Joseph Valenzuela will send an email notice to all working group members on Sept 23rd for their review prior to submitting to IEEE for the PAR.

Joseph Valenzuela will check with George Moskos and Erin Spiewak to see if there are existing comments from the last revision of the Guide that this working group could use to incorporate in the new revision.

Charles White to work with Tapan Manna to review IEC documents, guides and standards related to current transformer applications.

Reviewing assignments are due November 21st. Please submit all findings to Jeff Long, Vice Chair. Jeff Long to consolidate comments for review at January 2015 meeting.

Phil Zinck moved to adjourn the meeting. Charles White seconded the motion. Meeting adjourned at 2:42pm.

I30: Revision of C37.235 Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes

Chair: Ljubomir Kojovic

Vice Chair: Tapan Manna

Output: Revision of the Guide

Established: September 2014

Expected Completion Date: December 2018

Number of attendees was 9.

This was the second meeting. The conclusion of the meeting was to submit the PAR for the revision of the Guide. Erin Spiewak explained procedure for submitting the PAR.

PAR will be submitted in October so it can be approved before the next meeting.

I31/Subs C2: Environmental and Testing Requirements for Communications Networking Devices; IEEE 1613/1613.1

Chair: TBD

Vice Chair: TBD

Output: Revision

Established: September 2014

Expected Completion Date: TBD

At the Relaying Practices Subcommittee Meeting, John Tengdin introduced the plans for Substation Committee Working Group C2 and their effort to revise IEEE 1613/1613.1. The scope of the PAR is below. This is a Joint Sponsored Agreement between T&D, Substation, and PSR Committees.

The first meeting with PSRC attendees will be held in January 2015.

1. Preliminary Scope: "All devices or systems for alarm, control, data storage, display, measuring, monitoring, recording, protective relaying and/or sensing functions installed in an electric power facility. (Note: Quoting from IEEE 1613.1-2013 Clause "**3.1 electric power facility**: Any location with equipment that is operated for purposes of generating, delivering, or monitoring electric power. Examples include generation, transmission, distribution and customer located devices. Towers, poles, ground mounted transformers, enclosures, and control buildings are also included. A facility may be physically located within a boundary or fenced area - such as a generating station or a transmission or distribution substation (Zone A) – or external to those areas (Zone B)."

Liaison Reports

- a. Instrument Transformer Subcommittee (Fred Friend):

The Instrument Transformer Sub Committee spring meeting was in Savannah, GA. The fall meeting will be in Tyson's Corner, VA, 20 – 23 October. (There was an additional session held in Charlotte, NC on June 3rd)

There are three active working groups. All three PARs expire at the end of the year. A new standard for CTs, C57.13.7, with a 250 millamp maximum output is being developed. It is nearly ready for vote.

The second new project C 57.13.8 is a Station Service Voltage Transformer Standard. The third working group is reviewing a number of important proposed changes for C57.13. The integration into C57.13 of C 57.13.5 is the major discussion. Standard C57.13.5 requires extra testing for high voltage instrument transformers. The appendix will include a large section with new information on bushing and generator CTs.

Coordination Reports

None

Old Business

None

New Business

Del Weers has resigned from PSRC and will no longer be attending meetings. Fred Friend will coordinate any open items with Del. Fred will advise if he will be able to support this liaison report.

The I Subcommittee welcomed three new members to the group:

Ljubomir Kojovic
Tapan Manna
Joseph Valenzuela

Mike Meisinger motioned, Andre Uribe seconded, to create ITF32 to review the Survey of Relay Test Practices that was last completed by WG I11 in 2001. Motion passed.

Amir Makki submitted a request to form a new Task Force to determine whether a WG should be formed to define the terms used to describe the various types of relay testing techniques applied in our industry. Brian Mugalian to submit the proposal made by Amir to the rest of the ISC members for review and will discuss again at the next meeting.

Kevin Donahoe requested that members who have definitions for new words or acronyms to work with the Substation C5 WG and Mal Swanson.

J: ROTATING MACHINERY PROTECTION SUBCOMMITTEE

Chair: M. Yalla

Vice Chair: M. Reichard

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.

The J Subcommittee met on Wednesday, Sep 10, 2014 with 15 members (achieving quorum 15/27) and 26 guests. There was a call for the approval of the minutes of the May 2014 meeting in Ft Lauderdale. These minutes were approved unanimously by the subcommittee members.

Reports from the WG Chairs

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

Chair: Sudhir Thakur

Vice Chair: Mukesh Nagpal

Established: 2011

Output: Report

Expected Completion: December 2015

Status: Seventh Meeting

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 (summary) 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.

The WG met on Wednesday from 09:30 AM to 10:45 AM with Murty Yalla and Subhash Patel as acting Chair & Vice-chair in absence of Sudhir Thakur (Chair) and Mukesh Nagpal (Vice-chair). The second scheduled session was not necessary and was cancelled. Nine members and twenty one guests were in attendance.

The WG minutes were not approved as the minutes were not available. The WG chair will seek approval through email.

Most of the session was devoted to presentation by Bob Pettigrew of his writing assignment involving the effect of variation of source impedance on the trajectory of out of step locus at the station with multiple combined cycle generators. During discussions following the presentation a suggestion was made for the WG J5 to coordinate with WG D29 (Chair Norman Fisher) which is investigating the Out of Step application from the transmission lines perspective.

An idea of a single OOS relay for the multiple generators (or all outgoing lines) in special cases was also briefly discussed (Mike Thompson).

A double session with space for 40 persons and a computer projector is requested for the Jan 2015 meeting.

J6: Protection issues Related to Pumped Storage Hydro Units

Chair: Joe Uchiyama

Vice Chair: Dale Finney

Established: 2010

Output: Transactions Paper (Draft 3.3)

Expected Completion: TBD

Status: Tenth Meeting

Assignment: To review and summarize the trends of the last thirty-five (35) years of Pumped Storage unit protection since PSRC presented the summary report in May/June 1975. The WG review is focused on: (1) Old protection/control, (2) New protection/control, (3) New experiences during protection rehabilitation and (3) any significant issues/concerns. Evaluate and report on protective relaying concepts and practices applicable to a combination of generator and motor, associated auxiliary systems, and performance of plant protective systems. Summarize the trend of Pump-Storage motor and generator protection for the last thirty-five (35) years of industrial practices.

The J6 WG met on Tuesday, Sep 9, 2014 at 4:30 pm with seven (7) members and six (6) guests.

Chairman welcomed WG J6 attendee, and the attendees introduced themselves. Also, he had distributed meeting agenda & Draft-3.3 copy of the documents.

The comments on the draft-3.2 were reviewed and discussed the following topics:

- 1)Topic-1 (survey year) – It should be "2012" throughout the document.
- 2)Topic 2 (amortisseur winding) – Clear two types of amortisseur windings; one is connected and not connected one.
- 3)Topic-3 (Pumping vs Motoring) – WG decided to use "Pumping" throughout the document.
- 4)Topic-4 (device 21) – Since NERC PRC-025-1 had approved by FERC; PRC-025 should be included.
- 5)Topic-5 (device 37) – The term of "Single phase" is for EM relay, WG decided to take it out.
- 6)Topic-6 (device 59) – The overvoltage function is a digital relay also **may remain** accurate **depending on the technique** used over a wide frequency range.
- 7)Topic-7 (device 64S) – Deleted a sentence of "It is usually blocked during startingstating."
- 8)Topic-8 (device 81G) – WG modified as "Over- or Under-frequency relay for generating mode."
- 9)Topic-9 (Figure 2 – Example of typical digital relay connection) – WG members and guests had discussed extensive amount of time for this issue (VTs/CTs phase rotation vs Group Setting

selection by G/M contacts). Dale will mark-up and send to chairman for revision. It probably good idea to two figures; one for "VTs/CTs phase rotation," and another for "Group setting selection by G/M contacts."

- 10) Topic-10 (Figure 4 – Differential relay connections) – A guest from Duke Power (Wes Gross) brought out their experiences during his relay upgrading works. The problem was relay misoperations during starting up (Semi-Synchronous start).
- 11) Topic-11 (Summary and conclusion) – Revised part-2 of Improved monitoring & Self-diagnosis as "These relays are also capable of recording sequence of events and oscillographic waveforms."
- 12) Topic-7 (Analysis & Summary of 2013 Survey Results) – Dale commented on this section. This tabulated analysis should be in paragraphs. WG will work on this section.
- 13) Topic-8 (Figure-7 of Comparison of Elements) – This figure may be not needed since following figures included similar information. WG will work on this.
- 14) Wesley Gross of Duke Energy indicated problems with differential function during low frequency start of generator as a motor at one of their pumped storage plant. He will send the information to the WG.

The next targets are as following:

- 1)Chairman will update the draft-3.4 based on the consolidated comments from Dale, Will & Matt.
- 2)WG will make the draft-4 for J-subcommittee balloting.

J7: Avoiding Unwanted Reclosing on Rotating Apparatus

Chair: Mike Reichard

Vice Chair: Steve Conrad

Output: Report to the Rotating Machinery Protection Subcommittee of the PSRC

Established: 2011

Ninth Meeting Expected Completion 2015

Status Draft 1.0

Assignment: To review and provide comment on the protection and control vulnerability known as "Aurora"

WG Chairman Mike Reichard is presently deployed, Vice Chair Steve Conrad conducted the meeting and thanked Mike for his military service. Bob Pettigrew took notes of the meeting

The working group met with 7 members and 29 Guests on September 09, 2014.

The meeting minutes from the May meeting were not approved, vice chair will call for email approval. The chair discussed the assignment of the WG and summarized draft 1 of the report.

Dale Finney discussed his edits to the ROCOF clause of the paper, Murty Yalla accepted the assignment to review this section and the discussion of the Old Dominion paper material.

There were two presentations offered by NERC representative Ralph Folkers and Orlando Stevenson-

The first discussion was titled "**Aurora Event and GSU Sizing**" which discussed the modeling of GSU size related to machine MVA.

The second discussion was titled "**Aurora Path Forward**" which discussed the concerns associated with the alert reporting and status.

The abstract and conclusion sections of the paper remain to be completed. Zeeky Bukhala will submit a writing assignment to complete the Abstract, with due date of September 30, 2014.

Steve Conrad volunteered to remove manufacturer specific references from the draft paper and incorporate missed edits by Gene Henneberg

J12: Improved Generator Ground Fault Protection Schemes

Chair: Dale Finney
Vice Chair: Manish Das
Established: Jan 2013
Output: Report to subcommittee
Status: 4th Meeting

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

The group met on 9/10/2014 with 6 members and 10 guests in attendance. Quorum was not met.

The minutes from May 2014 meeting will be called for approval through email. The meeting began with Dale Finney announcing that he is taking over as chair due to Russ Patterson taking on an executive member role in PSRC. Manish Das is also taking over as vice-chair.

Nader Safari-Shad & Russ Franklin from Alliant Energy attended this meeting. Nader made a presentation on 100% stator ground fault schemes. He recounted Alliant's recent experiences with the third harmonic differential scheme. He went on to present a new method which automatically adjusts the ratio setting to balance the scheme.

The new scheme requires no user settings and has the potential to be more secure than conventional schemes. The pros and cons of the new scheme were presented. Following the presentation there were many questions and a good discussion. There were no assignments made.

The chair will send out a draft outline of the paper for review prior to the next meeting.

J13 : Modeling of Generator Controls for Coordinating Generator Relays

Chair: Juan Gers
Vice Chair: Phil Tatro
Established: September 2012
Output: Report to Subcommittee
Expected Completion: 2016
Status: Forth Meeting

Assignment: Work jointly with the Excitation Systems and Controls Subcommittee (ESCS) of the Energy Development and Power Generation Committee (EDPG) and the Power Systems Dynamic Performance Committee (PSDP) to improve cross discipline understanding. Create guidelines that can be used by planning and protection engineers to perform coordination checks of the timing and sensitivity of protective elements with generator control characteristics and settings while maintaining adequate protection of the generating system equipment. Improve the modeling of the dynamic response of generators and the characteristics of generator excitation control systems to disturbances and stressed system conditions. Improve the modeling of protective relays in power dynamic stability modeling software. Define cases and parameters that may be used for the purpose of ensuring coordination of controls with generator protective relays especially under dynamic conditions. Write a report to the J-Subcommittee summarizing guidelines.

WG Report

The working group met on May 13th with 23 members and 17 guests present. A quorum was achieved.

Minutes of the January 15th, 2014 meeting were approved unanimously.

Mike Basler presented the second part of his lecture on synchronous generator excitation system controls and limiters. The presentation received very good comments. It was focused on Power System Stabilizers and included the following topics:

Steady State and Transient Stability
Effect of the Excitation System
Modes of Oscillation
Power System Stabilizers
Case Studies

The presentation by Ashok Gopalakrishnan on available simulations tools and the availability of dynamic relay models will be canceled as he is no longer available. The chair and vice chair will get another volunteer to cover this topics which are very important for the group objectives.

It is hoped that Trevor Sawatzky can contact members of Excitation Systems and Controls Subcommittee (ESCS) of the Energy Development and Power Generation Committee (EDPG) to formalize the participation of this subcommittee and provide an overview of the activities that are of interest to the WG J13. Mike Basler volunteered to help with this since he is part of this Subcommittee.

Due to time limitations the first draft of the report outline was not reviewed. The working group will discuss the outline at the next meeting when contributors for the different sections will be assigned.

J14: Plant Issues Associated with Black Starting of Generators

Chair: Chris Ruckman

V Chair: Zeeky Bukhala

Established: May 2014

Output: Report to Subcommittee

Expected Completion: May 2016

Status: 2nd Meeting

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

The working group held its second meeting on Tuesday, September 9th, 2014 with 12 members and 11 guests in attendance

Chair began the meeting with introductions and a brief review of the assignment and background of the working group.

Minutes from the May 2014 meeting were approved with corrections.

Assignments were reviewed by going through the basic key areas as identified at the last meeting.

- a) Engines. Wayne Hartmann had previously provided a one-line sketch and outline for this application. Working group went over Dale Fredrickson's and Luis Polanco's comments.
- b) Combustion Turbines. Chris Ruckman had previously provided a one-line sketch. After some discussion it was agreed that the one-line should include the relevant LV loads and generators applicable for blackstart. Chris Ruckman will update the one-line and Dennis Tierney agreed to peer review the updated one-line.
- c) Hydro Turbines. Dale Finney will work with Sungsoo Kim and Nathan Klingerman to develop a sample one-line for these applications.

Other areas identified as in scope included:

- Closing on long transmission lines, excluding transmission and bus protection.
- Chris Ruckman will check previous papers related to control power for protective relays during blackstart (DC and UPS) to see if they are applicable for this effort.
- Black start permissives, including synch check bypass strategies.
- Matt Basler will provide a section related to potential excitation system issues during black start.

Harmonics generated by static start systems were deemed to not have any additional impact during black start applications as the start strategy and configuration are similar to normal starts.

There was further discussion around getting information from utilities that have experienced black start and sharing lessons learned. Chris Ruckman had contacted ISO New England and requested information regarding their restoration efforts related to the 2003 northeast blackout and is awaiting a response. Sungsoo Kim pointed out that the reports related to the northeast blackout were focused on the root causes rather than restoration efforts. Nathan Klingerman will see if he can provide a black start

operating procedure. Attendees agreed to follow up with facilities that have known black start capability and experience.

JTF10: Investigation of the Criteria for the Transfer of Motor Buses

Chair: Wayne Hartmann

Vice Chair: Joseph Valenzuela

Established: 2014

Output: TBD

Status: 2nd Meeting

Assignment:

- **Review, compare and contrast NEMA MG-1 with ANSI C50.41 regarding transfer criteria.**
- **Investigate existing open-transition motor bus transfer (MBT) actual data from multiple events at the medium voltage level. Examine for current versus Volts/Hz at transfer periods to see if there is a correlation.**
- **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.**
- **Examine published reports and papers on motor bus transfer criteria to reconcile the conclusions with the field-measured results.**

Activity:

- The Task Force met September 9 with 11 members and 10 guests.
- The TF reported on assignments from the May 2014 meeting and made additional assignments.

Discussion:

1. No technical differences between C50.41-2000 and 2012 versions, pursuant to 1.33 V/Hz resultant limit for motor bus transfers.
2. Modeling shows based on voltage, current and torque calculation models that coming in under 1.33 V/Hz criteria doesn't guarantee low transient torque and in fact may result in high transient torque at the motor.
3. Transfer tests using IEEE standard bus decay inertias and several initiating phase angles were reviewed that revealed low V/Hz values with properly conducted fast and in-phase transfers.

Assignments:

1. Joseph Valenzuela to investigate the use of a central desktop (SA) website to post motor bus transfer papers for group review. Members to be assigned to review a paper at the January 2015 PSRC meeting.
 2. Russ Patterson to report on status of development of motor manufacturers to be later used to contact them about motor torque capabilities versus the C50.41 standard
 3. Sudhir Thakur to report on motor transfer studies and papers to examine correlation between resultant V/Hz and reacceleration current.
 4. Joseph Valenzuela to report on contacts for recent projects where MBT systems have been installed to see if they will participate in the voltage and current monitoring during transfers.
 5. Wayne Hartmann to provide overall oscillography triggering suggestion for motor protection relays to Suparat Pavavicharn for passing onto OPPD Nebraska City Unit.
 6. Wayne Hartmann to produce annotated oscillographic records of transfers (fast and in-phase) that depict bus voltage, reacceleration current, and W/VAr values of reacceleration initiation period.
- All assignments are to be reported and disseminated at the January 2015 meeting.

Request to Subcommittee Chair at the J subcommittee meeting:

- In light of the vigorous conversation, interest in the subject and findings to date, shall the Task Force become a Working Group? A motion will be put in at the J subcommittee.

Other Reports:

C17: Fault current contribution from wind farm plants

G. Hennenberg did not attend the J SC meeting

Liaison Reports

Electric Machinery Committee (EMC)

C. Mozina did not attend the meeting

C. J. Mozina

IAS I&CPS Committee

C. Mozina did not attend the meeting

C. J. Mozina

Nuclear 1E WG

P. Kumar did not attend the meeting

P. Kumar

NERC (related to rotating machinery)

None

J. Uchiyama

Coordination Reports

None

Old Business

J SC to investigate with D SC Device 78 definition C37.2 – 2008 to change it to Loss-of-Synchronism protection. Gary Kobet will be point of contact.

John Tengdin indicated sent an email to Gary Kobet indicating the existing wording on 68 and 78 is OK.

J SC Chair and D SC chair will draft a proposal to the chairs of Substations Committee and PSRC for wording changes on 68 and 78 functions.

Mike Thompson to investigate C37.102 – 2012 21 function setting example and de-conflict it with NERC PRC 025-1, 21 function loadability guidance.

Mike Thompson indicated the setting example in C37.102 annex does not consider field forcing. NERC makes it clear that it's unacceptable to trip for high vars. This will be addressed during the next revision of the IEEE C37.102.

New Business

JTF10 Task force chair Wayne Hartman proposed a motion to make the task force a WG and it was seconded and unanimously approved. The new working group is J15.

K: SUBSTATION PROTECTION SUBCOMMITTEE

Chair: M. J. Thompson

Vice Chair: D. G Lukach

The K-Subcommittee met on Wednesday, September 10, 2014 in Milwaukee, WI, with 18 of 30 members and 30 guests in attendance. A quorum was achieved. Gene Henneberg motioned to approve the May, 2014 subcommittee meeting minutes. Charlie Henville seconded. Vote was unanimous to approve.

The K subcommittee welcomed Randy Hamilton to the subcommittee.

Reports from the WG Chairs

K1: PC37.245 GUIDE FOR THE APPLICATION OF PROTECTIVE RELAYING FOR PHASE SHIFTING TRANSFORMERS.

Chair: Lubomir Sevov

Vice Chair: Charles Henville

Established: Jan. 2012

Output: Guide for the Application of Protective Relaying for Phase Shifting Transformers

Expected Completion Date: Dec.2016

Draft: 4.2b

Assignment: To write a guide for the application of Protective Relaying for Phase Shifting Transformers (PSTs). The protection methods for different types of PST and operating conditions of PSTs will be reviewed. Representation of PST models to determine short circuit currents for relaying considerations will be considered. Protection CT sizing and location issues will be considered. Relay application and setting examples will be provided.

The K1 working group met in a single session. Eleven members and 6 guests were present. After the introduction, a call for quorum was made and quorum was achieved. It was noted that a ballot for approval of the minutes from the January 2014 meeting was conducted by email after the May meeting and was approved.

The IEEE Patent disclosure slides were presented.

Michael Thompson moved to approve the minutes of the May 2014 meeting. Steve Conrad seconded. Minutes of the May 2014 meeting were approved.

Current draft of the document is 4.2b. After this meeting, the next draft will be 4.3a

There is an outstanding question on the name of the PST type on Section 6.2 "Single Core with 3 two phase LTC units". Lubo Sevov was volunteered to liaison with the transformer committee to clarify this and other technical questions raised by Michael Thompson regarding C57.135 and C57.12. Winding Polarity markings on PST nameplate was also brought up as a topic to discuss with the transformers group.

Michael Thompson presented slides showing his addition to Section 11 providing a high level overview of protection of PSTs. Overcurrent overload and thermal overload protection was discussed.

The need to revisit a liaison for CIGRE Working Group B5.44 Protection Schemes for Special Transformers was discussed.

Brandon Davies discussed his contribution to section 11 for the addition of calculations for series unit secondary winding delta currents and the addition of three phase diagrams.

Charles Henville noted that he had revised Section 5.0 and that Sam Sambasavian had reviewed and commented on Section 9 (CT locations)

Assignments

- Brandon Davies will update the provided figures with polarity marks and review polarity and equations for consistency.
- Demetrios Tziouvaras will provide a section on applying distance protection to PSTs Section 11.5).
- Michael Thompson will provide a section on sequence component differential protection with variable phase compensation (Section 11.7.1).
- Randy Crellin will provide additional discussion on sudden pressure relay (Section 11.6) and after the meeting, also volunteered to provide additional comments on overload protection, particularly the use of hot spot protection (for inclusion in Section 7.0).
- Demetrios Tziouvaras will review sections 5 and 6 for clarity, completeness, and correctness.
- Sankara Subramanian will review section 11 (Introduction) and Section 11.1 and subsections of 11.1 for clarity, completeness and correctness. Sankara will also review the content to check applicability of information in applicable National Grid and IEC standards.
- Carried over from May meeting, Mahfooz Hilaly volunteered to draft sections 11.2 and 11.3 on phase and ground overcurrent protection.
- Carried over from May meeting, Abu Bapary agreed to provide a draft of Section 9.2 regarding VT requirements
- Carried over from May meeting, Eli Pajuelo will review proposed revisions to Section 10.0 and Steve Conrad and Charles Henville will review the ASPEN fault study model.

Randy Crellin joined the working group.

Sankara Subramanian joined the working group as a non-voting member.

Authors are requested to provide contributions by 15th November.

K3: Reducing Outages Through Improved Protection, Monitoring, Diagnostics, And Auto restoration In Transmission Substations – 69kv and above

Chair: Bruce Pickett

Vice Chair: Paul Elkin

Established: Sept. 2010.

Output: Papers – 1. Full Paper Report to the Sub Committee and Main Committee, and 2. Summary Transactions Paper

Expected Completion date of WG: December, 2015

1. Paper-Draft 13- FINAL; 2. Transactions Summary paper- 1

Assignment: To prepare a paper or a report on protection methods that reduce outage durations in substations with auto-restoration and communication techniques.

Meeting was called to order Sept 10, 2014 with 2 members and 8 guests
Introductions were done and status of WG and the first draft of the Transactions paper was briefly discussed, having emailed it out to the members just prior to the meeting with the request that the members review and comment. A copy will be sent to the guests at the WG Meeting so that a fresh set of eyes can read and comment.

At the meeting, it was decided to abbreviate the meeting and review the first draft off-line rather than trying to do it from the overhead screen.

K4: (PC 37.95.2002): GUIDE FOR PROTECTION CONSUMER UTILITY INTERFACE

Chairman: Mukesh Nagpal

Vice Chair: Chuck Mozina

Established: 2008

Output: Guide Revision

Approved by SA 3/27/14

Assignment: To revise C37.95-2002 (R2007) – Guide for Protective relaying of Utility-Consumer Interconnections

This working group did not meet. The subcommittee voted to disband working group K4 because they have completed their assignment to update of C37.95, IEEE Guide for Protective Relaying of Utility-Consumer Interface. The chairman plans to complete the summary transactions paper before the next meeting.

K5: (PC 37.119.2005): IEEE Guide for Breaker Failure Protection of Power Circuit Breakers

Chairman: Roger Whittaker

Vice Chair: Adi Mulawarman

Established: 2011

Output: Revised C37.119-2005 – IEEE Guide for Breaker Failure Protection of Power Circuit Breakers

Draft : 1.20

Expected Completion Date: Dec. 2016

Assignment: To revise and update C37.119-2005 – IEEE Guide for Breaker Failure Protection of Power Circuit Breakers.

1. Introductions/ Sign up sheet/Patent slides

Quorum : 16, met.

Attendees : 39 people.

2. Approve Ft. Lauderdale minutes

Motions by : Jeff Barsch, Jeff Long

Motion approved.

3. Review, approve June 18, August 13 on-line meeting notes

1nd online meeting June 18

Motions by : Jeff Barsch, Rich Young
Motion approved.
2nd online meeting August 13
Motions by : Rich Young, Bob Beresh
Motion approved.

4. Discuss final editing, main committee balloting permission

Discussion on timeline and we decided by January 2015 meeting we will for sure finish review of all sections (2 more to go).

Then we get a person to review from front to back. And accept all changes to create a clean copy. We will send this copy out to member of WG for their review. We will get their comments and response (for approval to present to request permission from Substation Protection Subcommittee K to go to ballot) by Email before the January meeting. Chairman Roger Whittaker agreed to edit and create the clean copy for members to vote and comment upon.

5. Continue line-by-line review at new section 6.17, "Generator breaker failure considerations".....then "Tandem breaker failure protection"

- move pg 45, line 6, entire paragraph to a new section 7.5.3 at the end/after 7.5.2

- 6.17.3 to 6.17.6 review completed. A few editorial comments were given and will be received back by the next meeting. Roger will make the necessary changes and create document draft 1.20 to upload to mentor.

- SVC bkr failure protection. (Dean Miller – joint working group with I9 Sub/T&D?). Dean suggested that they refer to our guide and also refer back to SVC protection guide since they have scheme not covered in our BF guide. Mike Thompson suggested this is added to section 6.7. Dean Miller agreed to send Roger a sentence which will be added to the guide describing a BFP scheme which uses undervoltage to determine successful breaker tripping in addition to overcurrent and 52a measurements.

- Did not have time to start Tandem Breaker Failure protection. 6.16 Roger will set up the final on-line meeting to complete the line-by-line review.

6. Breaker failure events? None.

Plan summary: :

Roger will setup one more on-line meeting and then will clean up the draft and resend to all for last review and vote for permission to go to ballot before January meeting.

K6: SUDDEN PRESSURE PROTECTION FOR TRANSFORMERS

Chair: Randy Crellin

Vice Chair: Don Lukach

Established: May 2005

Output: Report (including utility survey)

Expected Completion Date: September 2014

Draft 9.0

Assignment: To complete a technical report to the Substation Protection Subcommittee on the application of sudden pressure relaying in power transformers.

The working group met on Wednesday morning, September 10th, in a single session with 8 members and 7 guests. The working group currently has 13 members; 12 attending and 1 corresponding.

After introductions, the working group discussed the last few unresolved comments from the subcommittee review. Our current plans are to incorporate the accepted changes into the document and recirculate Draft 9.0 of the report to the subcommittee members for their approval.

At the present time, we would like to plan on meeting again in January to review PowerPoint slides for future presentations.

K10: SCC21 DISTRIBUTED RESOURCES STANDARD COORDINATION

Chair: Gerald Johnson

Vice Chair: TBA

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.

Working group K10 met on Tuesday Sep 9, 2014 in Milwaukee, WI with 4 members and 16 guests in attendance. We covered the status of 1547a - 2014 which is the amendment to 1547-2003 that includes changes to voltage and frequency ride through and voltage regulation. The document is available for purchase and cost \$42 for IEEE members. P1547.1a is an amendment to the testing standard to match up with the changes in 1547a-2014. The ballot pool has been formed and ballot is presently open for voting and comments. P1547.8, "Recommended Practice for Establishing Methods and Procedures that Provide Supplemental Support for Implementation Strategies for Expanded Use of IEEE Standard 1547" is being balloted now and scheduled to close on 9-12-14.

We had our second meeting of P1547 in Las Vegas June 2014 and the next meeting will be at NERC office in Atlanta in November. Many utility representatives were present for this meeting as well as consultants and Inverter manufacturers.

All minutes for working group meetings are posted on the SCC21 web site under "logistics" of the particular document. All revisions to P1547 must be completed by 2018. If you are interested in participating in the revision of P1547, please check the SCC21 web site for meeting information.

We ended the K10 meeting with open discussion of recent DG activity in member regions.

K11: Open Phase Detection for Nuclear Generating Stations

Chair: Charlie Sufana

Vice Chair: M. Urbina

Output: Report

Draft 0.5

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 9 members and 10 guests in attendance for the September 9, 2014 meeting.

The minutes from the May 2014 K11 meeting were read and approved.

Wayne Johnson of EPRI gave a short update on NEI activities. He also indicated that there will be an NEI meeting September 18-19 in Warrenville, IL.

Contributions from Tony Sleva and Ram that were received just prior to the meeting were reviewed.

Tony's contribution on symmetrical components is being added into clause 3. He will also be contacted to see if he provide some additional examples illustrating different transformer configurations. Ram will be contacted to get clarification on what he provided from IEE Monograph Series 17 for possible entry into the report.

Discussion next continued on the existing draft as there were several additions since the last working group meeting. The section added by Bob Arritt involving transformer models and why they impact the results was reviewed. Bob presents what voltages are present for various transformer types for an open phase condition. Several of the transformer types might lend themselves to using voltage protection. Bob presented phase voltages but he will be contacted to see if he can also provide the sequence voltages for the various transformer configurations.

The working group was encouraged to provide any additional writing contributions.

K12: P1032 Guide for Protecting Transmission Static Var Compensators.

Chair: John Wang

Vice Chair: Martin Best

Established: May 2013

Output: Guide for Protecting Transmission Static Var Compensators

Expected Completion Date: December 2016
Draft 7.0

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 WG K12 met Wednesday September 10, 2014 with 7 members and 5 guests present. IEEE patent slides were shown.

The WG met the quorum, and the meeting minutes from the May Fort Lauderdale meeting were approved. Minutes for New Orleans Meeting in January 2014 were approved by email on May 21, 2014. Dean Miller reported on several issues discussed in SC WG-I9 July PES meeting in Washington, DC. Topics includes physical separation between dual control & protection systems, coordination of overvoltage protection between the SVC control & the protection system, the need for periodic re-coordination studies due to the change of transmission system, requirements for the use of full-wound VTs versus CCVTs, auto-sectionalizing of SVC branches, low temperature tripping for thyristor valves, and using the SVC medium bus voltage as an input to detect SVC breaker failure condition.

There was a general discussion among WG members and guests on how BF protection using MV bus voltage monitoring would work along with current supervision and breaker "a" contact monitoring. Martin will work with Dean and Roger to merge his contribution to SC WG- I9's Draft D7 document and to properly reference the latest development of C37.119 to avoid repetition.

The WG reviewed Martin's contribution of Section 6.1.1.1 in the Draft D6 on the impact of CT saturation. A figure was added based on IEEE PSRC CT saturation tool to illustrate CT saturation for a fully offset fault current. A lively discussion ensued on what specific measures should be taken to deal with poor CT response. Since CT saturation may not be avoided, relay should be selected so that with proper settings, it can operate correctly before severe CT saturation. The SC WGI9 requested to add an additional figure showing CT saturation for a symmetrical fault. Martin will attempt to add such a figure. The SC WGI9 also asked K12 to include the appendix from the C37.110 (Guide for the Application of Current Transformers Used for Protective Relaying Purposes) describing IEEE versus IEC CT ratings. K12 WG decided it is best to reference to the appendix of C37.110 since C37.110 itself may be revised in future.

Roger Whitaker, Satish Samineni, Steve Conrad (G) and John Wang volunteered to review Draft D7. Tapan volunteered to add a section on harmonics. The chair plans to have a conference call before January meeting to prepare for a productive joint meeting with SC WG-I9.

New or pending assignments should be submitted by the end of October.

The current working document revision is draft D7.

The next joint meeting with SC WG-I9 is expected to be a full day meeting at January 2015 JTCM in Garden Grove, CA. It is preferable to request SC to schedule the meeting in the first day of JTCM to avoid schedule conflict.

K13 PC37.116 IEEE Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks

Chair: Ilia Voloh

Vice Chair: Joshua Park

Assignment: Revise IEEE C37.116 "Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks".

Draft 1.2

1. WG met on Tuesday, Sep 9th, 2014 with 8 members and 9 guests.
2. IEEE Patent slides were introduced.
3. There was not enough WG members to approve May 2014 Meeting Minutes. Therefore, Meeting Minutes approval was done by chair via emails.
4. Review of Prior Assignments:
 - o Reviewed draft version Section 3.2.3 "Line Harmonics" update provided by Tapan Manna. After discussion on his draft version additional clarification was requested. Tappan will re-visit his write-up and submit for next meeting.
 - o Luis Polanco presented comments after review and provided a draft copy with these comments to be incorporated.

- There was a discussion about incorporating a section on high speed reclosing after a fault clearance with capacitor not by-passed. The concern in this scenario is the presence of harmonics and its impacts to equipment and protection. (Pratap)
 - Sections 4 and 7 do not overlap with IEEE 824. Therefore, these sections are recommended to be kept without changes.
 - Many assignments were not provided, members will be reminded to contribute
5. Review Annex Sections & New Assignments
- Annex B. Mohammad Zadeh will expand this section.
 - Annex C – Keep as it is.
 - Annex D – Keep as it is
 - Annex E-G: Remove them. But check with series capacitor bank manufacturers on how to they provide capacitor protection (Ilia)
 - Section 3.6 update assigned to Louis Polanco.

K15: Centralized Substation Protection and Control

Chair: Ratan Das

Vice-Chair: Mital Kanabar

Assignment: Write a PSRC report describing and analyzing existing and emerging technologies for centralized protection and control within a substation

Draft 2.4

The working group met on Sep 10, 2014 with 31 participants (16 members and 15 guests). One guest joined the group as a member after the meeting. Three new members joined the WG after the May meeting.

Minutes of the May meeting approved by email stands final without any correction. No comments from participants on the outline of the report.

Four volunteers agreed to contribute to the remaining sections not assigned so far.

We had discussions on Sections 4.2, 4.3.1 and 7.1 – Summary of discussions is enclosed in the annexure along with the distribution of assignments.

We encourage members to submit their assignments by October 3. Updated draft will be circulated by Dec 5 for discussions during the January meeting.

Annexure Assignments:

Section 4.1 Alex Stanojevic and Lubo Kojovic will contribute to section 4.1. Jack Jester is going review their work.

Section 4.4 Rich Hunt will contribute to section 4.4.

Section 6.0 Mark Adamiak (Russian System) and Rich Hunt will contribute to Section 6.0.

Discussions on the Report:

Section 4.2

Vahid Madani recommended including the single line diagram of actual substations and bus configurations as part of some relevant architecture to have a feeling about the system.

Rich Hunt recommended adding the architecture where there is only one CPC which uses blade server with multiple CPU.

There are concerns related to security and access points.

Text will be converted to bullets for more readability.

Interoperability need to be added in comparison table of Traditional v/s Centralized in section 5.0

Section 7.1

Sakis explained about his contribution about substation state estimation. The challenge is the dynamic state estimation to develop the model of the device where lots of math needs to be done within each sampling rate.

There was a question on the selectivity and sensitivity of the SSS as compared to conventional algorithms.

Sakis explained about Section 4.3.1 where hidden failures can be detected by SSS. It is also possible to pin point the source of the data anomaly.
Wrong CT settings, VT fuse failure etc.
There were no questions on this section.

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: 0

The working group met with 21 members and 22 Guests on 10 September 2014, at the Pfister Hotel-Milwaukee, WI. Six new members joined the working group which now consists of 36 members. Quorum was achieved at this meeting. The minutes from the May – Ft. Lauderdale meeting were motioned for approval M Thompson and second from A. Mulawarman, motion approved. The chair reviewed and displayed the required patent information slides related to PAR activity of the WG, and provided opportunity for participants to identify patent claims. The assignment of the WG was also discussed. As a requirement of standards development work all participants are required to indicate both their Company and Affiliation. The attendance sheet was circulated to collect the required information of each participant.

The chairman led discussions on submitted assignments. A comment was made to ensure consistency in the figures relative to transformer terminal designations (H1 vs 1 etc.)

Much of the discussion centered on clause 8 with the following assignments made to review these sections and provide written comments back to the chair prior to November 1, 2014:

1. 8.3.1 Meyer Kao
2. 8.3.2 Chris Walker
3. 8.4.2 Meyer Kao
4. 8.4.4 Dennis Tierney

It was recommended that clauses 8.5.2 and 8.5.3 be addresses to clarify the differences between regulating transformers and phase angle regulating (phase – shifting), and to guide the reader to the PST Guide under development.

New WG assignments were made to review the following clauses and provide written comment to the chair which addresses significant editing. These are also due prior to November 1, 2014:

1. Clause 10 Randy Crellin
2. Clause 11 Adi Mulawarman
3. Clause 12 Bruce Makie
4. Clause 13 Pat Carrol
5. Clause 14 Mark Schroeder
6. Annex C Meyer Kao

The chair/vice-chair will arrange for a new “WG Members Only” restricted web-site to be set up for accessing standard related material.

KTF17 Geomagnetic Disturbances (GMD)

Chair: Qun Qiu

Vice-Chair: Luis Polanco

Assignment: To submit a WG report to the PSRC K Substation Subcommittee evaluating the performance of protection systems during Geomagnetic Disturbances

Draft: 0

The task force met second time on September 9, 2014 with 21 participants. Chair provided the background and purpose for the formation of the task force and discussed NERC GMD reliability standard TPL-007 requirements related to Protection & Control.

An overwhelming majority of the participants supported the idea to form a working group. 10 people (2 were not able to participate the meeting) expressed interest in joining the proposed working group.

The participants then discussed the assignment of the working group which reads as:

To submit a WG report to the PSRC K Substation Subcommittee evaluating the performance of protection systems during Geomagnetic Disturbances

If the formation of the working group is approved, it was recommended that two presentations be scheduled at the January JTCM meeting: 1) one presentation from IEEE Capacitor Subcommittee on the GMD impact on capacitors and 2) the other presentation on the GMD impact on generators. This would be double-session and we will need a room for 40 people with a projector.

I am willing to chair the proposed working group, and Luis Polanco is willing to serve as vice-chair of the working group.

It was recommended that PSRC seek IEEE approval to get the following papers used as reference for the working group members.

- [1] IEEE PSRC WG K-11, The Effects of GIC on Protective Relaying, IEEE Transactions on Power Delivery, April, 1996
- [2] K.S. Shetye, T. Overbye, Q. Qiu and J. Fleeman, *Geomagnetic Disturbance Modeling Results for the AEP System: A Case Study*, 2013 IEEE PES General Meeting, Vancouver, BC, Canada, July 21~25, 2013
- [3] T. Overbye, K. Shetye, T. Hutchins, Q. Qiu, et al., *Power Grid Sensitivity Analysis of Geomagnetically Induced Currents*, IEEE Transactions on Power Systems, July 2013

KTF18 PC37.108, Guide for Protection of Network Transformers

Chair: Adi Mulawarman

Vice Chair: Surarat Pavavicharn

Established: May 2014

Assignment: To give a report to K Subcommittee on the need to revise C37.108 2002 – IEEE Guide for The Protection of Network Transformer.

Number of attendees : 19.

6 sign up to review existing guides.

Task Force Workgroup Assignment:

1. Ask for volunteer to review the current guide
2. Provide recommendation to TF chair/vice whether we need to revise C37.108
3. Preview reaffirmation comments

Options:

1. submit as is with no change
2. submit with changes addressing reaffirmation comments
3. not do anything and let it expired

A PAR needs to be submitted regardless.

Do we need to submit a PAR by Oct 20th.? No. We have time.

By the next January meeting,

The TF chair will send reaffirmation comments to Members and also the 2 guides for review. (C37.108, C57.12.44) – approved for member distribution. Members are to vote on which options the task force has to choose.

At the next TF meeting we will also work on assignment for the WG which will be one of the 3 options.

Erin will request a copy of IEEE 1547.6 2011 to be included for members review to make sure it is in accordance with network protector guide.

Old Business:

No Old Business was discussed.

New Business:

The subcommittee voted to form working group K17 on Geomagnetic Disturbances and accept the assignment recommended by the task force. Q. Qui has accepted the position of working group chairman and Luis Polanco has accepted the position of working group vice-chairman.

General Discussion:

Gary Kobet gave a presentation concerning a shunt reactor tripping event.

- VIII. Presentations:** There was only one presentation at this meeting.
WG D11 – Effect of Distribution Automation on Protective Relaying - Fred Friend

- IX. Adjourn:** Meeting was adjourned by the chair at 11:30 AM.