POWER SYSTEM RELAYING COMMITTEE
OF THE IEEE POWER and ENERGY SOCIETY
MINUTES OF THE MEETING –Final-Approved
September 12, 2013
Albuquerque, NM

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 Main Committee Attendance sheet was routed.

II. Approval of Minutes & Financial Report Pratap Mysore

Minutes of the May 2013 meeting in Baltimore, MD were approved. Public service of New Mexico and PowerGrid LLC were acknowledged for their sponsorship of a coffee break.

III. Chairman's Report Roger Hedding

I'm sad to report that another of our longtime members, mentors, Albert Darlington III passed away in July. Phil Winston and Steve Grier attended the services on behalf of PSRC. Our condolences and prayers go out to Al's family.

Since the Tremont Plaza Suites caused us so much stress due to their remodeling during our May meeting, the manager of the hotel sent us 20 – 50 dollar gift cards for Home Depot. We will raffle off the gift cards and the end of this meeting.

20 newcomers attended the newcomer session Tuesday morning.

At the recommendation of the Advisory Committee, PSRC will send two donations in the amount of $1000.each to the PES Scholarship plus programs for the USA and Canada.

Damir Novosel, one of our PSRC members is running for PES President Elect in the upcoming PES elections. His term will commence in 2014. Please support him. He understands the importance of Technical Committees, and specifically, PSRC. Hopefully, he'll remember us if elected.

The PES Technical Committee task force looking at the entire PES technical committee organization structure is moving very slowly. Our reorganization initiative to change our name and scope to include Protection and Automation was on hold pending the conclusion of this Task Force Report. Upon the affirmative vote of our Advisory Committee we are forwarding our new Organization and Procedures Manual which contains the revised scope to the PES Technical Council O&P Committee for approval.

The revised scope is:

"Treatment of all matters relating to the application, design, construction and operation of protective, regulating, monitoring, reclosing, synch-check, synchronizing and auxiliary relays, plus matters relating to the data acquisition, processing and control systems within substations. Including matters necessary to the functioning of relays and relaying systems employed in transmission, generation, distribution and utilization of electrical energy and their effect on system operation. Control systems include transducers, Intelligent Electronic Devices (IEDs), Human Machine Interfaces (HMIs), Supervisory Control and Data

Acquisition (SCADA) systems, and communications equipment or networks associated with power system monitoring, protection or control. These matters include the low-level interfaces to and protocols communicating locally and remotely with these systems, functional modeling associated with protection and control communications, and management issues of protection and control systems. Cyber security and environmental phenomena that can adversely affect these systems are included. Maintenance of liaison and collaboration as required with other committees of PES and associated groups of IEEE."

IV. Reports of Interest

A. Technical Paper Coordinator's Report – Mike McDonald

T&D 18 papers submitted for review. 68 reviewers are reviewing the papers. To date only 10 people have completed their review. Please get them in ASAP. Request for review of 4 more papers sent out yesterday. Please respond to this request. Thanks to all for reviewers who responded to my requests. It makes his job easier not having to chase down and twist arms to get additional reviewers.

2014 General Meeting Paper submission period beginning shortly. We will need reviewers for this. Watch your emails !

Future Meetings
2014 JTCM is in New Orleans Jan 11- 15, 2014
2014 May Meeting in Fort Lauderdale at Pier 66 Hyatt
2014 September PSRC in Milwaukee at the Pfister Hotel
Jan 2015 JTCM arranged meeting – to be determined
May 2015 San Antonio TX
Sept 2015 La Jolla, CA

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B. CIGRE B5 Activities Report - Adamiak

The CIGRE 2013 B5 (Protection and Automation) Colloquium was held in conjunction with the Brazilian Power System conference – Simpase - in Belo Horizonte, Brazil from August 25-31. Items of interest from this meeting include:

- The 2015 B5 Colloquium will be held in Nanjing, China (date to be determined).
- Three new WGs were formed. Topics include:
  - Testing strategy for PAC functions in a full digital substation based on IEC61850
  - Analysis and comparison of Fault Locator system for different applications
  - Protection and Automation issues during System Restoration/Black Start and Protection and Automation of islanded systems

Please let Mark Adamiak know if you are interested in joining any of these WGs.

The 2nd Annual US CIGRE/EPRI-sponsored Grid of the Future Symposium will be held in Boston, MA from October 20-22, 2013. The Symposium will be hosted by National Grid. The theme will be "Technical Solutions to Regulatory Challenges". This is an opportunity to discuss everything from Smart Grid Deployments, Integration of Renewables in the Power System, to how to deal with new NERC requirements, issues with new protection and cyber technologies.

Make plans now for the CIGRE 2014 - August 24-30 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

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

C. IAS Power System Protection Committee - Mozina

Color Book Reorganization Progress – The IAS Industrial & Commercial Power System Dept. — I&CPS (responsible of the IAS color books) will meet at the IAS General Meeting in Orlando, FL Oct. 6-

10, 2013. 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). 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. Also some key members of I&CPS Buff WG are part of the balloting body for PSRC guide C37.95 **--** *Guide for Protection of Utility-Consumer Interconnections.*

Arc Flash – The IAS is the home of IEEE standard 1584, a key Arc Flash standard. The WG that is updating this standard will meet at the IAS Petroleum and Chemical Industry Conference – PCIC Sept. 23-26, 2013 in Chicago, IL. Lab tests are being conducted to refine the standard. The findings to date center around the impact of incident energy caused by the geometry around the enclosure where the arc flash has occurred. Other factors being addressed are heat and thermal effects, blast pressure, sound, toxicity and electromagnetic radiation. A joint collaborative research project has been formed with NFPA (National Fire Protection Association) to coordinate the research. The research is being funding by a number of industry companies which include switchgear manufactures, UL, consultant firms, companies that sell software to calculate arc flash energy as well as a few utilities.

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.

The US National Committee TAG has been dealing with these projects and documents:

- 60255-27 Safety Standard for Measuring Relays – Final Draft International Standard (FDIS) has been circulated multiple times to WG for review to develop the USNC vote to IEC. Based on feedback received, the US has voted in favor with no comments. This standard impacts the physical design features of relays for user safety and is important to manufacturers.
- 60255-149 CDV – *Thermal electrical relays* – FDIS by Murty Yalla's MT4 has been unanimously accepted by national committee vote, and became an IEC Standard on July 30. This document has been reviewed in multiple versions and circulations for several years.
- Request for Smart Grid Protection experts for new WG (95/307) – A new Ad Hoc Group AHG2 "New protection requirements for the smart grid" has been formed and will be having its first meeting in India on Dec 2, 2013. The Convenor is Norbert Rochow of Germany. It has 7 members; Murty Yalla will participate for the USNC. We have asked multiple times here and would still like some US utility volunteers.
- IEC/IEEE 60255-118-1 Ed. 1, Part 118-1 Synchrophasor for power system measurements – Convenor Ken Martin reports that project work will restart at the January 2014 JTCM or shortly after, by which time the amended base IEEE C37.118.1 will be in a good state for IEC work.
- IEC 60255-187-1 - *Functional requirements for biased (percentage) differential relays* – The development of this standard involves three different parts:

  1) IEC 60255-187-1 Differential protection for transformers, generators and motors.

  2) IEC 60255-187-2 Bus Differential protection.

  3) IEC 60255-187-3 Line current differential protection.

  The work on IEC 60255-187-2 and IEC 60255-187-3 will be started only after CDV is issued on IEC 60255-187-1.

MT4 under Murty Yalla continues its development of three functional standards (60255-187-1, -2, -3) for differential relays in a variety of applications as described in prior IEC reports. A Committee Draft of 187-1, *Differential protection for transformers, generators and motors* is expected in early 2014.

TC 57, Power systems management and associated information exchange

There is no TC 57 report available for this meeting. The liaison reports that TC 57 WG 10, which develops IEC 61850 parts, will meet the week of September 17 at remote Mackinac Island, MI.

E. Standard Coordinators Report – Phil Winston

The status of standards activities that have taken place since the May 2013, meeting of the PSRC are as follows:

RevCom Activity:

Standards Approved; Standards submitted for approval; or Standards due for 10 year review
None

Ballot Activity:

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

PC37.95	Guide for Protective Relaying of Utility-Consumer Interconnections
PC37.98	Standard Seismic Testing of Relays
PC37.118.1	IEEE Standard for Synchrophasor Measurements for Power Systems Amendment to modify selected performance requirements- Pre-Ballot
PC37.240	Standard for Cyber Security Requirements for Substation Automation, Protection and Control Systems
C57.13.3	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases-Invitation

NesCom Activity:

PARS approved

P60255-118-1	Synchrophasor for power system - Measurements
PC37.119	Guide for Breaker Failure Protection of Power Circuit Breakers
PC37.238	Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications
PC37.247	Standard for Phasor Data Concentrators for Power Systems
PC37.248	Guide for Common Format for Naming Intelligent Electronic Devices (COMDEV)

PAR Extensions (applied for or approved); Modified PAR submitted or approved; PARs Requested for Withdrawal; or PARs Administratively Withdrawn
None

PARS expiring at the end of 2013

PC37.95	Guide for Protective Relaying of Utility-Consumer Interconnections
PC37.98	Standard Seismic Testing of Relays
PC57.13.3	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases

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
PC37.242	Guide for Synchronization, Calibration, Testing and Installation of Phasor Measurement Units for Power System Protection and Control
PC37.243	Guide for Application of Digital Line Current Differential Relays Using Digital Communications

PAR/Standard Submittal Deadlines & Standards Board Meeting Schedule:

Submittal Deadline	**Meeting Date**
October 21, 2013	December 10, 2013

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

Chair: C. Preuss
Vice Chair: Vacant
Secretary: Vacant

No report

G. NERC Report - Phil Tatro

1. System Protection and Control Subcommittee (SPCS) Activities

   a. Order 733: The NERC Planning Committee (PC) has approved the SPCS report on protection system response to power swings. The SPCS recommends that a Reliability Standard is not needed based on its review of historical events, consideration of the trade-offs between dependability and security, and recognizing the indirect benefits of implementing the transmission relay loadability standard (PRC-023). However, the report provides recommendations for Reliability Standard applicability and requirements given the FERC directive to develop a standard.

   b. Order 754: The Section 1600 Request for Data or Information associated with FERC Order No. 754 is in progress. Data for buses operated at 300 kV and higher is due October 2. The on-line data entry system is live. The SPCS will review the data at its October 2013 meeting.

   c. Order 758: The SPCS has completed its draft report recommending minimum maintenance activities and maximum intervals for sudden pressure relays in response to FERC Order No. 758. The report will be presented to the NERC PC next week, with approval requested at the December meeting.

   d. Protection System Misoperations: The SPCS developed revisions to the misoperation reporting template based on recommendations in the Protection System Misoperation Task Force report. The changes provide: (i) clarity regarding misoperations that occur within 24 hours due to the same equipment and cause (to be counted as one misoperation), (ii) greater granularity in cause codes by breaking “Relay failure/Design error/Logic error” into three separate cause codes, and (iii) explicit guidance on information to be provided in the “Event Description” field.

2. Standards Activities

   a. Protection System Maintenance and Testing:

      PRC-005-2 – FERC issued a Notice of Proposed Rulemaking (NOPR) on July 18, 2013, proposing to approve PRC-005-2, six definitions, and the associated implementation plan. FERC also seeks comment on: (i) verification of operability and settings upon placement in-service of new or modified protection systems; (ii) use of a four percent target for countable events in performance-based programs; and (iii) violation severity levels for certain Requirement R1 violations. Comments are due to FERC by September 22, 2013.

      PRC-005-3 – PRC-005-3 addresses the FERC directive in Order 758 to include certain autoreclosing relays in the maintenance and testing standard. The standard achieved 79.24% approval in a ballot ending August 23. The drafting team will consider all comments received during the formal comment period and, if needed, make revisions to the standard. If the comments do not show the need for significant revisions, the standard will proceed to a final ballot.

   b. Protection System Misoperations: The drafting team is responding to comments from the previous ballot. One of the proposed changes is to remove the reporting requirement presently in PRC-004-2a and for NERC to request the data under Section 1600 of the NERC *Rules of Procedure*. Comments on the draft data request are due to NERC by September 23. Note that PRC-004-3 will continue to require entities to retain evidence of compliance for audit and compliance purposes.

c. System Protection Coordination: A ballot of PRC-027-1 concluded on July 3. The draft standard achieved an approval of 52.71%. The drafting team is developing responses to stakeholder comments and revising the draft standard. The next posting is targeted for early October.

d. Generator Relay Loadability: The standard has been approved by industry ballot with 76.52% approval, adopted by the NERC Board of Trustees on August 15, 2013, and is awaiting filing with regulatory authorities. Revisions are proposed in PRC-023-3 to assure there are no gaps or overlap between the transmission relay loadability and generator relay loadability standards. PRC-023-3 achieved 93.00% approval in its initial ballot and is posted for final ballot through September 13. If approved, it will be submitted to the NERC Board of Trustees for adoption at its November meeting.

e. Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection: PRC-019-1 has been filed with the appropriate regulatory authorities and is pending regulatory approval.

f. Generator Performance During Frequency and Voltage Excursions: PRC-024-1 has been filed with the appropriate regulatory authorities and is pending regulatory approval

V. ADVISORY COMMITTEE REPORTS

Chair: Roger Hedding
Vice Chair: Mike McDonald

B1: Awards and Technical Paper Recognition

Chair: Oscar Bolado
Vice Chair: Solveig Ward

The 2013 IEEE Power & Energy Society Awards Ceremony was held during the PES General Meeting at the Renaissance Vancouver Harbourside Hotel in Vancouver, Canada last Tuesday, July 23.

We are glad to report that Dr Mohindar S. Sachdev was presented the IEEE Charles Proteus Steinmetz Award.

Also, the PSRC got 2 out of the 4 awards given for technical publications. This is 2 out of 3 of the PSRC nominated publications.

IEEE PES WORKING GROUP RECOGNITION AWARDS

IEEE PES Outstanding Technical Report
• "IEEE Tutorial for Protection of Synchronous Generators, Second Edition"
Michael Thompson, Chair
Christopher Ruckman, Vice Chair

IEEE PES PRIZE PAPER AWARDS

• "IEEE PSRC Report on Global Industry Experiences with System Integrity Protection Schemes (SIPS)"
Vahid Madani, Damir Novosel, Stan Horowitz, Mark Adamiak, Javier Amantegui, Dan Karlsson, Shinichi Imai and Alex Apostolov

B2: Fellows Awards

Chair: C. Henville
No report.

B3, Membership Activity Report

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

Attendance during the Albuquerque PSRC meeting was 216, which is considered a healthy number for us.

23 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.

16 Service Awards were presented.

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

Group did not meet. – is being reviewed for re-organization.

B8: Long Range Planning

Chair: Bob Pettigrew

No report.

B9: PSRC Web Site

Chair: Russ Patterson
Russ met with webmasters to discuss secure methods to access PSRC servers and future plans for website

No report

VI. Items from the Main Committee meeting:

A. There were no new Main Committee members announced
B. There were no new Fellows announced

VII. SUBCOMMITTEE REPORTS

C. SYSTEM PROTECTION SUBCOMMITTEE

Chair: S. Ward
Vice-Chair: J. O'Brien

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 11, 2013 in Albuquerque, NM with 20 members and 43 guests in attendance. Quorum was reached.

Minutes of the May 2013 Subcommittee meeting were approved.

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

PSCE liaison report: Nothing to report.

PSSC liaison report: Nothing to report.

OLD BUSINESS

None

NEW BUSINESS

The working group C17 - Fault Current Contributions from Wind Farms has determined that another related subject needs to be explored. It is to work with the Fault Study program vendors to modify their programs to include wind turbine models. They suggested a new Task Force be formed to explore that. Task force CTF24 will be called "Modification to Fault Study Programs for Wind Turbines". Sukumar Brahma agreed to chair the task force.

Reports from the WG Chairs

C2: Role of Protective Relaying in the Smart Grid

Chair: Alex Apostolov
Vice Chair: Roy Moxley
Output: IEEE Report
Established: January 2010
Expected Completion Date: To Be Determined

Assignment: Identify the functions and data available in Protective Relaying Devices 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.

Working Group C2, Role of Protective Relaying in the Smart Grid, met on September 11, 2013 at 9:30 am. Individual introductions were made and attendance was taken. 15 members and 11 guests were in attendance.

The meeting began with a review and clarification of the group's assignment. Since WG H2 has completed its work and published their report, it was decided that the C2 report will be made available as a separate report.

Contribution by Dylan Jenkins was presented and discussed. It has been added to the report.

The latest version of the draft report was later reviewed.

Each section was discussed and a couple of members volunteered to review and add material where necessary. Damir Novosel made a proposal that a section on the role of SIPS in the smart grid is added to the report. This proposal was accepted and the contribution should be made available by October 31 2013.

Roy Moxley and Damir Novosel volunteered to perform a final review of the document by November 30 2013.

Roy Moxley accepted to become the Vice-Chairman of the working group.

WG C2 Assignment and Volunteer List – May 16, 2012
Underlined names indicate that original or additional assigned material needs to be submitted.

Report Sections

1. Smart Grid Definition – Solveig Ward
2. Introduction – Rene Midence, Marco Janssen
3. Multifunction Protection Devices – Rene Midence
4. Protection Communications – Rene Midence, John Lane, Bob McFetridge
   - 4.1 WG2 H2 coordination
   - 4.2 No discussion of communications
   - 4.3 Determine communication requirements for Smart Grid
5. Impact of Protection on Smart Grid
   - 5.1 Dynamic transformer loading – Aaron Martin
   - 5.2 Adaptive protection – Juan Gers, Andre Uribe
   - 5.3 Condition monitoring – Paul Myrda, Mansour Jalali
   - 5.4 Relay load data used to supervise home device control – Charles Sufana

6 Use of Existing Protection Functions

- 6.1 Measurements - John Csisek
- 6.1 Synchrophasors - Mark Peterson
- 6.2 Status information - Rene Midence, Adi Mulawarman
- 6.3 Waveform, disturbance and event recording/reporting – Mark Peterson, Aaron Martin
- 6.4 Fault location – Aaron Martin, Sukumar Brahma
- 6.5 Volt/VAR relay interface – Tom Jauch, Bob McFetridge
- 6.6 PSL / Load Shedding – Sankura Subramanian
- 6.7 Numerical differential relays / phase shifting transformers - Sankura Subramanian

7 System Documentation – Kevin Donohoe

General Review - Read the current document and provide comments
Dean Ouellette, Athula Rajapakse, Vajira Pathirana, Mansour Jalali, Arvind Chaudhary, Chih-Wen Liu

Utility Users – List desired functions
Jack Jester, Paul Myrda, Don Parker, Stephen Trchian, James Ariza, George Gresko, Rafael Garcia, Don Ware

Protection Vendors – List available functions
Adam Gauci, Jay Sperl, Chris Chelmecki, Siman Richards, Phil Beaumont, Tim Day, Jim Ebrecht, Jakov Vico,

Review and Comment - Add relevancy and applicability comments
Tony Leszczynski, Fred Friend, Travis Smith, Vajira Pathirana

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

Chair: Galina Antonova
Vice Chair: Vasudev Gharpure
Output: Guide C37.244
Established: January, 2011
Estimated Completion Date: To be determined

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 Sept 10, 2013 in Albuquerque, NM in a single session with 16 attendees (7 members and 9 guests). Quorum was not achieved. January 2013 and May 2013 meeting minutes will be approved electronically.

After introductions, Working Group Chair presented IEEE Patent Policy and asked to bring up any patent issues. None were identified.

As IEEE C37.244 Guide was approved and published, the main Working Group activity is producing a summary paper. Current paper draft was presented. Most assignments given at May 2013 meeting have been completed. Discussion on additional material followed. Assignments were given on additional material, input to be submitted within a month. The goal is to have a complete draft for final review at January JTC meeting.

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

Chair: Farnoosh Rahmatian
Vice Chair: Paul Myrda
Output: Guide C37.242
Established: May, 2010
Estimated Completion Date: June, 2011

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).

The Working Group met on Sep 10, 2013 in a single session. The session was chaired by Vasudev Gharpure, in the absence of the chair and the vice chair. There were participation from 4 members and 16 guests. We did not have a quorum of members (4/17).

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

All participants introduced themselves.

The minutes of the January 2013 meeting and May 2013 were reviewed but not approved since we did not have a quorum of the members. Will be using the electronic approval process.

Session Chair reviewed a presentation prepared to cover C37.242 at the industry events. [The following comments were made]

1. Mladen Kezunovic observed that the presentation (in the early slides) should be more than just bullets. He considered it lacked information. (This may have been just applicable to the early slides, and should be considered as maybe a need for a better roadmap as part of the presentation.)
2. There was some discussion (Allen Goldstein, Mladen Kezunovic, and others) on the difference (if any) between spoofing and meaconing. It seems that what has been described as spoofing of a PMU is actually an example of meaconing.
3. It was noted by Allen Goldstein that when IEEE 1588 was first introduced in the presentation, the impression was given that it could be used as a substitute for GPS. In fact, it would merely be a way to distribute a time signal. That time signal may or may not be derived from GPS, but the use of 1588 per se does not obviate the need for a precise time source.
4. This same problem appears on the slide headed “Synch Distribution Methods” in the first “dash” of the last bullet. This absolutely must be revised.
5. It was considered by Vasudev Gharpure and others that two slides on time distribution could be combined.
6. Harold Kirkham was curious whether the “error” results given in the side headed “Inst Transf Accuracy” were real or the result of a simulation. It should be stated.
7. On the diagram showing installation, “view to south” should be “view to equator? Horizon?.”
8. On the Test Equipment diagram, add a link from GPS to PMU

The attendees briefly reviewed the outline for an IEEE Transactions paper. [No particular progress was reported, and many of the assignees were not present. Ken Martin asked for guidelines on how much material was to be furnished for each section.]

The plan is to hold periodic conference call to expedite the overall paper development starting in October 2013.

C13: <u>Undervoltage Load Shedding Protection</u>

Chair: Miroslav Begovic
Vice Chair: Shinichi Imai
Output: IEEE Report
Established: September 2005
Expected Completion Date: May 2012

The Working Group did not meet.

Working Group is planning to meet in January 2014 to work on a transactions paper.

C15: <u>Design and Testing of selected SIPS</u>

Chair: J. Sykes
Vice-Chair: Y. Hu
Output: Report on industry practices in design and testing of selected SIPS
Established: September 2008
Expected Completion Date: December 2012

Assignment: Write a report in industry practices and testing of selected SIPS (System Integrity Protection Schemes)

Working group C15 met on Wednesday, September 11, 2013 in Albuquerque, New Mexico, in single session chaired by Yi Hu with 5 members and 4 guests attending.

The working group members and guests reviewed the latest revision of the draft slides, and then worked on finalising the draft presentation slides to be presented at PSRC main committee meeting. The WG completed the review of the draft slides. The discussion has identified several slides that need some editing. The following are agreed as the follow on action items:

- WG Chairs to send the updated slides deck to WG members who has the assignment to revise assigned slides – Done
- Revised slides send back to WG chairs – by September 20, 2013
- WG chair to finalize the revised slides – by October 15, 2013
- Forward finalized slides deck to Alex Apostolov and Adi Mulawarman for presentation at APAP and MIPSYCON– by October 15, 2013

The working group will meet at next PSRC meeting in one session to work out a condensed version (about 10 to 15 slides) of the current presentation for PSRC main committee meeting. Per information from PSRC main committee, the planned PSRC main committee meeting to present this report will be May 2014.

C16: <u>Relay Scheme Design Using Microprocessor Relays</u>

Chair: R. Lascu
Vice-Chair: T. Seegers
Output: Report
Established: September 2008
Expected Completion Date: To be determined

Assignment: Write a supplement to the existing 1999 relay trip circuit design paper as an IEEE report to address microprocessor relays.

Working Group C16 held its meeting on Tuesday afternoon with 16 attendees. Seven working group members were in attendance.

Draft 3.7 of the paper was distributed and review comments were discussed and many were resolved.

The chair and vice-chair will try to complete a new draft and recirculate the report for a new vote and comment by mid October.

Action items:
Don Lukach will add a revision on retrip to the section.

Tony Seegers will discuss some review comments with Mike Thompson and Bruce Mackie

C17: <u>Fault Current Contribution from Wind Plants</u>

Chair: D. Miller
Vice-Chair: G. Henneberg
Output: Report by the Joint Working Group
Established: January 2009
Expected Completion Date: 2012

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.

The Joint Working Group met in conjunction with the PSRC meeting in Albuequrque, NM on Tuesday September 10, 2013 with 11 members and 15 guests. Introductions were made and the assignment for the working group was presented. Minutes from the May 2013 C-17 and July 2013 Joint Working Group meetings were discussed and approved as presented. (C-17 only acts in support of the Joint working group.)

The report has been approved by the Working Group, C subcommittee of PSRC, and the officers of the PSRC, EMC and T&DC. Comments were incorporated in the report at each stage of review and approval. A summary of the most recent edits includes:

- Section 2.2. Include higher generator voltage (>690 V) for WTG larger than about 3 MW 93.3 and 6 kV).
- Section 3. Incorporated per unit scaling on charts that modeled currents for individual WTG .
- Refined the ties between sections 3.1.1 and 3.1.2.
- Clarified the (10^4) scaling for Figures 3-18 and 3-21.
- Section 3.3.2. Added three sentences about the potential for Type III WTG fault current harmonics during the crowbar period if the slip is significant referenced to Figure 3-24.
- Section 3.4. Removed references to Type IV as synchronous generators without gearboxes, since some Type IVs are induction machines with gearboxes.
- Section 3.4. The listing of a wide frequency and voltage range was removed, as not appropriate, and not specifically relevant for the purpose of this paper.
- Section 3.4. Reference to the German guideline VDE 0102 was eliminated in favor of the similar subject, but wider scope covered by IEEE 551.

The editing team has just received additional comments from a working group member. It is believed that the paper already covers most of these comments, but several are likely to be incorporated.

Dean Miller led discussion of the present paper status and future direction for the Joint Working Group.

- The paper is substantially finished. Dean is hoping to have it in final form before he makes a presentation at the Western Protective Relay Conference in October. The consensus of the Working Group is that it is time to publish.
- There is interest in continuing C-17 to develop one or more summary papers from the main report.
- There is interest in expanding the subject of fault contributions from wind plants to include similar contributions from photo-voltaic installations. This probably should also be a joint effort with other PES groups. A new task force will be proposed to the C subcommittee of PSRC.
- There is an interest in further development of fault duty calculating commercial programs to include more detailed models for Type III and IV (and perhaps PV) equipment. This probably should also be a joint effort with other PES groups. A new task force will be proposed to the C subcommittee of PSRC.

The next joint working group meeting will be in conjunction with the PES Joint Technical Meeting in New Orleans, LA, January 12-16, 2014.

C18: <u>Transmission to Generation Interconnection Protection Considerations</u>

Chair: Alla Deronja
Vice-Chair: Russ Patterson
Output: IEEE Guide
Established: September 2011
Expected completion date:- TBD

Assignment: Develop a 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 is intended to provide 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 11, 2013, in Albuquerque, NM chaired by Jim O'Brien with 14 members and 21 guests present. Two guests indicated desire to join the working group as new members. Quorum was not reached so minutes from the May meeting will have to be approved by email.

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

We had a presentation titled *Generation to Transmission Interconnection Protection – A Few Design Requirements* by Ram Subramanian. Thank you, Ram. This presentation will be posted on the PSRC WG website.

Ram Subramanian had sent a list of issues to Alla for consideration in the guide. Ram went through the list to explain his position.

In general discussion, Mike Jensen made the recommendation that the guide should point out the issues with the connection point design. Arvund Chaudhary also noted the guide should include the viewpoint of the generator owner.

The rest of the meeting was dedicated to reviewing the Guide's Outline. Writing assignments were made covering most of the unassigned sections of the Guide's Outline, thanks to active members' and guests' participation and volunteering.

The updated Outline, with the names of the writing contributors, will be sent out with the meeting minutes. The writing assignments are due December 1, 2013. Please email them to the chair of the working group (**aderonja@atcllc.com**).

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

Chair: Vasudev Gharpure
Vice-chair: Mital Kanabar
Output: Standard
Established: May 2013
Expected completion date:- TBD

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

Working Group C19 met on September 10th, 2013 in Albuquerque, NM in a single session with 13 attendees (5 members and 8 guests). Quorum was not achieved. The minutes of the previous meeting will be approved electronically.

After introductions, Working Group Chair presented IEEE Patent Policy slides and asked for any patent issues to be brought up. None were.

A summary of PDC functions included in C37.244, and their disposition for this WG was presented. The functions to be discussed were taken up next.

Communications:
- Minimum requirements for this function is the ability to send / receive synchrohphasor frames
- Data validation (such as CRC check) can be included
- Physical ports, Ethernet ports, serial ports etcetera should not be included. The PDC should be able to use any of these.

- "Communication channel" part of the section (in C37.244) needs to be clarified before a requirement is stated.
- "Data transfer protocol support" function can be merged with communication function. It should be left to Manufacturer's to specify which data transfer protocol(s) are supported in the PDC.

Protocol conversion
- This is not a minimum requirement for a PDC. However, the PDC standard should specify what a PDC should do in case some of the PMUs use the C37.118-2005 standard and others use the 2011 version.
- This function could be an Annex, to provide guidelines. The WG to undertake an analysis of the conversion between 2005 and 2011 versions of C37.118.
- Another annex can provide information on conversion between C37.118 to IEC 91850-90-5 from WG H21 work.

Reporting rate conversion
- "Deletion should not be allowed for down-conversion.
    - Devices do perform deletion while down-converting P-class data
    - M-class down conversion should not be allowed without filtering.
- Discussion continued with the need for additional filtering for up/down sampling of the data with interpolation or decimation techniques.
- It was noted that filtering could add latencies on the data.
- A question was raised about how to aggregate P-class and M-class data together
    - It was clarified that there is no separate P-class PDC and M-class PDC. Data aggregation based on class may not be required in the PDC.
- An example was discussed to illustrate the problem when data is deleted for down-conversion.
    - Consider a 60 fps signal, with a 0.7 Hz oscillation, being down-converted to 1 fps by data deletion. Such a down-conversion rate may be needed for interfacing with SCADA/HMI.
    - The 1 fps signal would show a 0.3 Hz oscillation due to aliasing around the Nyquist frequency of 0.5 Hz.
    - This down-conversion would need filtering to remove frequencies over 0.5 Hz.

Configuration
- This function is protocol dependent, as IEEE C37.118 and IEC 61850-90-5 have different mechanisms for configuration
- The WG should attempt to write a generic configuration function requirement, that would be protocol independent.

Performance monitoring
- Latency statistics for communication delays need to be included in the standard.

Cyber security
- It was mentioned that the IEEE 1588 group is expected to engage IETF on this issue, and we may want to take guidance from how that effort develops.
- It was suggested that this could also wait until the communication function was settled.
-

C20: <u>Impact of DC Transmission on Protective Relaying</u>

Chair: Joe Mooney
Vice Chair: Ian Tualla
Output: Report to the PSRC
Expected Completion Date: May 2015

***Assignment*:** Develop a report to the PSRC describing HVdc and its affect on the performance and requirements on local AC system protection.

The working group met with 13 attendees; four members and 9 guests. Four guests decided to become WG members.

Joe Mooney provided some background material concerning the need for developing a document concerning the impact of HVdc transmission on AC system protection.

A presentation was given on HVDC technology describing some of the basic concepts and differences between the line current commutated (LCC) and voltage source converter (VSC) technologies. The presentation provided the WG with background material needed to begin development of the guide.

The WG chair stated that the next couple working group meetings would have material presented to help the WG better understand HVdc systems. He stated that Mike Bahrman of ABB has agreed to present at the May 2014 meeting. A presentation for January is still in the works.

The WG discussed an outline for the report. It was suggested the a section on communication be included. A general outline is as follows:

1. Introduction to HVdc Technology
2. Reasons for using HVdc
3. Field Experience
4. Relay Implications
5. Communication between HVdc and AC systems

Charlie Henville mentioned that other have been discussing creation of a working group to investigate fault contributions from solar and other converter based technologies. This would be a follow on to the fault contribution from wind turbines work. There may be some commonality between this working group and the C20 working group.

C21: <u>Commission, Design and Operation of Large Scale Sips</u>

Chair: Yi Hu
Vice Chair: Gene Henneberg
Output: Guide
Established: May 2013
Expected Completion Date: December 2019

Assignment: Develop a "Guide for Design, Commissioning, and Management of large scale SIPS".

Working group C21 met on Wednesday, September 11, 2013 in Albuquerque, New Mexico, in single session chaired by Yi Hu and Gene Henneberg with 13 people attending.

Working group attendees concentrated on the development of the Project Authorization Request (PAR) for the working group.

The agreed draft scope for PAR is "This document provides guidance for design, commissioning, and management of System Integrity Protection Schemes (SIPS) involving communications among separate locations. General concepts for architecture and communication design to achieve functionality and performance requirements are addressed. The document also addresses principles for commissioning processes and strategies for management."

WG agreed on the following next step actions:

- WG Chair to draft initial text for "Need for the project"
- WG Chair to distribute the draft scope and "Need for the project" to all meeting attendees for review and feedback
- WG Chair to use email / conference calls before next PSRC meeting to discuss and refine "Need for the project"

- Distribute refined PAR scope and "Need for the project" before next meeting

The completed PAR will be reviewed and finalized at the next working group meeting before submitting it to C subcommittee and PSRC main committee for approval.

CTF3: Joint meeting with Power System Dynamic Performance Committee (PSDP)

Chair: C. Henville
Vice-Chair:-
Output: Recommendations to the Subcommittee regarding possible joint activities
Established: January 2010
Expected completion date:-

CTF3 did not meet in Albuquerque. TF Chair Charles Henville reported that the newly completed synchrophasors standards (C37.118.1, C37.118.2, C37.242 and C37.244) had been presented at the Dynamics Measurement Working (DMWG) group meeting during the PES General Meeting in July 2013. Arun Phadke also made a presentation on "The Birth of Phasor Measurement Units". Luigi Vanfretti (Vice Chair of DMWG) made a presentation on "Real Time Data Mediation for Synchronous Application Development Compliant with IEEE C37.118" Also Frankie Zhang of ISO New England made a presentation on "PMU Data Validation at ISO New England". All the presentations had been received with great interest. The TF Chair recommends that CTF3 be disbanded since the ongoing work with PSDP will be maintained by the newly formed working group J10 of the rotating machine protection subcommittee.

The System Protection Subcommittee agreed to disband CTF3 so there will be no more meetings. Charles Henville will maintain liaison with PSDP.

CTF 23 Coordination of Synchrophasor Related Activities

Chair: Jim O'Brien
Vice-chair: Damir Novosel

Task Force CTF23 met on September 10, 2013, in Albuquerque, NM, in a single session chaired by Jim O'Brien with 28 attendees.

This task force was initiated because of transitioning phase of NASPI (North America Synchrophasor Initiative) that may be eliminated in the future and the goal to have work of the PSTT (Performance and Standards Task Team of NASPI) continue and be formalized by IEEE PES. It was felt that the PSRC would be a logical home for the work the PSTT had done.

Bob Cummins gave background information on NASPI.

Damir Novosel gave a presentation on the work of the PSTT.

Tony Johnson indicated that funding for NASPI would continue for now but its long term future was uncertain.

Allen Goldstein expressed his concerns about the NASPI work moving to the PSRC as follows:

1) *PSTT has provided valuable guidance to PSRC by providing the insights of utilities, vendors, academia, and government agency members in the form of informal reports and guide documents. If PSTT activities were to become a part of PSRC, we would lose valuable external guidance. The stakeholders who attend NASPI meetings are different from those who attend PSRC meetings with a little overlap. We would lose the insight of those who do not attend PSRC meetings.*

2) *NASPI PSTT reports and documents are less formal and require less review and voting than IEEE PSRC reports and documents. They are able to be published in much shorter time frames. IEEE PSRC must abide by its own by-laws, the by-laws of IEEE PES (Power Engineering Society) and the*

by-laws of the IEEE SA (Standards Association). Each of these require review, editing, and voting at their own level which means that documents cannot be published nearly as quickly as they have been through NASPI.

3) *IEEE PSRC working group meetings take place during conferences where there are numerous working group meetings taking place in parallel. Currently, nearly every meeting period is taken up by some PMU related meeting and often two or more PMU related meetings occur simultaneously so that stakeholders are unable to attend all of them. Meetings are urged by the PSRC leadership to only be one hour in length but many of them need to be "double sessions" which run over two meetings. Some special groups have been meeting the day before the conference, but now even this period is being filled and it is difficult to avoid conflicting meetings. Besides, the PSRC is not responsible to provide meeting space before their meetings start so it is up to the individual group to arrange a space.*

4) *IEEE is a private organization who sells their documents. NASPI not only gives their documents away freely, they are proactive, making sure that stakeholders who do not attend meetings are made aware of the availability of new documents.*

After further discussions a vote was taken as to whether the task force should continue regardless if PSTT work continues or not as PES PSRC should provide long-term home for PMU system performance and standards initiatives. Only 18 of the attendees voted but of those who voted, the vote to continue the task force won by a clear majority. Some attendees did not vote (NERC and ICAP) due to perceived potential conflict of interest.

The following is the proposed assignment of the task force based on discussions and comments by Allen:

The ongoing task force will provide three main functions:

- Liason with NASPI (North American Synchrophasor Initiative) (specifically the PSTT (Performance and Standards 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 PSTT developed documents to PES PSRC including making recommendations which PSTT 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.

Several people indicated the name of the task force didn't clearly state the function of the task force so the following name was proposed and accepted:

CTF23 Coordination of Synchrophasor Related Activities

Jim O'Brien agreed to continue on as chair and Damir Novosel agreed to serve as vice chair.

D: LINE PROTECTION SUBCOMMITTEE

Chair: R.W. Patterson
Vice Chair: G.L. Kobet

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 at 3:00 p.m. with 27 members and 38 guests present.

Following introductions, a count of SC membership was made, and it was determined a quorum was present (27 out of 43 members present).

Minutes from the May 2013 meeting in Baltimore, MD were approved.

Chairman Patterson reported items of interest from the Advisory Committee:

- For PAR-related activities, requirements are 30-day notice on all meetings including web/teleconference, an attendee list with participant affiliation, and written minutes
- Each WG chair should be given a copy of the P&P manual (available on PSRC website)

Seven working groups and two task forces 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: January 2014
Draft: 10.5

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 held its meeting on Tuesday May 10th, 2013, at 3:00 PM with 18 attendees, of which 10 are guests.

Meeting minutes from the Baltimore meeting were presented and approved.

Elmo Price discussed his writing assignment on unequal pole open during switching condition in a pilot scheme. Members of the working group agreed this section is not applicable to the objective of this report and thus will be remove.

Other editorial and technical revisions were made based on the review feedbacks from draft report of the previous meeting.

Gary Kobet and Randy Cunico will submit minor revisions to the exiting sections for farther clarifications.

Meyer Kao will ask author of section 5.3 to see if some the references he provided can be omitted from the report, because some of the references he listed are not publically available.

Meyer Kao shall finalize the report and submit it to the members of the working group by end of September 2013. Members of the working group shall ballot the report by October 31th, 2013.

D6: AC Transmission Line Model Parameter Validation

Chair: Tony Seegers
Vice Chair: Sam Sambasivan
Output: Report to PSRC
Established: January 2009
Expected completion date: May 2014
Draft: 6.8

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.

Working Group D6 met with 9 members and 21 guests in attendance.

The working group discussed the latest draft version 6.8 of the report. Changes to the report as discussed and agreed upon will be incorporated by the Tony Seegers. Following this, a general editorial review will be completed by Tony Seegers and Randy Crellin. Following this review, the document will be circulated to the working group members for a vote on the content. An attempt to resolve any negative votes and comments will be made prior to the January meeting in order to begin review by the subcommittee.

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

Chair: Rick Taylor
Co-Chair: Don Lukach
Output: Revised IEEE Guide C37.113
Established: September 2011
Expected completion date: September 2014
PAR Expiration Date: 2015
Draft: 3

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.

The D19 working group met in a single session on Tuesday, September 10 with 11 of 22 balloting members present. All present voted to approve the minutes. After the meeting, other WG members that were attending PSRC were asked to vote for minute approval. Thus, quorum was met and the May 2013 minutes were approved. Also in attendance were 6 corresponding members, and 23 guests. The balloting and correspondence member lists will be revised based on attendance.

Draft 3, was discussed at length. Some of the sections were not discussed and remain open from May, 2013:

5.6.2.2	Sam Sambasivan	Expand “special considerations” discussion
Fig 27	John Miller	Revise Figure 27 This item is still open for discussion, but several figures were received from John.

Section 5.11 was discussed at length and will be revisited by Claire Patti by October 31, 2013 for comment resolution.

The Polarization and LOP section review team submissions were discussed and will be incorporated into the next draft.

The SIR team of Rick Taylor/ Mike Thompson/ Normann Fischer/ IanTualla/ Alla Deronja is expected to submit their information very soon and will be ready for discussion at the January 2014 meeting.

A review team of Dom Fontana, Jeff Barsch, and Martin Best will review the D24 report for inclusion into this guide by October 31, 2014.

A review team of Demetrios Tziouvaras and Martin Best will review the D27 Draft Guide for inclusion into this guide by October 31, 2014.

At the D Line Protection Subcommittee, the D25 report on distorted waveforms was discussed for inclusion into this guide. The consensus at that meeting was that the line guide is large enough and that the topics in D25 may be better for a separate guide.

The K13 working group discussed that line protection is not part of their scope. The D19 Vice-Chairman will review the current D19 draft and submit recommendations for inclusion of series-compensated line protection.

D24: Transmission Line Applications of Directional Ground Overcurrent Relays

Chair: Don Lukach
Vice Chair: Rick Taylor
Outputs: Report to WG D19, PC37.113, Guide for Protective Relay Applications to Transmission Lines and Report to the PSRC
Established: May 2007
Expected Completion Date: September 2013
Draft: Final

Assignment: Prepare a report to the Transmission Line Guide revision working group and PSRC on the justifications and application criteria for directional ground overcurrent relays

The working group (WG) met with 16 members, 8 guests, for a total of 24.

The May, 2013 meeting minutes were approved as submitted.

At the conclusion of the May meeting, the report required a minor figure change and an editorial edit. At that time the WG voted to submit the report to the Line Protection Subcommittee with the provision of having the edits complete. As a courtesy, the report with edits incorporated, was mailed to the WG and presented at the September meeting. Minor editorial comments were incorporated into the final report dated September 9, 2013. The WG members voted unanimously to submit the report to the Line Protection Subcommittee for ballot.

A review team of Dom Fontana, Jeff Barsch, and Martin Best will review the D24 report for inclusion into the D19 guide by October 31, 2014. The work will be part of D19. Thus, all assignments for D24 are complete.

D25: Distance Element Response to Distorted Waveforms

Chair: Karl Zimmerman
Vice Chair: Aaron Martin
Output: Technical Report to Line Protection Subcommittee
Established: January 2009
Expected completion date: September 2013
Draft: 2.3

Assignment: Write a technical report to the Line Protection Subcommittee on the performance of distance elements with distorted waveforms.

The working group met in Albuquerque NM on September 11, 2013 with 12 attendees.

In June, Subcommittee D members approved the report with the final results:

41 approve, 2 disapprove, 2 no response.

Approval rate 91%, which is greater than the 75% requirement, so the document is approved and will be complete pending the Chair/Vice-chair resolving comments with the individual commenters. Thank you for all who participated.

All of the comments made from the two negative ballots have been resolved and incorporated in the paper. The highlighted changes will be sent to the negative balloters within two weeks, and the plan is to submit to the SC and PSRC officers for approval.

Also, the WG Chair offered the possibility of presenting the report at a future IEEE meeting and/or regional relay conferences. To that end, we will approach Georgia Tech Relay Conference planning committee about submitting an abstract for the 2014 conference.

Also, there was discussion on the possibility of future activities to turn this report into an IEEE Guide. This is a consideration for the Line Protection Subcommittee. (NOTE: SC voted to form a task force DTF30 to consider)

We propose keeping the WG intact for one more meeting in January in case there are any further activities required.

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
Draft: 4

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. The attendees were provided the opportunity to respond. There were no responses.

There were 22 attendees with 15 members (13 Balloting & 2 Corresponding) and 7 guests. At the meeting's conclusion 1 guest joined the membership. There are 18 balloting members on the Working Group so a 75% voting quorum was not achieved to approve changes to the Guide.
Minutes from the May meeting in Baltimore were approved.

The chair reviewed the steps necessary to complete the assignment on schedule by December 2014. The draft must be submitted for terminology review and to IEEE-SA for editing review, a 30 day review period. Coming in 2014, there may also be a period for public review process lasting 65 days. The chair hopes to be able to go to ballot by early 2014. Following the 30 day balloting period and depending on the extent of the comments a decision will be made whether we need to request a PAR extension towards the end of 2014.

Most, but not all of the review comments had been incorporated into the latest Draft 4 distributed before this meeting. The working group reviewed the major contributions and the review comments that were received prior to the meeting.

- Section 4.2 - 4.2.2: Definition of Error - This was the initial reason for the revision to the guide. There were no additional comments.
- Section 5: Two Terminal Methods - Some expansion and rewording.
- Section 5.3.1-5.3.1.2: All new material discussing synchronized phasors versus synchrophasor techniques. This was moved from Section 8.1 but 8.1 was not removed and needs to be.
- Section 6.2: Series Compensated Lines much of it is new
- Section 6.4: New section on Tapped Lines
- Section 6.5.1.4 - 6.5.4.2: All new material on application of distribution fault locating. We briefly reviewed these additions but need to review in additional detail.

The chair will schedule a couple of WebEx sessions before December to finish reviewing the major new contributions and comments we didn't get to in this meeting.

- Section 6.5.1.4 - 6.5.4.2: All new material on application of distribution fault locating. Review in additional detail.
- Section 6.14: Fault Location for nonhomogeneous transmission lines all new material
- Section 7.4: Traveling wave fault location all new material

The major gap noted is that the references are out of numerical sequence, and are missing for some sections.

- Joe Mooney will follow up with the authors of the sections missing the references. The sections noted are 5.3.1.2 and 6.5.1.5.
- Joe Mooney will update the draft and redistribute with the remaining comments and those comments from this meeting.
- Randy Cunico volunteered to review all new additions for references and to renumber the references to be in numerical sequence.

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: Sept 2010 (PAR approved)
Output: IEEE Guide PC37.243
PAR expiration date: Dec 31, 2014

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.

WG D27 met on Tuesday, September 10, 2013 at 9:30am MDT in a single session with 8 voting members, 1 corresponding member, and 23 guests. Since the current voting membership is 21, a quorum was not established.

After introductions, the patent slides were shown and reviewed. The minutes for the May meeting and the review session in August will be sent to members via email for approval.

The scope of the PAR was reviewed.

The review of completed writing assignments and recent changes to the document due to review team meetings took place.

> Roy Moxley reviewed the document after the section 7 review team teleconference in August. His comments and changes to the document were reviewed and will be incorporated into the document.
>
> Mark Schroeder's additions to the document in regards to definitions were reviewed. The definition of T1 needs to be reviewed, then E1 will be defined. Bruce Mackie will work with Mark Schroeder to resolve this issue. Bruce will also determine correct definition of IEC61850 acronyms.
>
> The remainder of the changes to the document was reviewed.
>
> Bruce Mackie will look for assistance to improve the figures for the document.

The assignments still outstanding were reviewed.

> The Testing and Maintenance section has not been complete. A suggestion was made to not include a section on testing; however, this will require a change in the scope. Several members or volunteers who will now be members stated they would like to draft the section. These members are Joe Perez, Bob Ince, Don Ware, and Jun Verosa. They will complete their draft by November 30, 2013.

The future plan of the working group was discussed. All were given the assignment to review the document and submit comments by November 30, 2013. The existing review teams will meet via webinar

in December to review the comments. Roy Moxley and Bruce Mackie volunteered to review the entire document after the review teams have completed their changes.

The following will be added as voting members of the working group: Joe Perez and Don Ware

DTF28: Review of C37.230 Guide for Protective Relay Applications to Distribution Lines

Chair: Brian Boysen
Established: May 2013

Assignment: Review the C37.230-2007 Guide to see if any major changes are necessary and make a recommendation to the SC on whether to apply for a PAR or to send the document to IEEE for balloting.

Meeting # 2

The task force met on September 11, 2013 with 24 participants.

The assignment of the task force is to evaluate the need for revision of IEEE C37.230 which is due to expire in 2018.

The participants approved the meeting minutes from the first task force meeting which occurred on May 14, 2013 in Baltimore. The task force participants determined that IEEE C37.230 should be revised to correct errors and address additional distribution line protection related topics. For example, new sections should be added to this guide to address distribution line protection impacts on and/or interaction with arc flash hazards, the smart grid, and fault locating. Existing sections within this guide should be revised to discuss non-conventional current and voltage transformers and distributed resource integration and coordination.

The participants also worked on the PAR and finalized the working group membership list. The task force recommended to the D subcommittee that a working group be formed to revise IEEE C37.230. Brian Boysen will chair the new working group and Claire Patti will be vice chair. NOTE: During the D subcommittee meeting on September 11, 2013; the D subcommittee voted and approved the formation of a D28 working group to revised IEEE C37.230.

The new D28 working group will have its first meeting at the January PSRC meeting. This will be a single session and the meeting room should have a video projector and accommodate 40 participants. At this meeting the working group will determine review and writing assignments. A copy of IEEE C37.230 and its previous balloting comments will be sent to all working group members for them to review prior to the January meeting.

DTF29: Investigate Need for Guide for Out-of-Step Protection Applications to Transmission Lines

Chair: Normann Fischer
Established: Sept 2013

Assignment: Review the 2005 D6 report titled “Power Swing and Out-of-Step Considerations for Transmission Lines” and investigate the need for producing an out-of-step TL guide.

DTF29 met on Tuesday 10th of September, with 16 attendees. The purpose of the meeting was to determine whether to form a working group to turn the report generated by D6 in 2005 in to a guide. Since most of the attendees were not aware or did not have a copy of the report generated by working group D6, the assignment for those attendees that wanted to become working group members was to read the report generated by D6 before the PSRC meeting in January. At the meeting in January a decision will be made by the working group whether to propose to the subcommittee to turn the report into a guide or not.

Of the 16 attendees 7 indicated that they would like to become working group members should working group go ahead.

SC Motions to be made to Main Committee

None

Coordination Reports

None

Liaison Reports - Fred Friend

The T&D Committee / Distribution Subcommittee met during the PES General Meeting in Vancouver, 21-25 July 2013.

Their next meeting will occur during the JTCM in New Orleans, 13-16 January 2014.

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

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

Continued discussion on developing the 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.

Four panel presentations are planned for Smart Distribution Applications during the 2014 General Meeting: Outage Management, Asset Management, Accommodating High Penetration Renewables, and Effect of DR on Distribution Systems.

Volt-VAR Control Task Force
Discussion to create a guide for determining the effect of reduced voltage on electric power demand and energy consumption on electric power systems.

Distribution Management System (DMS) Task Force
Continued discussion regarding vision, scope, objective, and deliverable for DMS TF.

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

Continued work on P1806 “Guide for Placement of Overhead and Underground Switching and OCP Equipment”
Scope: This guide is to provide criteria for switching and protective device placement for distribution circuits.
Purpose: This standard develops a guide for where and when switching and overcurrent devices are placed on the distribution system.

Old Business

None

New Business

Ken Behrendt and Tom Wiedman have resigned from the D-subcommittee. We thank each for their contributions and will miss their participation.

The D-subcommittee welcomed Claire Patti and Brian Boysen as new members.

WG chairs are requested to send their latest rosters to the D-SC Chair/Vice-Chair so they can be updated in the PSRC Directory.

This is Russ Patterson's last meeting as Chair of D-subcommittee. Russ was applauded for his three years of capable service. Gary Kobet will assume responsibilities as Chair beginning in January 2014. Karl Zimmermann has accepted an invitation to serve as Vice-Chair.

There was some discussion regarding the protection of transmission lines having series capacitors. Working Group KTF13 is developing the C37.116 Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks. It was pointed out that the scope of C37.116 is essentially limited to the protection of the series capacitor bank itself. The implications of series capacitor banks on transmission line protection is expected to be treated by Working Group D19 (Guide for Protective Relay Applications to Transmission Lines). Rick Taylor and Don Lukach (Chair/Vice-Chair of D19) agreed that this would be the case.

General Discussion

None

Line Protection operations of interest

Heather Malson discussed an event that concluded with a recommendation for use of fault detectors when relay potential transfer schemes are used.

The meeting was adjourned at 4:15 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 11, 2013 with 20 members of 34 total, comprising a quorum. 23 guests were also present. Minutes of the May 2013 Baltimore, MD meeting, with one correction (two extraneous paragraphs deleted), were approved without objection.

The Chair presented several announcements from Adcom:

- Working group reports are due to the SC leadership within 1 week after the working group meeting.
- A SC meeting agenda is due to the members at least 2 weeks prior to a SC meeting.
- Working groups who use web meeting capabilities are congratulated for their resourcefulness and reminded that they must run these as full meetings, including role call/attendance awareness, patent warnings, distribution of minutes to all WG members within two weeks of a meeting, and opportunity for those who could not attend to comment on decisions taken at the meeting.

The Chair made other announcements:

- The Chair distributed the most recent set of P&P and OP manuals on August 17 to working group leaders.
- Standards development WG rosters must include the affiliation of each WG and voting member, which may be different from the member's company.
- For any given standard, the SC needs to have a TF look into developing an action plan 5 years prior to the expiration date of that standard, since the replacement must be fully developed, voted, and approved before the old version expires.
- Participation in SC e-mail votes is required in order to maintain SC membership. A standardized e-mail subject line is being instituted for all future SC votes by e-mail.

WG business:
The H4 working group announced that it had completed its task and is disbanding.

Any interested SC member is invited to present a portion of the tutorial for working group H9 at the upcoming Texas A&M relay conference in March 2014.

The H11 working group requested subcommittee approval to move an amendment to the C37.118.1 standard, developed under its own PAR, to IEEE SA ballot. This supports the SC request to the main Committee for permission to ballot.

The SC voted unanimously to approve the balloting of the amendment to C37.118.1 that is proposed by the H11 working group.

The formation of working group H25 was announced with Marc Benou as chair, Dylan Jenkins as vice-chair, and the assignment: Revise IEEE Standard C37.94-2008, *IEEE Standard for N Times 64 Kilobit Per Second Optical Fiber Interfaces Between Teleprotection and Multiplexer Equipment*.

The Chair accepted formation of working group H26 with Rick Cornelison as chair, and the following 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 Chair announced the formation of working group H27, pending PSRC officer approval of chair Chris Chelmecki. Dylan Jenkins will serve as vice-chair. H27 has the following 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.

Old business:
None

New business:
Members were encouraged to prepare presentations of their work for future meetings of the PSRC Main Committee. Slots are available starting in January 2014.

Alex Apostolov encouraged SC members to submit articles on recently completed PSRC work to PACWorld in order to promote the accomplishments of the PSRC working groups.

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 guide for application of digital communications for protective relaying systems and schemes, including transmitting and receiving equipment, digital channels, application principals, performance, installation, troubleshooting, testing and maintenance.

The H1 working group met with 4 members and 1 guest. After introductions, it was explained that the guide was published earlier this year. The task of the working group is to now write a paper and a presentation on the Guide.

Not having experience with writing a paper of a guide, examples were solicited. Ilia and Roger Hedding will supply examples of papers written by other working groups. Ilia, Mal, and Marc will work on writing the report and presentation. Jerry, Neil, and Ray agreed to help proof the paper.

The goal is to have this done by the January 2014 meeting.

H3: Time Tagging for Intelligent Electronic Devices (IEDs)

Chair: W. Dickerson
Vice Chair: J. Hackett
Substations C4 Co-Chair: M. Lacroix
Output: Standard
Established: 2006
Expected completion date: December 2015

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 7 members and 5 guests in attendance. The patent policy slides were shown, and no issues were identified.

Minutes for the last three meetings will be distributed and voted by email, due to the absence of a quorum.

The meeting focused on a discussion of the latest draft of the standard. Discussion centered on the issues of vendor obligations to provide procedures to measure time tag accuracy, and especially the proposed transition to TAI or a variant thereof. No conclusions were reached, but the consensus of the WG is that if we are to endorse this, and there exist valid technical reasons to do so, we will have an obligation to educate the user community regarding the benefits and consequences, both positive and negative.

H4: Revision of C37.111 COMTRADE Standard

Chair: R. Das
Vice Chair: A. Makki
Output: Standard
Established: 2006
Expected completion date: June 2013

Assignment: Revision of IEEE Std C37.111-1999 - IEEE Standard Common Format for Transient Data Exchange (COMTRADE) for Power Systems.

Meeting # 25

This standard is one of the critical standards identified by IEEE SA for Smart Grid activity and the standard was published on April 30, 2013.

The Group met on September 10, 2013, with 10 members present. Three guests were also present. The minutes of the previous meeting held at Baltimore were approved.

Chair provided feedback from the presentation at the IEEE PES General Meeting in July at Vancouver. Chair also provided update for future conference presentations at Texas A&M and Georgia Tech. Stan Thompson and Jim Hackett are coordinating the paper submission and presentation for the two conferences.

Chair thanked all members and guests for their support over the last 10 years. The working group thanked PSRC members, H Subcommittee Chair and Vice-Chair, PSRC officers and standard coordinators for their support over the years.

The WG is requesting to disband the group as decided during the last WG meeting as the assignment is completed.

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 Chairman Charlie Sufana. There were 9 members and 16 guests present. Two new members Rick Lipochak and Calvin Vo were added.

The minutes from the May 2013 meeting were reviewed and approved with no comment.

The Chair opened the meeting with a question to the group of what 61850 projects were being done or any proposed presentations.

Craig Preuss is doing a 61850 installation at a distribution substation and using GOOSE. Hi is finding that devices pre-selected at start of project have limitations in their 61850 implementation. So he must use DNP to supplement the overall control schemes to do things like change report control blocks. (What about settings groups?) Different relays were found to support differing levels of 61850 GOOSE and MMS. Optional 61850 features are not supported. The data concentrator also supported differing levels of MMS and GOOSE. Lesson learned is to understand the application requirements first and THEN choose the devices that will support it. However it was mentioned that 61850 is still maturing and that DNP suffered the same development cycle.

After a review of these issues a healthy discussion ensued on the viability of using various features of 61850 with the intentions of the standard versus the reality of making it work as it is now.

The Vice-Chair reviewed status of the UCA-IUG Test Subcommittee progress on the Ed. 2 conformance testing specifications. The EPRI test bed project was mentioned that will take place in two weeks at the workshop hosted by BPA in Portland OR. The demo will focus on functionality of a typical breaker failure scheme. All utilities are encouraged to attend/participate.

The Chair then reviewed the report outline and assignments of the working group and discussed the contributions provided to date. Those assignments that were to be done by individuals who are now retired or no longer in PSRC are to be redistributed – Alex Apostolov has previously volunteered to provide several write ups on the various report topics. Craig suggested to at least include a reference to C37.244 which defines the different tests usually performed. The Chair directed that the report's focus is on the application testing but agreed that these other references could be added. The Chair solicited for more contributors for the vacant outline sections.

Reassigned writing assignments are now requested to be provided by January 3, 2014.

H9: Understanding Communications Technology for Protection

Chair: R. Midence
Vice Chair: A. Oliveira
Output: WG Paper
Established: 2005
Expected completion date: June 2013 (Completed)

Assignment: Prepare a document that would assist engineers in understanding the communications technology for protective relaying.

The Working Group H09 met in the Alvarado – G Room, Albuquerque Hotel, in Albuquerque, NM, USA on September 11, 2013 at 9:30 am. Seven (7) members and six (6) guests were present.

Since the chair was unable to attend, the meeting was run by the vice-chair.

Initially, the vice-chair gave the update regarding the promotional paper. Currently, the paper has 32 pages. Ideally, its number of pages should be reduced to 14 or 15 pages. In the previous meeting, in Baltimore, Bruce Mackie and Stephan Brettschneider volunteered to work on the paper. Unfortunately, they were not present in this meeting to report their progress. The chair and vice-chair will follow up with them regarding the status of their contribution.

The next item discussed was the tutorial.
The vice-chair presented a task list listing 28 items composing the tutorial structure with their respective assigned volunteers. The contributions for six items were missing. With the exception of Tony Bell, all assigned volunteers were not present. The vice-chair solicited more volunteers to help to finish these items. The following people volunteered:

Chris Chelmecki: Item 6 – Channel Delay, Item 15 – Ethernet and Item 16 – High availability Ethernet protocols
Bob Ince: Item 10 – Multiplex Channel, SDH, PDH, SONET

For Item 20 – Power Line Carrier, Tony Bell informed that he would be working on the item to deliver the material.

As for Item 17 – Utility Oriented Protocols, the chair and vice-chair will follow up with the original volunteers.

The vice-chair promised to make the digital copy of the tutorial available for the group members.

The last item discussed in the meeting was the invitation made by Eric Udren to present the tutorial in the Texas A&M Pre-conference, on March 31st, 2014.
Eric himself attended the meeting and presented the invitation personally.
Due to the small number of attendees, especially among those who have been contributing to the tutorial, it was agreed that a conference call would be held within the next couple of weeks to discuss the Texas A&M presentation and to identify those interested in presenting the tutorial along with René Midence. Eric Udren requested to be invited to the conference call.
The vice-chair also requested for volunteers to work on tailoring the tutorial for the Texas A&M presentation. Chris Chelmecki and Anderson Oliveira volunteered for the task.

The group also discussed about the items from the task list that should be presented at TEXAS A&M presentation.

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 2013

Assignment: Create a new Synchrophasor Standard C37.118.1, using the measurement portion of the current standard, C37.118-2005, and adding dynamic phasor measurement and frequency measurement requirements according to the PAR issued 17 June 2010.

WG H11 met on Wednesday, September 11, 2013 at 8:00 AM in a double session with 10 members and 13 guests. The IEEE patent infringement rules were reviewed.

Allen Goldstein was announced as the new vice chair. Bogdan K. resigned as vice chair about a year ago.

The current status was reviewed: After standard was passed, further testing of Model and actual PMUs showed deficiencies. Par was submitted in January to amend the standard, and approved in March. The WG completed the amendment in May and approved it in June. To go to ballot, it must be approved by the PSRC main committee. An Email vote did not appear feasible, so H11 is waiting to go to ballot pending the main committee approval at this meeting (tomorrow). The balloting body was formed in May and editorial review was done in July.

If approved by the PSRC main committee, the amendment can go to ballot immediately. The minimum ballot is 30 days. The next standards submission date is October XX. To make this date, timing is short. If a recirculation is required, the standard can be submitted at the same time that it starts under certain circumstances. Minimum recirculation is 10 days.

The revision PAR for the joint IEC-IEEE development was approved in June (it was delayed for amendment development & approval). The document format was discussed (IEC is different from IEEE). The current format is the one required by IEEE.

The new PAR states that the new document will be 60255-118-1 which is the IEC number. Therefore both IEC and IEEE will use the same number; there will be no C37.118 number.

Discussion of IEC joint work:

- Will there be changes so that manufacturers wait for the joint standard rather than using the amended IEEE standard. The consensus was “no” since vendors are moving on and the IEC work will probably take 2 years.
- Differences in meeting formats & time frame. Could have IEEE & IEC meetings separately and communicate by e-mail. Expect 1 meeting/year outside of US. Probably have some web meetings.
- Will look into having our first meeting in conjunction with the JTCM in January—suggested to have the meeting on the day after the JTCM to avoid conflicts. We can also consider meeting at CIGRE later in the year. IEC meetings expect a local sponsor so there is no cost to attend.
- There is no limit to the WG size, but at least 5 member countries must participate to have an IEC project.
- We should start discussing with IEC what the format of the meetings will be.
- Ken Martin is both IEC convener and IEEE WG chair. He will initiate discussion of logistics and speculation of how the work will proceed. He will also issue a call for IEEE members to the WG.

Status of summary paper: it is fairly complete as is, with some pending edits. It was suggested to include sections describing the amendment and explaining the differences between M & P class. It was recommended to just merge the amendment changes into the existing sections as appropriate (i.e., not treat it separately). Harold explained his previous comments to the paper made by e-mail. The evolution and meaning of M & P class was discussed at length, and further explanation will be included in the paper. The paper will be edited and completed once the Amendment balloting is complete. The following members volunteered to edit the paper: Ken Martin, Allen Goldstein, Dan Dwyer, Bill Dickerson, Harold Kirkham, and Jay Gosalia.

Disposition of the C37.118.2 paper submitted to Transactions on Power Delivery was discussed. It was rejected by the editor as not having new work and not having archival value. However several believe that as a WG paper it should not have been reviewed at all. It was agreed to submit it to Transactions on the Smart Grid. It was also agreed to submit it as a paper to the PES general meeting.

Recent testing has shown that the harmonic interference test (Section 5.5.5) in C37.118.1 may produce different results depending on the way the harmonic components are phased. The standard does not specify this detail. It was resolved that the harmonics should have the same phasing as found in the actual power system, and not simply positive sequence. Further testing will be done to determine if the measurement differences are significant enough to require further specification in future standard revisions.

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: May 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, 2013 with 8 members and 13 guests. The Chair had circulated the prior draft in August.

At this meeting, the WG reviewed a significantly revised draft based on comments received and on a rearrangement of some section material. Especially helpful was a thorough review by Chris Huntley, whose key comments were reviewed.

The following sections still require further editing and the listed attendees took assignments:

Section 7.2 – Internet Group Management Protocol – Chris Chelmecki with help from Vivek Umasuthan.
Section 9 – Scalability and Internetworking – editing and focusing – Vivek Umasuthan.
Section 10 – Security – editing and focusing per Chris' suggestion – Vivek Umasuthan.
Section 12 - Ethernet Network Design for P&C Communications – editing review – Chris Chelmecki.
Section 13 – Intersubstation applications – Charlie Sufana.
Section 14.1 – Needs update to describe IEEE 1613.1 changes – Bob Beresh.
Section 14.2 – Needs new brief description of IEC 61850-3 environmental (& other) requirements - Eric
Section 15 - IT engineering and management needs for P&C experts – needs a bit of editing enhancement – Tony Johnson.

The VVRP heading is misplaced and is to be recovered – Eric.

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.

Meeting was called to order – There were 10 members and 17 guests in attendance.

IEEE Slides were presented and call for any knowledge on proprietary data made. None was offered.

Presentation by Savi Subramainiam of IEEE Conformity Assessment Program discussing the purpose of ICAP. Discussion on how the ICAP program may be beneficial for C37.240. It was agreed that we should suggest a task force be formed and meet during the next meeting to determine if a WG should be formed to address this testing program.

Summary of the present state or our standard was presented. We are in the comment resolution stage from the first Sponsor Ballot. Volunteers were solicited from the WG membership to participate in a comment resolution committee, 6 members volunteered. Sam and Tim will sort the comment list so to separate editorial and technical comments. The technical comments will be distributed between the volunteers for initial evaluation, and proposed resolution. The comment resolution group will meet vial web conference to discuss comment resolution proposals for inclusion in the document, to be presented to the full working.

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.

The WG did not meet. Following are minutes from the May 2013 meeting in Baltimore. The WG will meet in January in New Orleans.

The meeting of Working group H17 was held May 14, 2013 in Baltimore, MD. 13 members and 4 guests were present.

After introduction of the attendees, Alex Apostolov reviewed with the participants the scope of the working group. It was concluded that it will be useful to distribute to the members of the working group the IEC WG 10 format for use cases.

New assignments were identified:

- Amir Makki to contribute to the use case of correlation from the point of view of disturbance recording and event analysis
- Rick Cornelison to provide H10 summary
- Amir Makki to provide IEEE C37.232 summary
- Pierre Martin to provide the XML schema for the COMTRADE configuration file

After some additional discussions on the reference documents it was decided that a contribution on Time stamping should be provided by Bill Dickerson.

The use of standard units, harmonization between IEC TC 57 working groups 13 and 14 and unification between CIM and IEC 61850 were also discussed.

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 10, 2013 in single-session chaired by Yi Hu and Allen Goldstein with 22 people (seven members and fifteen guests) attending.

After reviewing working group's assignment and the meeting agenda, the working group proceeded to review the draft use case diagram created by Harold Kirkham, and discussed and worked on the revision of the use case diagrams to be more general for developing the standardized mapping.

Two use cases were derived as the results of the discussion and revision. The follow-on actions of the working group are:

- WG Group Chair to work with Harold Kirkham to clean-up and refine the use case A and B diagrams
- WG Chair to work with Mital Kabanar on drafting the initial configuration information mapping illustration diagram
- Use email / conference call among WG members to review and refine draft use case diagrams
- Distribute draft use case diagrams before next WG meeting for review and finalization

H22: Guide for Cyber Security for Protection Related Data Files

Chair: Stephen Thompson
Vice Chair: Dylan Jenkins
Output: Guide
Established: September 2012
Expected completion date: December 2015

Assignment: Develop an IEEE Guide on security for data files used for configuration, management, and analysis of protective relaying systems.
Working Group met on May 14 2013 with 14 attendees, 8 of whom were members

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.

PAR was approved August, 2013.

The Working Group met on Tuesday, September 10, 2013 with 5 members and 0 guests.

The minutes from the last meeting were approved.

The outline was discussed and assignments were made. The discussions included concern over the size of some of the names that might be used, how this work related to various other standards, and how channel names fit in with this work.

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 met on September 11 2013 in Albuquerque, NM in a single session with 23 attendees (8 members, 15 guests). The quorum was not achieved. May 2013 meeting minutes will be approved electronically.

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 co-chair provided the status of IEEE C37.238 revision. Co-chair reminded that group of the proposed schedule and the need to resolve remaining comments promptly.

Discussion on items raised by IEC TC57 WG10 followed.

- SNMP MIB to be optional: it was generally agreed to make management mechanism optional.
- Accept masters without C37.238 TLV: generally agreed, if 802.1Q tags remain to be mandatory
- 802.1Q support to be optional: after extensive discussion it was suggested that a compelling reason for changing the standard is required. Input from IEC TC57 WG10 is needed.

An update will be provided for the Sept 16-20 meeting of the IEC TC57 WG10.

Craig Preuss suggested that explanations on changes to the standard to be included. There was a general consensus that this would be useful. This information could possibly reside in an informative Annex or an introduction.

Discussion on ISPCS 2013 presentation followed. It was suggested that a proposal should be made by the Working Group officers.

HTF25: <u>Review of C37.94</u>

Chair: M. Benou
Vice Chair: D. Jenkins
Output: Recommendation on formation of a Working Group
Established: January, 2013
Estimated Completion Date: December, 2013

Assignment: Determine if a working group should be formed to revise C37.94 or write a new standard to cover single fiber applications of C37.94 technology.

Task force HTF25 met with 8 people. Seven of the attendees have agreed to become members if the task force becomes a working group. After introductions, it was explained that the task force chair had stepped aside because he did not expect to be able to continue to come to the PSRC meetings. Marc Benou, with the approval of the H subcommittee, agreed to take over as chair.

The task force discussed if the task force should become a working group and if so, what the output of the working group would be. It was agreed by all in attendance that a singlemode version of C37.94 was needed. It was also agreed that a teleprotection to mux protocol should be included, to match C37.94, but a point to point scheme should not be included in a standard but added to an annex.

A list of manufacturers was passed around of several possible manufacturers that could supply SFP singlemode heads that would support the C37.94 data rate. It was agreed that the group should not move forward unless more than one manufacturer could be found.

The initial intent of the TF was to proceed with a new standard that would focus only on a singlemode version of C37.94. The hardware requirements would be changed leaving the protocol the same. We proposed calling it C37.94.1. Chris Huntley pointed out that a better approach would be to come up with a revision to C37.94 to include all the changes rather than create a new standard. After doing some initial checking about possible conflicts with the dual logo status with IEC, the group voted unanimously to revise C37.94 rather than create a new standard.

Dylan Jenkins volunteered to vice chair the task force and potential working group.
The chair, with the help of Roger Ray will contact PSCC to determine that group's desire to participate in the revision.

The task force will request to become a WG from the H subcommittee at their meeting on 9/11/13. The goal is to have PAR submitted to IEEE by the January meeting.

The TF spent the rest of the time working on material for the PAR.

HTF26: <u>COMTRADE Conformity Assessment</u>

Chair: R. Cornelison
Output: Recommendation on formation of a Working Group
Established: May, 2013
Estimated Completion Date: September, 2013

Assignment: To explore the feasibility of developing a test plan for conformity assessment of the C37.111-2013 standard to support the ICAP proposal.

The Task Force met on Tuesday September 10, 2013 with 9 members and 6 guests.

Ravi Subramaniam of IEEE-SA made a presentation on ICAP (IEEE Conformity Assesment Program) and how it could be used to certify compliance with the new COMTRADE standard.

Discussions included whether or not conformity assessment was needed, whether a test plan was needed, and just what should be tested. The task force could not reach a consensus whether a formal compliance assessment through IEEE ICAP is useful to the industry. That determination is best left to the IEEE ICAP program based on the market need and is outside the scope of the task force. However, it was decided there is a need to develop a test plan for testing COMTRADE files for conformity to the standard. By a vote of 5 for, 1 against and 3 abstaining, the task force decided to request that a working group be formed to:

Develop a plan that can be used to test COMTRADE files for conformity to the IEC 60255-24 Ed 2.0 2013-04 / IEEE Std. C37.111™ standard.

It is anticipated that two web meetings will be held prior to the next PSRC meeting.

HTF27: <u>Standard File Format for IED Configuration Data (COMSET)</u>

Chair: A. Apostolov
Output: Recommendation on formation of a Working Group
Established: May, 2013
Estimated Completion Date: September, 2013

The Task Force met on September 10, 2013.

25 people attended the task force meeting.

The meeting began with a brief review of the work performed by H5 and the ideas behind it.

Four use cases were briefly presented highlighting the need for the development of a standard file format for exchange of protection relay and IED configuration data between different engineering tools.

The participants very quickly reached a conclusion that there is a need for a standard file format. This was followed by discussions of the assignment of the future working group.

This is the agreed 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.

20 people expressed interest to become members of the future working group.

Chris Chelmecki accepted to become Chairman of the working group.

Dylan Jenkins accepted to become Vice-Chairman of the working group.

Liaison Reports

PES Substations Committee

S. Sciacca

No report

PES Communications Committee

D. Nordell

No report

IEC TC 57 WG 10, 17, 18, and 19
Ch. Brunner

IEC TC57 / **WG10** will meet in September in Mackinaw Island, MI, USA. WG10 has currently the following projects:

1. Finalisation of Edition 2 of IEC 61850:
All parts except part 2 (Glossary) and part 3 (EMC and environmental requirements) have been published as second Edition. Part 3 is in finalization while the work on part 2 has only started.

2. Preparation of an Edition 2.1 of IEC 61850 for some of the major parts
The work to create the Edition 2 based on the UML model of the IEC 61850 logical nodes and data is delayed. We expect to have first drafts of the Amendments officially circulating early next year.

3. Technical reports that are under preparation
   - IEC 61850-90-3 – using IEC 61850 for condition monitoring has been circulated as DC. The comment resolution was prepared.
   - Work on IEC 61850-90-11 – modelling of logics, IEC 61850-90-12 – Wide area network engineering guidelines, IEC 61850-90-14 – Using IEC 61850 for FACTS data modelling and IEC 61850-90-16 – System Management is ongoing.
   - A technical report IEC 61850-100-1 on functional testing is in preparation.
   - A technical report IEC 61850-7-500 about the usage of the Logical Nodes to model applications for substation automation has been circulated as DC and the comment resolution was prepared. A similar report IEC 61850-7-5 explaining the more generic concepts is in preparation.

4. An additional task force addresses issues of Alarm handling.

5. Recently, SCL has been extended to provide an enhanced way to describe structured functions. A new task force "function modelling" started to work on defining functions for substation automation.

6. The new work to define mapping between DLSM/COSEM (IEC 62056) data and IEC 61850 has been accepted. A new task force had a first meeting to prepare a TS IEC 61850-80-4 addressing that topic.

7. Response to user feedback
   The task force "user feedback" has prepared the framework to handle feedback from users of the standard. The task force started to address the feedback from ENTSO-E. Additional feedback from CFE is expected.

8. A new task force has been created that will work on a mapping of Modbus data on IEC 61850. The scope is similar to what is in preparation as IEEE 1815.1 for the mapping of DNP3.

IEC TC57 / **WG17** will meet in October in Geneva, Switzerland and is working on the following topics:

1. Technical reports that are under preparation
   - IEC 61850-90-8 – use of IEC 61850 for modelling of Electrical vehicles has been circulated as a first DC. DTR is in preparation
   - IEC 61850-90-6 – use of IEC 61850 for distribution automation, IEC 61850-90-9 – Storage batteries, IEC 61850-90-10 – Schedules and IEC 61850-90-15, Modelling a generic electrical view of DERs: First WG drafts are available.

2. Mapping on web services

The WG prepared a draft TR IEC 61850-80-3 with the requirements on webservices for various applications. Based on these requirements, the WG is now evaluating various solutions.

IEC TC57 / **WG18** will meet in October as well in Geneva together with WG17. The WG is working on the following topics;

1. IEC 61850-90-13 – Extension of IEC 61850 information models to also include logical nodes and data models for steam and gas turbines

2. Interoperability tests for hydro equipment based on IEC 61850 and Communication network structures in hydro power plants

IEC TC57 / **WG19** with regard to IEC 61850 works on the preparation of IEC 61850-90-2 – Use of IEC 61850 for communication towards the control centre. The comments on the circulated draft have been addressed and will now be integrated in a second draft.

IEC TC57 / **General**:
TC57 had its plenary meeting in March 2013 in Nice, France. The next plenary meeting will be in November 2014 in Tokyo, Japan.

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 11, 2013 with 27 members in attendance – a quorum was achieved.

- Approved minutes of ISC meeting held in Baltimore MD in May 2013

- Items of Interest:
    - Working group agendas should be emailed to the working group one full week ahead of the PSRC meeting
    - Working groups that are working on Standards/Guides must maintain minutes for meetings and conference calls, including member roster with affiliation
    - A working group that completed their assignment and continues on to write a transaction paper need not have a quorum
    - Working group roster updates are due September 20
    - The Standards Association will be implementing a Public Review Period for Standards
        - Duration is 65 days
        - A new web site will be established
        - Draft standards will be available for purchase
        - Balloting will be concurrent with the SA ballot
        - Will be included in myProject
        - Plan is to go live in July 2014
    - Working groups that are working on standards may provide guests with draft copies of the standard, but they must be returned to the WG chair at the end of the session
- Administrative items:
    - Working group Chairs are asked to keep their Vice-Chair informed of activity in the event that the Chair is unable to attend the working group meeting
    - Double sessions are discouraged and should only be held when necessary; it is very difficult to schedule these without conflicts with other meetings of interest to members
    - Do not cancel a working group or task force meeting. If necessary, notify the Subcommittee officers one meeting ahead so other arrangements can be made, such as a substitute Chair
    - Email items to post on the I web page to Fred Friend, copy 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 Tuesday, September 10, 2013 with 7 members and 8 guests. Minutes from the May meeting in Baltimore 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. Reports were given on the status of each. Mal suggested the working group check that acronyms have a definition in the database during our review.
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.
The official name to be used when referencing the dictionary is the "IEEE Definition Database.
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 working group chair have access to the dictionary database through their MyProject account. They can also give permission for 3 additional officers: Vice Chair, Secretary, and Technical Editor.
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.
Requested a time slot on Wednesday morning after all of the working group meetings at 11 a.m.; some folks do not have access to dictionary, make I2 liaison your working groups technical editor so that they can access the dictionary. Chair, Vice Chair and Technical editors are the only three allowed for each project in the dictionary.

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 11, 2013 with 4 members & 4 guests. The Chair reviewed for the attendees the status of standards documents under development, which had been sent to WG members and recent guests in advance:

- 60255-27 Safety Standard for Measuring Relays – FDIS has been circulated multiple times to WG for inputs to support USNC vote to IEC, due this week. Based on feedback received, the US will vote in favor and has no comments (vote in favor cast after meeting). At this meeting, the WG attendees explored the nature of this design standard, in the context of the overall program of TC 95 standards for design of relays, electrical environment capabilities or behavior, and the more recent suite of functional standards.
- 60255-149 CDV – *Thermal electrical relays* – FDIS by Murty Yalla's MT4 has been unanimously accepted by national committee vote and became an IEC Standard on July 30. This document has been reviewed in multiple versions and circulations for several years.
- Request for Smart Grid Protection experts for new WG (95/307) – A new Ad Hoc Group AHG2 "New protection requirements for the smart grid" has been formed and will be having its first meeting in Hyderabad, India on Dec 2, 2013. The Convenor is Norbert Rochow of Germany. It has 7 members; Murty Yalla will participate for the USNC.
- 60255-121 Functional Standard for Distance Relays – after years of development in which PSRC participated, the FDIS is currently in translation to French and will be issued for NC voting shortly.
- IEC/IEEE 60255-118-1 Ed. 1, Part 118-1 Synchrophasor for power system measurements – Convenor Ken Martin reports that work would likely restart at the January 2014 JTCM or shortly after, by which time the amended base IEEE C37.118.1 will be in a good state for IEC work.
- IEC 60255-187-1 - *Functional requirements for biased (percentage) differential relays* – The development of this standard involves three different parts:

  4) IEC 60255-187-1 Differential protection for transformers, generators and motors.

  5) IEC 60255-187-2 Bus Differential protection.

  6) IEC 60255-187-3 Line current differential protection.

  The work on IEC 60255-187-2 and IEC 60255-187-3 will be started only after CDV is issued on IEC 60255-187-1. A Committee Draft of 187-1 is expected in early 2014.

There was no TC 57 or IEC 61850 report available for the meeting. The Chair reported that TC 57 WG 10, which develops IEC 61850 parts, will meet the week of September 17 at remote Mackinac Island, MI.

I5: <u>Schematic Representation of Power System Relaying</u>

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.

Working Group I5 met on Tuesday afternoon with 10 members and 11 guests in attendance. Vice-chair Richard Young presided over the meeting as Keven Donahoe was not able to attend. Following introductions, it was announced that the draft report has been approved by a majority of members, but with a number of comments that must be addressed.
A line by line review was performed of a red line version of the document, showing changes were made to the draft. The following items were discussed which require further revisions:

- "Protection Zone Drawings" needs to be added to Section 2.3 and described as a Type of Drawing, and to Section 2.4 in the Drawing Hierarchy. Rich Young will look at revising these sections.
- Don Ware noted that the boundaries of the Zones of Protection are determined by the physical locations of CTs. It was suggested that CTs should be shown on the Protection Zone Diagram so bvious where the boundaries overlap. Don will take a look at this.
- On a One Line Diagram, where multiple relays share a common CT secondary, without special coding marks it is not always possible to identify which CT secondary is being measured by a particular relay.
- Not only the full winding CT ratio, but also the actual tapped connected ratio might be shown on the one line, if this information might be maintained on the drawing reliably even when changes are made in the field.
- Alex Apostolov mentioned the importance of showing consistent communication and configuration details between devices. He asked the workgroup how 61850-type implementations are described. For example, are goose messages shown on the one line? How are logic configurations shown and is there described a unique naming structure? Members responded that several methods are described which include logic diagrams, communications diagrams, message tables, spreadsheets with bitmaps and input/output lists and descriptions.
- Specific Manufacturer references must be removed from the example drawings so that generic schemes are shown. Figures 30 through 35 need to be modified to exclude manufacturer names and model numbers.
- It was mentioned that drawing methods or symbols must be suitable not only for commissioning new projects, but also for operating and troubleshooting for the life of the installation.

I7: 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 I7 held its meeting in a single session on Tuesday, September 10, 2013. This was the fifth meeting for this working group.
There were 5 members present and a quorum was reached. Nine guests attended the meeting. Membership stands at 10 members and 4 corresponding members.

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

May 2013 meeting minutes were reviewed. Meyer Kao motioned to accept the May 2013 minutes and seconded by Mark Schroeder. WG members voted to approve the minutes.

Draft 3.0 was previously distributed to working group members by posting to the WG site on IEEE-SA Central Desktop.
Remaining comments were reviewed and resolved from sections 9 through 11.

Mark Schroeder is the liaison from the I2 WG Terminology Review. Mark will review the document to see if any terms/definitions need to be added to section 3.

Gary Kobet will request Renee Stoll to modify Figures 25 and 26 in section 12.2 to move the location of the X0 bushing to above the neutral CT (because these figures address transformers with externally accessible neutral CTs).

The WG Chair will be scheduling WebEx's over the next four months to review each section and finalize the document.

When this is complete, the WG will request permission from the I-SC to submit the document for sponsor ballot.

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 Turquoise, Hotel Albuquerque at Old Town, Albuquerque NM on September 10, 2013. Fourteen members and four guests were present. A quorum was achieved.

Definitions "synchroscope", "resistive voltage transformer" (RVT), and "resistive potential device" (RPD) were approved by the Terminology Usage Review working group I2.

The IEEE-SA invitation to create a ballot body opened on August 19, and will close on September 19. All working group members are to sign up for this balloting body.

The draft for MEC was uploaded on August 15 (D5.9) and the review completed on September 4, with some changes to the formatting to indicate that it is a draft. Also, need to obtain copyright permissions; Erin Spiewak will provide the links to the forms needed. MEC discovered that Section 6.3 is missing.

The document will be corrected into the correct format. The working group requests sponsor ballot at I SC and at the Main Committee meeting.

Brian Mugalian will file a PAR extension by the October 21 deadline for the December 2013 IEEE SA-SB meeting. When ballot comments are received, Brian will forward them to Phil Winston for the SA-SB meeting to determine the length of the PAR extension.

Del Weers asked about Annex C and Annex D. The WG voted to remove Annex D (grounding survey) and place its summary elsewhere in the guide; also Brian Mugalian will check on whether to keep Annex C (NEC 90.2).

I10: Revision of C37.98 Standard for Seismic Testing of Relays

Chair: Marie Nemier/Suresh Channarasappa
Vice-Chair: Munnu Bajpai
Output: Revision of IEEE Std. C37.98

Working group I10 C37.98 did not meet, ballot comment review is in progress.

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"

There were 5 members and 1 guest present. Did not have a quorum, the minutes of the previous January meeting were reviewed but could not be approved.

Bruce discussed the Agenda, and the current Draft distributed by Farnoosh 8/31/13.

Brian led an overall review of the 8/31/13 document and highlights sent by Farnoosh, and updated the current Draft 2 of the document. Comments were made and a new draft will be created for the January meeting.

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 I12 working group, chaired by Michael Wright, met on Tuesday, September 10, 2013 with 8 members and 14 guests.

Minutes from the May meeting in Baltimore were reviewed and approved.

The group conducted business as follows:

- Updated status of writing and review assignments.
- Assigned new assignments for first draft review.
- Changed wording in selected areas.

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 did not meet.

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 10, 2013 at 11:00am MDT in a single session with 8 members and 20 guests. After introductions, the previous meeting minutes were reviewed.

The chair stated he had conversations suggesting that instrument transformers be added to the assignment. Some concerns were raised, such as instrument transformers not being included in the scope of the PSRC. The assignment was not changed at this time; however, reference will be made in the report regarding instrument transformers for the awareness of those reading the document.

The writing assignments were reviewed and changes made to the document. Additional assignments were issued to add or revise portions of the document. Some of the details are given below:

Roy Moxley will write a section on manufacturer's processes to remove or reduce infant mortality failures. Bruce Mackie will find source for comment stating "results are statistically meaningful only for a group of at least 30-60 similar devices…"

Rick Gamble will write section on incompatibilities/ non-interoperability with other technologies.

Roy Moxley will write section on lack of support/spare/parts by vendors.

Robert Frye will contribute to the section on cost of maintenance or repair compared with replacement.

The body of the reliability section will be removed and rewritten. Tony Seegers will contribute to this section.

Bob Beresh will contribute information on Regulatory compliance as well as create checklist.

I23: <u>Revision of C57.13.1 – Guide for Field Testing of Relaying Current Transformers</u>

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 Alvarado B, Hotel Albuquerque, Albuquerque, NM, on September 11, 2013 at 9:30 am. Eight members and 6 guests were present.

Patent Conflict slides were shown.

May 2013 minutes not approved due to no quorum. Minutes will be emailed to the WG for approval.

Comments to the Scope used in the PAR were discussed. The revised Scope will be emailed to WG members for a vote and no later than October 21 for SASB meeting.

Changes made to the PAR included an update to the scope and introduction. After a discussion on the inclusion of the word "safety" it was concluded to remove from the scope and ask for clarification on adding it in the introduction.

IEC 61869-10 will be included in the introduction.

The new guide would include in each section the subtopics:

1. Safety
2. Type of test

3. Acceptable methods
4. How to interpret the test results

Discussion of the writing assignments took place. Rene Aguilar provided input on 12.5, 8.2, and 12. These changes were discussed and will be added with modifications to the revised guide. Jason will work these into the guide.

Conference call will be set in early December if the PAR is approved to prepare for the January meeting.

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 I24 met on Wednesday, September 11, 2013, at Albuquerque, NM in single session chaired by Jim Niemira with a total of **10 attendees** (4 members and 6 guests).

It was determined we did not have a quorum at this meeting (there are 10 members on the WG; quorum would be 5 in attendance), so we will need to get approval via email from the rest of the members in order to approve the minutes from the May meeting.

IEEE patent information slides were shown.

Mark Taylor gave a presentation on the characteristics, advantages, and limitations of the CSA-1V Hall Effect Sensor by explaining the information found in the manufacturer's technical data sheet. This device was presented as an example of a typical sensor for illustrative purposes.

Jim Niemira will send C37.92, C37.235, and C37.241 to active working group members to use as references when writing this report.

We went over C37.92 – the guide on low level signal inputs, because in the guide it refers to optical sensors and discusses the current sensing ranges of the sensors and their associated magnitude and phase errors. We agreed that a reference to this guide and discussion in our report is appropriate. Sensing devices other than optical that have the same interface should work with relays that have interfaces compliant with this standard. We should indicate or include references from this guide in our report.

We agreed to review C37.235 – Guide on Rogowski Coils, because the format for the guide may provide a better outline for our report.

We reviewed the outline of the report, added/modified technical sections, and issued more writing assignments. **Writing assignments are due to Jim Niemira by November 15.** We are hoping to have a fleshed out first draft ready for the January 2014 meeting in New Orleans.

We reviewed the Introduction writing assignment submitted my Jeff Long and George Semati, and determined it needed more information in order to better summarize the entire report.

Reports from the TF Chairs

ITF25: Commissioning of Substation Protection and Control Devices

Chair: Rafael Garcia
Vice Chair: Kevin Donahoe
Established: January 2013
Expected Completion Date:

ITF25 met on Wednesday September 11th with 11 signing up to be members and 25 guests. Phil Tatro and Phillip Winston representing the NERC System Protection and Control Subcommittee provided background information on the discussions at the SPCS that led to their request for IEEE/PSRC to create a document to address commission to provide guidance for the utility industry. The group also discussed IEEE Guide C37.333 Guide for Power System Protection Testing, which covers commissioning as well as other testing activities. Since very few members have copies of this standard it was requested that we obtain a copy of the standard to be shared with the working group members. There was a good discussion of what should be included in commissioning and pitfalls that need to be addressed. Bryan Moore and Heather Melson presented outlines of what their respective companies review during commissioning. At the end of the discussions, it was the decision of the taskforce to request to the subcommittee that a working group be created to more specifically address commissioning of Protection Systems.

ITF26: Review and Expand Transaction Paper on Mathematical Models of Current, Voltage, and Coupling Capacitive Voltage Transformers

Chair: Amir Makki
Vice Chair: TBD
Output: Report: Recommendation to update or expand transaction paper
Established: January 2013
Expected Completion Date: January 2014

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.

ITF26 met on September 10, 2013 with fourteen attendees with four indicating interest in becoming a member. Jeffrey Pond chaired the meeting for Amir Makki.
The task force discussed updating or expanding the existing transaction paper on Mathematical Models for Current, Voltage, and Coupling Capacitor Voltage Transformers." Mladen Kezunovec suggested it may be a better idea to write a new paper covering changes since the original transaction paper was written. This paper could also include non-conventional transducer models or the non conventional transducers could be a separate paper.
Mladen Kexunovec recommended that the task force research papers on the mathematical models for conventional CT, VT, and CVT transformer models since the transaction paper was written and to also research non-conventional transducer models to make a determination if there is enough new contributions to write a new paper. The task force has the following assignments:
Mladen Kezunovic to research papers on conventional CT, VT, CVT transformer models since the transaction paper was published.
George Bartok and Dean Sorensen to research papers on non-conventional transducers (optical, Hall effect, Rogowski coils, etc.) models since the transaction paper was published.

Liaison Reports

a. Instrument Transformer Subcommittee

August 27, 2013
Memo :
To : Jeff Pond, I Subcommittee Chairman
CC : Lee Bigham, ITEC
RE : Instrument Transformer Sub Committee, Liaison Report

Good Morning,

The Instrument Transformer Sub Committee fall meeting will be in St. Louis October 20-24, 2013.

There are two active working groups. One is writing a new standard for CTs with a mill-amp secondary output. It is nearly ready for vote.

The second 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.

NERC – Phil Tatro will present this report at the Main Committee

Coordination Reports
None

Old Business
None

New Business

I12 Quality Assurance for Protection & Control Design scope rewording required: Mal and Andre will propose a new scope. The wording "as-built" may require clarification and review of the IEEE Dictionary.

Scope:***"To develop a special report outlining ~~the best recommended~~ the practices of quality assurance for protection and control design drawing packages from conception to final "as-built".***

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 11, 2013 with 16 members (achieving quorum 16/29) and 29 guests. There was a call for the approval of the minutes of the May 2013 meeting in Baltimore. These minutes were approved by the subcommittee members with the following revisions: J6 Vice-Chair is Dale Finney, J10 final report was Draft 11 and was published as C37.96-2012.

Reports from the WG Chairs

J2: Protection Considerations for Combustion Gas Turbine Static Starting

Chair: Mike Reichard
Vice Chair: Zeeky Bukhala
Established: 2005
Output: Report to the Subcommittee
Completion: 2009
Status: Final

Assignment: Deliver a paper or report on special protection requirements on generators employing load commutating inverter (LCI) static starting.

The Working group did not meet at this meeting. The report is published on the PSRC website. Mike Reichard will send Draft Transaction paper to J SC members for review and comment, then to PSRC officers for review and comment. We will review this in January. No meeting for the next session.

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

Chair: Sudhir Thakur
Vice Chair: Mukesh Nagpal
Established: 2011
Output: Report
Expected Completion: December 2014
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 Working Group met for a double session with 21 members and 24 guests present. The minutes of Baltimore meeting were approved.

Working group chair presented a draft of the email to Chair of SPCS of NERC on working group's concern with section 3.13 of the NERC TRD Power Plant and Transmission System Protection Coordination, which says, "Out-of-step protection should not be applied unless stability studies indicate that it is needed and should be applied in accordance with the results of those studies." This was an action item for the Chair from the Baltimore meeting. There was very good discussion on this subject. The draft of the email was approved and the Chair has emailed the same to the Chair of SPCS of NERC.

Gene Henneberg made presentation on double blinder and concentric circle schemes, and associated calculations. Juan Gers made a presentation on Loss of Synchronism Characteristics. Phil Tatro made a presentation on Stability Studies. All the presentations were excellent and were very well received. There was good discussion on these subjects. The presenters will be revising their sections based on the discussions and feedback from the attendees.

Chair will be following up with working group members for completion of the assignments, new assignments for writing the remaining sections, and also for reviewing the sections which are already drafted. November 22, is the assigned date for completing and submitting these assignments.

A double session with space for 50 persons and a computer projector is requested for the January 2014 meeting. The sessions need to be scheduled so as not to have conflict with K4 working group, as K4 chair Mukesh Nagpal is vice chair of this working group.

J6: Protection issues Related to Pumped Storage Hydro Units

Chair: Joe Uchiyama
Vice Chair: TBD
Established: 2009
Output: Transactions Paper
Expected Completion: TBD
Status: Ninth 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, September 10, 2013 at 9:30 a.m, in Albuquerque, NM with five (5) members and eight (8) guests. Chairman welcomed to WG J6, and briefly explained the purpose and goal of this WG. Also, he had distributed sheets of this meeting agenda & Baltimore meeting minutes.

Chairman reported the status of on-the IEEE survey, and discussed the following topics:
Topic-1 (Survey results) - The survey results show 28 over 49 were responded. However, Chairman explained that 49 were based on the total installations owned by 24 utilities. WG thought this was a good turn-out.
Topic-2 (Non-responded utilities) – Chairman also brought up an issue to the WG what to do with the rest of non-responded utilities. Those utilities may have some reasons (company policies, IT issues, etc,) for not responding to the survey. Analysis of survey results - WG members thought 28 responders were good enough to our analysis for a paper.
Topic-3 (Copy of 1975 Paper & survey results) – Chairman will send the copy of 1975 transaction paper & survey results to WG members & guests. This may take a little time since we are expecting one more responder.
Topic-4 (Content of Paper & assignment of each section) - WG discussed the contents of "Paper" and assigned write-up of sections to members.

The assignments are following WG members:
Abstract –Joe Uchiyama & review by Wayne Hartman
Introduction – Joe Uchiyama & review by Wayne Hartman
Methods of Starting in the Pumping Mode – Zeeky Bukhala
Protection Requirements – Dale Finney & Will English
Figures (five as shown in 1975 paper & new figure with µ-processor relays) - Bob Pettigrew
Tables of Elements used by utilities in according to the survey results – Joe Uchiyama & Dale Finney
Analysis/summary of the survey - Joe Uchiyama & review by WG members
Some discussions/recommendations on the significant issues from the survey - TBD

The assignments are due November 15, 2013 for January 2014 meeting.

Next meeting will be 15 people and one session with a computer projector.

J7: <u>Avoiding Unwanted Reclosing on Rotating Apparatus</u>

Chair: Mike Reichard
Vice Chair: Steve Conrad
Established: 2011
Output: Report to Subcommittee
Status: Sixth Meeting

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

The working group met with 9 members and 21 Guests on September 10, 2013 in the Albuquerque Hotel at Old Town, Albuquerque NM

The discussions focused on the recent presentation by Gene Henneberg on Stiffness Ratio and how it could be used to "filter" the areas of concern as an initial screening. The WG will revise the present material to include the use of stiffness ratio to aid in the need for potential mitigation.

Dale Finney agreed to contact Mark Zeller of to discuss his work on the SEL paper on "Islanding Detection Logic" and report to the WG.

Dale Finney will provide an essay on the mitigation technique Rate-of-Change-of-Frequency.

The applicability of the Cyber aspects of the concerns related to attacks is to be discussed at ad com to determine relevance to the WG.

Next meeting requirements: Single meeting, room for 20, computer projector.

J12: Improved Generator Ground Fault Protection Schemes

Chair: Russ Patterson
Vice Chair: Dale Finney
Established: Jan 2013
Output: Report to subcommittee
Status: 1st Meeting

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

The task force met on 9/11/2013 in Albuquerque, NM with 21 members and 17 guests in attendance.

The chair announced that the engineers from CFE that developed a sequence voltage based scheme for acceleration of tripping for generator ground faults have tentatively agreed to come to the New Orleans meeting and give a presentation on their method and its performance history.

Afterwards there was lively discussion on several topics that will likely be reviewed in view of being incorporated or clarified in C37.101 and C37.102. Topics included accelerated tripping for ground faults, turn-turn fault detection, intermittent ground faults, and resonant (Peterson coil) grounding. Several misoperations of existing protection schemes were described by attendees that highlighted the need for secure and dependable generator ground fault protection.

Four working group members (Hasnain Ashrafi, Normann Fischer, Dale Finney, and Mani Sankaran) accepted an assignment to review the CFE papers to learn their accelerated tripping scheme and summarize it for the next meeting. Also, all working group members were given the assignment to read the collected papers in preparation for our next meeting.

The working group will have its 2nd meeting in January 2014, with the need for a single session, computer projector and seating for 35 people.

Task Force JTF9: Plant Issues Associated with Black Starting of Generators

Chair: Chris Ruchman
V Chair: Zeeky Bukhala
Established: September 2012
Output: Report to Subcommittee
Expected Completion: 2014
Status: Third Meeting

The task force met on Tuesday, September 10, 2013 with 7 members and 14 guests.

Assignment: TBD

Resources available for more information on black start were discussed. The Chair reported that the literature search is ongoing and should be complete prior to the next meeting. C. Mozina reported that the Stan Horowitz “blue book” did not contain references to black start. Chair will contact J. Gardell on his review of the GE training course documentation for similar references.

Chair provided a short presentation of a GE 7FA black start case study.

For the next meeting, T. Sawatzky will attempt to provide a typical hydro one-line. The Chair will provide a typical combustion turbine one-line and W. Hartmann will provide a typical reciprocating engine one-line. Chair will forward these to the group prior to the next meeting.

Based on the review of these one-lines it was generally agreed that the Task Force will examine the three general categories of black start machines (hydro, engine and combustion turbine) for protective

elements within the plant that may be impacted during black start scenarios. Once the at-risk elements are identified, mitigation strategies will be developed.

Assignments should be submitted no later than December 20, 2013.
A single session is requested for the next meeting with provisions for 30 people and a computer projector.

J13 : Modeling of Generator Controls for Coordinating Generator Relays

Chair: Juan Gers
Vice Chair: Phil Tatro

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

WG Report
The working group met with 19 members and 11 guests present.

Mike Thompson, former JTF10 chair, explained the origin of the working group activity and desire for coordination with the ESCS and PSDP.

Minutes of the May 15, 2013 JTF10 meeting were approved unanimously.

The working group discussed the objective to develop a report to the J subcommittee, with the possibility for a transaction paper that includes guidelines for setting generator relays under dynamic conditions.

The working group discussed liaisons. Trevor Sawatzky will be the liaison to ESCS. Phil Tatro will be the liaison to NERC. The chair will contact Claudio Canizares who previously offered to be a liaison to PSDP.

The working group discussed the need to clarify that this work is focused on getting to the next level by considering dynamic coordination, rather than only static coordination.

The working group will schedule web meetings to facilitate participation of ESCS and PSDP if representatives of those subcommittees are not able to attend. Web meetings will be established following the next face-to-face meeting. The working group may eventually schedule a joint face-to-face meeting depending on the level of participation from ESCS and PSDP.

The working group discussed potential activities necessary to complete its assignment and solicited potential contributors for each topic. Four initial subjects were identified:

1. Ashok Gopalakrishnan will present on available simulations tools and the availability of dynamic relay models.
2. The chair will contact Mike Basler or Rick Schaefer to present excitation limiters; specifically, why and how excitation limiters change dynamically with voltage.
3. Trevor Sawatzky will contact members of ESCS to formalize the participation of this subcommittee and provide an overview of ESCS activities that may be of interest to J10.

4. Phil Tatro will present work by the NERC System Protection and Control Subcommittee regarding apparent impedance trajectories during generator field-forcing.

The working group identified additional items for future consideration. Charlie Henville discussed the need to understand generating unit shutdown mechanisms, such as negative field-forcing and the sequence of tripping the turbine, excitation breaker, and generator breaker for various fault locations and abnormal operating conditions. Charlie will provide a paper on this subject.

Joe Uchiyama suggested the working group should develop information to help protection engineers understand whether a simulation, for example for a loss-of-field condition, is sufficiently accurate for setting relays.

The working group discussed the availability of system models that NERC has developed from the August 14, 2003 blackout and SPCS work on power plant and transmission system protection coordination. Phil Tatro will investigate availability of the models for this purpose.

The work of the group will be used to support revisions to C37.102, thus the working group will need to work quickly with a target to have a report in three years.

The requirements for the next meeting are a single session, a meeting room for 40 people, and a computer projector.

Other Reports:

C17: Fault current contribution from wind farm plants
Report provided by Gene Henneberg. Final report being coordinated between PSRC, Electric Machiery Committee, and T&D Committee

Liaison Reports

Electric Machinery Committee (EMC) C. J. Mozina
The Committee met at PES General Meeting in Vancouver, BC--- July 21-25, 2013. The minutes for this meeting have not been posted on the EMC web site. The minutes from the 2012 meeting were reported in detail in the May 2013 liaison report. One of the most important items that impacts PSRC protection standards is the update of C50.13 "IEEE Standard for Cylindrical-Rotor 50 Hz and 60 Hz Synchronous Generators Rated 10 MVA and Above" which is frequently cited in our generator protection standards. At the PES 2012 General Meeting a paper was presented by member of EMC Generator Subcommittee WG 8 that discussed the impact of NERC Grid Code (PRC-025) has on this standard as well as IEC 60034-3.

IAS I&CPS Committee **C. J. Mozina**
This report will be given at the main PSRC committee meeting. The written report is published under main committee liaison reports.

Nuclear 1E WG **P. Kumar**
IEEE 741 Nuclear 1E protection standard is being split into two standards, the PAR has been approved- the degraded voltage setting guidelines which was an annex in the original 741 will be now a new standard 742.

NERC (related to rotating machinery) **J. Uchiyama**
BES Definition Document (25 MW per unit/75 MW aggregate) – 66.11% approval
PRC-025 (Generator Relay Loadability) – 76.62 % approval
PRC-023-3 (Transmission Line Relay Loadability) – 93% approval
PRC-005-3(addition of 79) – 79.24% approval
PRC-027 (System Coordination, replacement of PRC-001)- ≡60%

Coordination Reports
None

Old Business

Discussion on C37.101 statement regarding "The importance of detecting ground faults close to the neutral point of the generator is not dependent on the need to trip because of fault-current magnitude, since it may be negligible and will not, in general, cause immediate damage. If a second ground fault occurs, severe damage may be sustained by the machine because this may result in a short circuit current not limited by the grounding impedance". WG J12 will include this in their work.

New Business
None.

K: SUBSTATION PROTECTION SUBCOMMITTEE

Chair: M. J. Thompson
Vice Chair: D. G Lukach

The K-Subcommittee met on Wednesday, September 11, 2013 in Albuquerque, NM, with 24 of 28 members and 33 guests in attendance. A quorum was achieved. Charlie Sufana motioned to approve the May, 2013 subcommittee meeting minutes. Gene Henneberg seconded. Vote was unanimous to approve.

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

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. Ten members and seven guests were present. After the introduction, a call for quorum was made and quorum was achieved. Motion for approval of the minutes from the May 2013 meeting was made and the minutes were approved.

The IEEE Patent disclosure slides were presented.

Mike Thompson updated the K1 group about the CIGRE working group on activities regarding protection of special types of transformers. The CIGRE working group has not made progress. They are looking for additional experts to join the working group, but they have not met in over a year. Mike Kockott agreed to provide the CIGRE liaison report in the future.

Lubo noted that Eli Pajuelo will have the short circuit simulation work prepared for the next meeting.

Diagrams prepared by Dean Miller were presented. Dean explained that his diagrams represent the four basic types described in the IEEE C57.135 Standard "IEEE Guide for the Application, Specification and Testing of Phase Shifting Transformers"

1. Single Core with half tap winding

2. Single Core with three two phase LTC units (Arvind Chaudhary will investigate whether the name "three two phase LTC" is correct)

3. Delta Hex

4. Two Core with wye-wye exciting unit.

The possibility of adding phasor diagrams to the single line diagrams was discussed. Dean will draft additional phasor diagrams.

Paul Elkin and Brandon Davies presented their contributions showing protection applications on three different phase shifting transformers. After discussion, Paul and Brandon agreed to update the applications.

Arvind Chaudhary will also discuss with the Transformer Committee whether the wording of the zero sequence current instead of being zero sequence impedance in Clause 5.4.1.2 is correct.

Two new members joined the working group.

K3: <u>Reducing Outages Through Improved Protection, Monitoring, Diagnostics, And Auto restoration In Transmission Substations)</u>

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 a proposed WG: December, 2014
1. Paper-Draft 10- FINAL; 2. Transactions Summary paper- 0

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. 11, 2013 with 4 members and 4 guests

Introductions were done and previous minutes were discussed.

Approval of the paper was discussed, with email approvals at 78%, no negative ballots, three members not responding to final minor editorial revision.

Expectations are to request permission from the "K" Subcommittee to send the full paper to the Main Committee for posting to the Report Section on the website, and then start the Power Delivery Transactions Summary Paper.

Paul Elkin to start formatting into Transactions format.

K4: <u>(PC 37.95.2002): GUIDE FOR PROTECTION CONSUMER UTILITY INTERFACE</u>

Chairman: Mukesh Nagpal
Vice Chair: Chuck Mozina
Established: 2008
Output: Guide Revision
Draft 12
Expected Completion Date: 2014

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

The WG met in double session on Tuesday Sept.10. A total of 9 members and 9 guests were present. A quorum was achieved. The minutes of the May WG meeting were approved as written. The chair opened the meeting with a discussion of the progress to date and the path forward. Since the May meeting the document was submitted for IEEE SA balloting. The standard received greater than the 75% required response and a 98% approval rate. There were two negative ballots and a total of 92 comments many of which were editorial. At the meeting one negative ballot was resolved with minor changes to the document. Some of the comments that resulted in the second negative ballot were discussed and resolved. Because of the number of comments associated with the second negative ballot a WG Webinar is planned with the individual who authored the comments to resolve the negative ballot.

The PAR will expire at the end of 2013 and a one year extension will be requested by the Chair so the WG can complete addressing balloting comments and conduct a re-circulation ballot. Plans are to conduct the re-circulation ballot prior to the January 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 : 1.0
Expected Completion Date: Dec. 2016

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

The K5 workgroup met on September 9th. Patent Slides were shown. Sign up sheets, agendas, and copies of Draft 1.10 were handed out. A quorum was met as 15 voting members attended the meeting. (14 attending voting members are needed to achieve a quorum.). The number of total attendees was 26 including both members and guests..

The minutes from the previous regular meeting in Baltimore were shown and approved. The minutes for two succeeding on-line meetings, one occurring on July 3rd, and another occurring on Aug 7, were each reviewed and approved. These minutes each include attending members names and also the new draft number/reference resulting from work at that meeting.

Roger announced that the newly revised scope statement has been approved by Revcom/IEEE.

The group discussed Jeff Long's topic of concern regarding Gen. Bkr Protection. The existing guide includes no talk about location of CT for gen bkr. Should there be a recommendation? Claire Patty recommended a new section for it. Jeff volunteered to write the section.

Mike Thompson and Dennis Teirney volunteered to do a special application section on generator bkr and will try to point out the special consideration on existing sections. Dennis mentioned that the schemes shown by the existing guide are not comprehensive as several BF schemes shown by standard C37.102 are not described or included in the BF Guide.C37.119.

Dennis presented a breaker failure event where a generator breaker failed mechanically, shaking violently during a pumping action. 15 trip-close operations were recorded within a several second window. Multiple cascading failures of both the original breaker, one of the primary relays, and also a backup breaker occurred.

During the continued line-by –line review the group discussed retrip. Roger mentioned that retrip design is dependent upon several tripping methods shown by new figure 21. These include respective tripping, cross tripping, or all-on-one tripping.

The group continued the line by line review up to and including Design Considerations for fault detectors. The title "fault detectors" was changed to "current verification, 50BF".

The group agreed to have more on-line meetings to continue to expedite the line-by line review. Roger will set up these meetings.

K6: SUDDEN PRESSURE PROTECTION FOR TRANSFORMERS

Chair: Randy Crellin
Vice Chair: Don Lukach
Established: May 2005
Output: Report (including utility survey)
Expected Completion Date: May 2014
Draft 5.0

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 11th, in a single session with 10 members and 8 guests. The working group currently has 13 members.

After introductions, the working group reviewed and discussed Don Lukach's writing assignment which was to consolidate several writing assignments from the previous meeting into Draft 4.0 of the document.

Our current plans are to finalize the document, resubmit to the working group for approval, submit to the subcommittee for review in October and then address the subcommittee responses during the January meeting in New Orleans.

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 Wednesday Sept 11, 2013 in Albuquerque, NM with 6 members and 2 guests in attendance. We covered the status of P1547.7 which is in the balloting process, P1547.8 which is close to being ballot ready, and progress on 1547.a which is an "amendment" to the IEEE 1547-2003 with focus on three areas:

- Voltage regulation (IEEE Std 1547 clause 4.1 General requirements sub-clause 4.1.1 Voltage regulation).
- Voltage ride through (IEEE Std 1547 clause 4.2 Response to Area EPS abnormal conditions sub-clause 4.2.3 Voltage)
- Frequency ride through (IEEE Std 1547 clause 4.2 Response to Area EPS abnormal conditions sub-clause 4.2.4 Frequency).

The amendment 1547.a including the new voltage and frequency ride through tables, was recently balloted and received a 91% affirmative rate (requirement is 75%) based on the total ballot pool numbering 277, with an 83% response rate (requirement is > 75%). A ballot resolution committee is being established by the P1547a Sponsor as per IEEE protocols.

With the 1547a amendment well on its way to completion, the testing standard 1547.1 will be amended as 1547.1a to provide testing and certification required for the new tables in 1547.a. Minutes for the1547.a and 1547.1a are posted on the SCC21 web site under 1547.a and 1547.1a "logistics" for anyone that would like to review them. SCC21 leadership plans to open the 1547-2003 standard for revision beginning Dec 2013 or Jan 2014. All revisions have to be completed by 2018.

We then had open discussion of recent DG activity in member regions. If you need a password for the active 1547.8 working group, email me at geraldjohnson@basler.com

K11: Open Phase Detection for Nuclear Generating Stations

Chair: C. Sufana
Vice Chair: M. Urbina
Output: Report

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 15 members and 20 guests in attendance.

The minutes from the May 2013 K11 meeting were read and approved.

Charlie reported on the NEI (Nuclear Energy Institute, http://www.nei.org) teleconferences that he has participated in and indicated that they have interest in our work. He indicated that there are several papers that he will send to the working group.

The next order of business was to revise the assignment and scope. After some discussion, the working group decided:

Assignment: Write a report to the K Subcommittee entitled Methods for Analyzing and Detecting an Open Phase Condition of a Power Circuit providing off-site power to a Nuclear Power Generating Plant.

Scope: The report will address the concerns that are presented by the NRC in report NRC Information Notice 2012-03 Design Vulnerability in Electric Power System involving an open phase.

The report will evaluate detection of open phase conditions that are theorized to occur in the three phase, high voltage power supply to primary windings of station auxiliary transformers that serve both balance of plant and emergency loads at nuclear power plants.

Additional wording may be added to include NEI wording and make sure comments are added that are for important safety related equipment.

The report will present findings as to how to detect an open phase condition that could impact proper operation of equipment important to safety in nuclear generating plants.

The report will address:

1. Schemes that can detect open phase conditions
2. Location of the detection schemes.
3. Loaded, unloaded, and lightly loaded cases
4. Transformer types (shell/core), and winding configuration and their effect on detecting an open phase condition

There was also a review of the proposed outline and there is a need for additional authors.

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

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.

K12 had its 2nd meeting on Tuesday Afternoon, September 10, 2013. 5 members and 6 guests attended.

Meeting minutes from May Baltimore meeting was approved.

IEEE patent slides were shown.

We reviewed assignments from May meeting, discussed briefly on SVC operation and in more detail on the use of protection CT, metering CT, CCVT and magnetic VT in the SVC application.

We discussed Martin Best's contribution in detail. It was determined that additional detail on how to evaluate CT capability should be added. As high as possible is not actionable guidance. Martin plans to have his write up reviewed by several SVC experts before the next meeting. It was also determined that separating the sections on CTs and VTs would help organization and flow.

Tripping philosophy and selectivity of protection systems was also discussed. An SVC system can usually operate in derated mode if not all of its major components are out of service. It is desirable to ensure selectivity of the various zone protections within the SVC installation.

We briefly scanned over draft section of Protection Schemes and Philosophy from the latest draft provided by the SC-I9 working group. We think some details of the protection description are either well covered in existing IEEE standards or out of the scope of this guide. We will need to discuss this issue with SC-I9.

Assignments are given to the working group members to prepare for the first joint meeting with SC-I9 in January.

1. Martin Best will revise the section of Instrument Transformers to incorporate good discussions during the meeting.

2. Definitions - John Wang will work with Roger Whittaker from I2 Terminology Usage Review working group for terminology definitions.

3. Dean Miller will review and revise Section 4 Protection schemes and philosophy of the working document provided by SC-I9.

4. Calculation of Fault Current – Eli Pajuelo will review and provides comments (assignment from May meeting, pending update)

5. SVC protection - Casilla Nestor provided some initial writing and we need to discuss with SC-I9 whether this section should be combined with Section 4 Protection schemes and philosophy.

6. Thyristor protection – Satish Samineni will provide initial writing (pending assignment from May meeting)

KTF13 PC37.116 IEEE Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks

Chair: Ilia Voloh
Vice Chair: Joshua Park
Assignment: Report to K-SC on the need to revise the existing C37.116 Guide

Task force KTF13 assignment was to investigate the need to revise or re-affirm "IEEE C37.116 -2007 IEEE Guide for Protective Relay Application to Transmission Line Series Capacitor Banks"

Chair Ilia Voloh started the meeting with Vice Chair Joshua Park

Task force met with 15 members present

KTF13 discussed comments received recently from Capacitors subcommittee. They insist on removing some sections which they think are irrelevant to our guide. They have IEEE Std 824™-2004 standard for series capacitors bank.

History of resolving comments for 2007 release were given by Dean Miller and Gustavo Brunello.

Members agreed to revise this guide and improve it. A liaison with Substation committee will be established so that all previous concerns will be addressed and to consider aligning 824 standard with the development of revising C37.116.

Also it was noticed that scope of the present C37.116 -2007 is not stated very clearly.

Therefore we are asking to form a working group to apply for a PAR. The JTCM of the PES in January will be an opportunity to meet Capacitors subcommittee members. This group will be chaired by Ilia Voloh and vice-chaired by Joshua Park.

KTF14 PC37.91 IEEE Guide for Protecting Power Transformers

Chair: Will English
Vice Chair: Steve Conrad
Assignment: Report to K-SC on the need to revise the existing C37.91 Guide

Albuquerque, NM. September 10, 2013

The KTF14 task force met for its first of two scheduled meetings on Tuesday September 10, 2013 with 20 members and 3 guests.

The chairman opened the meeting by expressing the desire to encourage attendees to become members of the task force and potentially members of the yet to be established working group.

The assignment of the working group is to consider whether to commence work involved to update / revise the existing C37.91 guide.

Material produced by Russ Patterson discussed the concerns with Annex A of the guide. The issues relate to the through fault duration curves. The TF discussed the possibility of whether to pursue corrigenda or include the correction in the process of updating the guide. Mike Thompson suggested that the TF work effort be considered in the pending workload of the SC to ascertain when/if to form a WG.

Steve Conrad suggested the TF members review the existing guide and to discuss this at the next TF meeting in January.

The chair will request that the SA make the guide available for TF members “for use in standards development”. This will allow the members to personally use the document.

KTF15: Centralized Substation Protection and Control

Chair: R. Das
Vice-Chair: M. Kanabar
Assignment: To explore the feasibility of a PSRC report describing the emerging technology related to centralized substation protection and control.

Meeting # 1 (September 11, 2013)

The task force met on September 11, 2013 with 38 participants. Chair provided the background for the formation of the task force. This was followed by the general discussion about the assignment of the task force. Some of the participants discussed the benefits of the effort and supported the idea to form a working group immediately. An overwhelming majority of the participants supported the idea to form a working group.

The participants then took initiative to discuss the proposed assignment of the proposed working group which reads as: Write a report to the main committee describing and analyzing existing and emerging technologies for centralized protection and control within a substation.

Old Business:

No Old Business was discussed.

New Business:

Working Group K3 submitted their report to the SC for balloting. The K3 chairman motioned to have the group start working on an IEEE Transactions paper. The motion carried unanimously for starting the Transaction paper.

The KTF13 chairman motioned to form a working group that will open C37.116 IEEE Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks for revision. The motion carried unanimously for a new working group. KTF13 will be K13, chaired by Ilia Voloh and Vice-chaired by Joshua Park.

The KTF15 chairman motioned to form a working group that will create a PSRC report describing the emerging technology related to centralized substation protection and control The motion carried unanimously for a new working group. KTF15 will be K15, chaired by Ratan Das and Vice-chaired by Mital Kanabar.

General Discussion:

No general discussion took place.