



**POWER SYSTEM RELAYING COMMITTEE  
OF THE IEEE POWER and ENERGY SOCIETY  
MINUTES OF THE MEETING –Final-Approved  
January 16, 2014  
New Orleans, LA**

**I. Call to order/ Introductions Roger Hedding**

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

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

**II. Approval of Minutes & Financial Report Pratap Mysore**

Motion to approve Minutes of the September 2013 meeting in Baltimore, MD was moved by Karl Zimmerman and seconded by Mike Thompson and was approved unanimously.

The financial status of PSRC is in good standing

**III. Chairman's Report Roger Hedding**

**No report**

**IV. Reports of Interest**

This was a joint meeting with T&D technical committees. PES officers Miroslav Begovic Jeffrey Nelson, Damir Novosel and reported on various initiatives of IEEE PES.

**A. Report from the Vice- Chair – Mike McDonald**

**a. Technical Paper Coordinator's Report.**

A hearty 'thank you' to all who volunteered to review papers for the 2014 T&D Expo and Conference and the PES GM2014.

The 2014 T&D Conference & Expo will be held April 14-17, 2014 at McCormick Place, Chicago, IL. We had 18 papers submitted and reviewed. 12 papers were accepted for presentation (10 posters, 2 IEEE Transactions).

The 2014 PES General Meeting will be held July 27-31 at the Gaylord National Resort and Convention center in National Harbor, MD (Washington, DC area). 77 papers were submitted for our review – 9 of these are IEEE Transactions papers, 68 are poster sessions. As of January 11<sup>th</sup> 51 papers have not been fully reviewed which must be done promptly to be able to notify the Authors of acceptance, revise/resubmit or reject by January 27<sup>th</sup>. Please complete you review promptly is you haven't already.

IEEE Transactions session chair is needed for our 4 hour (8 papers) session at the General Meeting. Please advice if interested in filling this position.

**b. Future Meetings**

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

## **B. CIGRE B5 Activities Report - Adamiak**

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

- Analysis and comparison of fault location systems in Substation Automation Systems – B5.52
- WG B5.53 - Test Strategy for Protection, Automation and Control (PAC) functions in a full digital substation based on IEC 61850 applications – Alex Apostolov chair
- Protection and Automation Issues of Islanded Systems during System Restoration/Black Start – B5.54

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

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

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

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

The US has 26 papers accepted for the 2014 conference.

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

For more information, check out the "new" CIGRE B5 webpage: [b5.cigre.org](http://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) met 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 Petroleum and Chemical Industry Committee (PCIC) of IAS is the sponsor of IEEE standard 1584, the key Arc Flash standard used by a majority of users. The WG responsible for updating this standard normally meets twice a year, once before the start of PCIC conference and again in conjunction with IAS Electrical Safety Workshop (ESW). The next meeting of the WG will be held on February 3, 2014 in San Diego, CA before the start of ESW. Testing on standardized enclosures has been completed. During the next phase, testing on actual equipment will be performed to validate the model and verify calculated results of the incident energy reflect the actual conditions in the field. Other factors being measured are blast pressure, sound, and intensity of illumination

## **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 Conveners.

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

- 60255-121 – Functional Requirements for Distance Relays – just voted and now approved as an International Standard. This creation has been a massive effort from many groups and individuals, but here we give special thanks to PSRC WG D21 headed by Alex Apostolov and Alla Deronja which helped the IEC Maintenance Team with the entire development and contributed to a technically excellent product.
- 60255-27 Safety Standard for Measuring Relays – Discussed here before; now approved as a new International Standard. The old 60255-5 on insulation requirements becomes obsolete.
- The new Smart Grid Protection Ad Hoc WG AHG2 “New protection requirements for the smart grid” held its first meeting in India in December. Murty Yalla participates for the USNC.
- IEC/IEEE 60255-118-1 Ed. 1, Part 118-1 Synchrophasor for power system measurements – Convener Ken Martin is restarting the joint IEEE-IEC project work at this JTCM meeting, January 16-17. It starts with the amended base IEEE C37.118.1.
- IEC 60255-187 - *Functional requirements for biased (percentage) differential relays* The Maintenance Team headed by Murty Yalla is close to issuing a Committee Draft of 187-1, *Differential protection for transformers, generators and motors*.

TC 95 will hold its 2014 plenary meeting in December in the US.

### **TC 57, Power systems management and associated information exchange**

TC 57 WG 10 continues development of parts of IEC 61850. Notably, all of the base parts have now been published in Edition 2 versions except the Glossary Part 2. There is a long list of new parts under development – the list will keep on growing and our industry creates new applications for power system protection, control, & monitoring – see the full detailed TC 57 Liaison Report from WG 10 Convener Christoph Brunner under the Subcommittee H Relaying Communications report.

## **E. Standard Coordinators Report – Phil Winston**

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

### **RevCom Activity:**

#### **Standards Approved**

C37.98 IEEE Standard for Seismic Qualification Testing of Protective Relays and Auxiliaries for Nuclear Facilities

#### **Standards submitted for approval**

PC37.118.1 Amendment to modify selected performance requirements of IEEE Standard for Synchrophasor Measurements for Power Systems

#### **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  
PC37.240 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; PAR Extensions (applied for or approved); Modified PAR submitted or approved; PARs Requested for Withdrawal; or PARs Administratively Withdrawn**

PC37.95- 1yr ext. Guide for Protective Relaying of Utility-Consumer Interconnections

PC37.116- rev	Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks
PC57.13.1- rev	Guide for Field Testing of Relaying Current Transformers
PC57.13.3- 2yr ext. Invitation	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases

**PARS expiring at the end of 2014**

PC37.95	Guide for Protective Relaying of Utility-Consumer Interconnections
PC37.114	Guide for Determining Fault Location on AC Transmission and Distribution Lines
PC37.240	Reserved for Standard for Cyber Security Requirements for Substation Automation, Protection and Control Systems
PC37.241	Guide for Application of Optical Instrument Transformers for Protective Relaying
PC37.243	Guide for Application of Digital Line Current Differential Relays Using Digital Communications

**PARS expiring at the end of 2015**

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

**PAR/Standard Submittal Deadlines & Standards Board Meeting Schedule:**

<b>Submittal Deadline</b>	<b>Meeting Date</b>
February 14, 2014	March 27, 2014
May 2, 2014	June 12, 2014
July 11, 2014	August 21, 2014
October 20, 2014	December 10, 2014
December 19, 2014	January 30, 2015

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

**Chair: C. Preuss**

**Vice Chair: Vacant**

**Secretary: Vacant**

**Working Group Reports (See below)**

- A. Meeting minutes template file was sent out to WG officers
- B. C0 secretary resigned
- C. Tutorial for DNP3 is being arranged for the Substations Annual Committee meeting being held in May in Portland, OR
- D. Awards were discussed
- E. New working groups
  - a. C18 P1613.2 AC surges on phone lines (TBD)
    - i. Chair: Marc LaCroix
  - b. C19 PC37.xxxx Cyber Security of files related to Substation Automation, Protection and Control Systems (TBD)
    - i. Joint WG with PSRC H22 WG that wants to expand the H18 report to cover everything in a substation
    - ii. May have a chair volunteer
- F. C0 is tracking PSRC TF K15.
- G. SUBS manuals are updated on the website.
- H. Resolution of an issue with a security requirement in IEEE 1686 will likely result in an amendment PAR
- I. WG C12 may need to change to a task force, liaison, or other sub group.

**C1: IEEE 1686 Standard For Substation IED Cyber Security**

**Chair: S. Sciacca**

**Vice Chair: M. LaCroix**

**Secretary:**  
**Output: Standard**  
**Expected Completion Date:**

Did not meet

**C2: IEEE 1613 Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations**  
**Chair: J. Tengdin**  
**Vice Chair: L. Smith**  
**Secretary:**  
**Output: Standard update**  
**Expected Completion Date:**

Did not meet.

**C2: IEEE 1613.1 Environmental and Testing Requirements for Communications Networking Devices Installed in Transmission and Distribution Facilities**  
**Chair: J. Tengdin**  
**Vice Chair: J. Ramie**  
**Secretary:**  
**Output: New Standard**  
**Expected Completion Date:**

Met to discuss the update of the standard to include any devices in T&D facilities, whether or not they have a communication port. Chair is working with other committees like T&D and PSRC looking for joint status for the new work.

**C3: IEEE C37.1 Standard for SCADA and Automation Systems**  
**Chair: C. Preuss**  
**Vice Chair:**  
**Secretary: Vacant**  
**Output: Standard**

Reviewed a submission on HMI ergonomics, discussed possible updates to 1613.

**C4: IEEE PC37.237 Time Tagging for Intelligent Electronic Devices (IEDs) – COMTAG**  
**Joint with PSRC**  
**Chair: M. LaCroix**  
**Vice Chair:**  
**Output: Standard**

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

**C5: IEEE C37.2 Draft Standard for Electrical Power System Device Function Numbers and Contact Designation**  
**Chair: M. Dood**  
**Vice Chair: B. Ackerman**  
**Output: Standard update**

1. Continued review of Edition 2 of 61850-5 and came up with additional acronyms that may be missing. TW for traveling wave devices and FL as a suffix for fault locator. It was also decided to combine 61850-5 and C37-2008 to see what gaps exist for updating in the new version of C37.2.

**C6 Standard for Serial SCADA Protection Protocol (SSPP) (P1711.2)**

**Chair: D. Whitehead**

**Vice-Chair: A. Wright**

**Output: Standard**

1. Discussed whether the umbrella standard can be P1711.1 or not, what to include in it, and that work on it will be accomplished under C6.

**C7 IEEE 1588 Profile for Power System Applications**

**Chair: T. Tibbals**

**Vice Chair: M. Dood**

**Output: Standard**

**Established: 2013**

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

**C8 IEEE 1615 Recommended Practice for Network Communications in Substations**

**Chair: Open**

**Vice Chair:**

**Secretary:**

**Output: Standard**

**Established: 2011**

1. Found a new chair
2. Reviewed present draft

**C9: IEEE 1646 IEEE Standard Communication Delivery Time Performance Requirements for Electric Power Substation Automation**

**Chair: J. Tengdin**

**Vice Chair: D. Holstein**

**Output: Standard**

**Established: 2009**

**Expected Completion Date: 2010.**

The C9 working group did not meet.

**C10: IEEE PC37.240 Standard for Cyber Security Requirements for Substation Automation, Protection and Control Systems**

**Joint Chair: T. Tibbals**

**Vice Chair:**

**Output: Standard joint with PSRC H13**

**Established: 2008**

**Expected Completion Date: TBD**

Met joint with PSRC H13. See PSRC report.

**C11: PC2030.101 IEEE Recommended Practice for the Design and Implementation of Time Synchronization Distribution Systems for Substation Automation**

**Chair: J. Bougie**

**Vice Chair:**

**Output: Standard**

**Established: 2012**

**Expected Completion Date:**

1. Reviewed present draft.

**C12: IEEE 1815 IEEE Standard for Electric Power Systems Communications - Distributed Network Protocol (DNP3)**  
**Chair: L. Smith**  
**Vice Chair: R. Farquharson**  
**Output: Standard**  
**Established: TBD**  
**Expected Completion Date: TBD**

1. Reviewed DNP3 technical committee work
  - a. technical bulletins and application notes published to date
  - b. response was reviewed to cyber security fuzz testing

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

The C13 working group did not meet.

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

Continued work with review of comments from ballot.

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

The WG reviewed the present draft and discussed when writing needs to be complete to meet or beat the PAR schedule. A presentation was made by Christoph Brunner.

**C16: PC2030.102.1 Interoperability of IPSEC Utilized within Utility Control Systems**  
**Chair: J. McQuire**  
**Vice Chair:**  
**Output: Standard**  
**Established: 2013**  
**Expected Completion Date: 2014**

The WG reviewed the present draft. NAT traversal may be incompatible with the present draft. May need to add some context to decisions made to arrive at some setting selections.

**C17: P1711.3 Standard for Secure SCADA Communications Protocol (SSCP)**  
**Chair: M. Hadley**  
**Vice Chair:**  
**Output: Standard**  
**Established: 2013**  
**Expected Completion Date: 2014**

The WG reviewed the present draft developed from the source files.

## **G. NERC Report - Phil Tatro**

### **1. System Protection and Control Subcommittee (SPCS) Activities**

- a. Power Plant and Transmission System Protection Coordination: The SPCS is in the process of updating this report to address input from the IEEE PSRC J3 working group and stakeholder comments.
- b. Order No. 754: The Section 1600 Request for Data or Information associated with FERC Order No. 754 is in progress. Single-point-of-failure data for buses operated at 200-300 kV is due March 3. The NERC SPCS is presently reviewing data for buses operated at 300 kV and above.
- c. Order No. 758: The NERC Planning Committee approved the SPCS report recommending minimum maintenance activities and maximum intervals for sudden pressure relays in response a FERC directive. The report will be used by the Protection System Maintenance and Testing drafting team in development of PRC-005-4.

### **2. Standards Activities**

- a. Protection System Maintenance and Testing:

PRC-005-2 – FERC issued Order No. 793 on December 19, approving PRC-005-2, while directing revision to one Violation Severity Level (VSL) and directing NERC to submit an informational filing on the development of a guidance report concerning the commissioning of power system protection systems. NERC appreciates the efforts on the I25 working group in helping to address this concern.

PRC-005-3 – This version of the standard addresses the FERC directive in Order No. 758 to include certain autoreclosing relays in the maintenance and testing standard. The standard was adopted by the NERC Board of Trustees on November 22 and is pending filing with the appropriate regulatory authorities.

- b. Protection System Misoperations: The drafting team has completed its assessment of comments from the previous ballot and revised the draft standard PRC-004-3. The standard will be posted for a 45-day comment period and concurrent ballot.
- c. System Protection Coordination: A ballot of PRC-027-1 concluded on December 31. The draft standard achieved approval of 65.71%. The drafting team is developing responses to stakeholder comments and revising the draft standard.
- d. Generator Relay Loadability: PRC-025-1 and associated changes to PRC-023-3 have been filed with the appropriate regulatory authorities and are pending regulatory approval.
- 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.
- g. Disturbance Monitoring: A ballot of PRC-002-2 concluded on December 16. The draft standard achieved approval of 43.29%. The drafting team is responding to comments and revising the draft standard as necessary. A comment period for the Cost Effective Analysis Process (CEAP) was held from November 1 through December 2. To collect additional industry feedback, another 30-day comment period is open through February 7.



- h. Stable Power Swings: The NERC Standards Committee has approved moving forward with Project 2010-13.3 in response to a FERC directive in Order No. 733. Drafting team nominations closed on January 10, and the Standards Committee will be appointing the drafting team this week.
- i. Standards Applicability for Dispersed Power Producing Resources: Project 2014-01 is being initiated in response to a stakeholder-submitted Standards Authorization Request (SAR) to review applicability of NERC Reliability Standards to dispersed power producing resources. Drafting team nominations closed on January 10, and the Standards Committee will be appointing the drafting team this week.
- j. Undervoltage Load Shedding: This project will consolidate four existing standards into one revised standard, PRC-010-1. The drafting team is developing responses to stakeholder comments from the informal comment period and is revising the draft standard. The standard will be posted for a 45-day comment period and initial ballot.

## 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 B1 Working Group met on January 14th, 2014 in New Orleans, LA with 7 of its 7 members. The group didn't meet in September. There are no minutes to review. Don Lukach, Vice Chair of K SC accepted his nomination as WG B1 Vice Chair. Candidates for Outstanding Working Group awards were reviewed and nominations were selected. With no additional business to discuss the meeting was adjourned.

The following awards were presented at the Main Committee meeting:

**D2:** Revision of C37.104 Transmission and Distribution Reclosing Guide - Chair: Gary Kobet  
**D11:** Effect of Distribution Automation on Relaying - Chair: Fred Friend  
**D21:** Supporting IEC Standard for Distance Relay Characteristics - Chair: Alex Apostolov  
**D22:** Performance Testing of Transmission Line Relays for Frequency Response - Chair: Tom Wiedman  
**H2:** Relay Applications Using the Smart Grid Communications Infrastructure - Chair: Mark Simon  
**H7:** IEEE 1588 Profile for Power System Applications - Chair: Galina Antonova  
**I9:** Reaffirmation of C57.13.1 Guide for Field Testing of Relaying Current Transformers  
 Chair: Brian Mugalian  
**I20:** Revision of C37.90.1 - IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus - Chair: Tom Beckwith  
**J3:** Power Plant and Transmission System Protection Coordination - Chair: Phil Waudby  
**J10:** PC 37.96 Guide for AC Motor Protection - Chair: Prem Kumar  
**K8:** Guide For the Protection of Shunt Capacitors - Chair: Pratap Mysore  
**I3:** Relay Functional Type Testing - Chair: Jerry Jodice

### **B2: Fellows Awards**

**Chair: C. Henville**  
 No report.

**B3, Membership Activity Report**  
**Chair: M. Swanson**

**Assignment:** Assist in searching for new attendees.

**Requesting support from attendees' employers.**

Attendance during the New Orleans joint meeting was 235, which is considered a healthy number for us.

8 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.

No 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**

No report

**VI. Items from the Main Committee meeting:**

- A. Normann Fischer, Didier Giarratano, Zhiying Zhang were announced as the new Main Committee members announced
- B. Solveig Ward was inducted as a Fellow of IEEE.

**VII. SUBCOMMITTEE REPORTS**

**C. SYSTEM PROTECTION SUBCOMMITTEE**

**Chair: J. O'Brien**

**Vice-Chair: G. Henneberg**

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

The C System Protection Subcommittee met on Wednesday, January 15, 2014 in New Orleans, LA with 26 (of 38) members and 45 guests in attendance. Quorum was reached.

Minutes of the September 2013 Subcommittee meeting were approved.

C Subcommittee has three new members: Sukumar Brahma, Joe Mooney, and Ian Tualla C Subcommittee also had three members withdraw their membership: Ken Berhendt, Hyder Docarmo, and Gary Kobet.

10 Working Groups and 2 Task Forces met at this meeting.

PSCE liaison report: Nothing to report.

PSSC liaison report: Nothing to report.

## **Reports from the WG Chairs**

### **C2 Role of Protective Relaying in the Smart Grid**

**Chair: Apostolov, A.**

**Vice Chair: Moxley, R.**

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

The working group met on January 15, 2014 in New Orleans. 15 Members and 13 Guests were present.

We discussed membership lists as we have more than 44 members listed so a quorum is impossible to achieve. Cleanup may need to be made upon balloting.

Formatting of the report was modified and a "Conclusions" section was completed to prepare the report for ballot.

Alex Apostolov and Eric Gunther accepted assignments to determine where the report should be publicized and presented.

Joe Xavier accepted an assignment to create a presentation for the report.

The present draft of the report will be sent for balloting this week.

Due to the possibility of a need to resolve objections we would like a room at the next meeting for 50 people and a projector.

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

**Chair: Antonova, G.**

**Vice-Chair: Gharpure, V.**

**Output: Guide C37.244**

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

Working Group C4 met on Jan 14, 2014 in New Orleans, LA in a single session with 16 attendees (9 members and 7 guests). The group completed its assignment; the main task is to produce a summary paper.

After introductions, Working Group Chair presented the status of the paper: latest draft D3.0 is dated Jan 12, 2014. A few assignments were not submitted, these are due by the end of January.

Discussion on whether to produce an IEEE transaction paper (8-page limit) or an IEEE conference paper (5-page limit) followed. After extensive discussion it was decided to continue work on the transaction paper and pursue conference paper(s) later. It was agreed to produce a list of conferences to consider and have a teleconference on Feb 12, 2014 at 7am Pacific time to continue work on the paper.

Requirements for the next meeting: a single session, meeting room for 20 people with a computer projector.

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

**Chair: Rahmatian, F.**

**Vice chair: Myrda, P.**

**Output: Guide C37.242**

**Established: May 2010**

**Estimated Guide Completion: March 6, 2013**

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

The Working Group met on Jan 14, 2014 in a single session. The session was chaired by Farnoosh Rahmatian. There were participation from 9 members and 16 guests.

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

All participants introduced themselves.

The minutes of the January 2013, May 2013, and September 2013 WG meetings were reviewed. The minutes were approved upon motion by Allen Goldstein and seconded by Vasudev Gharpure.

Session Chair reviewed an updated PowerPoint presentation prepared to cover C37.242 at the industry events. This update included edits in response to several comments collected during the previous WG meeting review. Additional edits were made during the session with comments and contributions from WG members in attendance. The revised presentation will be used as part of a synchrophasor technology tutorial at IEEE-PES and other industry events (including IEEE-PES ISGT February 2014, IEEE PES T&D April 2014, and IEEE PES GM July 2014).

After discussion of the need and intent of a summary paper, the WG decided to develop a conference paper for presentation at a future IEEE conference (motion by Allen Goldstein to change target from a Transaction paper to a Conference paper.)

The attendees briefly reviewed the outline for an IEEE Conference paper. The chair assigned leads for each section to develop first draft by March 31, 2014.

The meeting adjourned at 10:45 AM.

A single session with a room for 40 people and a computer projector is requested for the May PSRC meeting. The meeting is requested for Tuesday morning, exactly the same time as this session in New Orleans to minimize conflicts.

Respectfully submitted,

Farnoosh Rahmatian and Paul Myrda, Chair/Vice-Chair

**C13 Undervoltage Load Shedding**

**Chair: Begovic, M**

**Vice Chair: Imai, S.**

**Output: IEEE Report**  
**Established: September 2005**  
**Expected Completion: May 2012**

The Working Group did not meet. Working Group is planning to meet in May 2014 to work on a transactions paper.

**C15 Design and Testing of Selected SIPS**

**Chair: Sykes, J.**

**Vice Chair: Hu, Y.**

**Output: Report on industry practices in design and testing of selected SIPS**

**Established: September 2008**

**Completion: December 2012**

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

The report will be primarily based on the published information and accessible utilities documents, with some information gathered from selected utility interviews and contributions from working group members.

**C16 Relay Scheme Design Using Microprocessor Relays**

**Chair: Lascu, R.**

**Vice Chair: Seegers, T.**

**Output: Report**

**Established: September 2008**

**Expected Completion: To be determined**

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

The working group met with 9 members and 15 guests in attendance.

The work focused on resolving comments of substance received during the recent working group review of the report. Changes discussed will be incorporated into the report and it will be recirculated for approval.

There are only two assignments outstanding:

Rich Hunt will make corrections to some drawings

Tony Seegers will compile the changes for the new draft.

**C17 Fault Current Contributions from Wind Plants (Joint WG with other committees)**

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

**Electric Machinery Committee (EMC): Ron Harley, Chair**

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

**Gene Henneberg, Vice Chair**

**Output: Report**

**Established: 2008**

**Completion date: 2013**

**Joint WG Assignment:**

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

**C-17 WG Assignment:**

To support the activities of the Joint Working Group on Fault Current Contributions from Wind Plants.

In the absence of the co-chairs, Dean Miller chaired the session. Steve Conrad took notes in the absence of Gene Henneberg.

The Joint Working Group met in conjunction with the PSRC meeting in New Orleans, LA on Monday January 13, 2014 with 16 members and 15 guests. Introductions were made and the assignment for the working group was presented. Minutes from the September meeting was discussed and approved after correcting a typo error.

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. The completed report is posted on the PSRC website.

Dean presented the paper at the Western Protective Relay Conference in October.

The WG meeting centered on the need to consider preparing a summary paper for sections 3.3 and 3.4 since there has not been any presentations of this material. Sections 3.1 and 3.2 have been presented. There was little interest in production of a summary paper. The group then entertained the discussion of producing a tutorial for presentation at either the T&D or PES General Meetings.

The following sections of the report were divided amount members for preparation of slides for the presentation. Some members volunteered for sections. Others, not in attendance, were nominated for unfilled positions. The following are the assignments:

1. Introduction-Dean Miller
2. Section 2 Wayne Dilling
3. Section 3 parts 3.1 and 3.2 Sukarmar Brahma; parts 3.3 and 3.4 Reigh Walling
4. Section 4-Steve Conrad
5. Section 5-Jim Niemira
6. Section 6-Charlie Henville and Ashok Gopalakrishnan
7. Section 7-Caitlin Martin
8. Conclusions-Dean Miller

It was requested that the PSRC Systems Protection Subcommittee be asked to entertain the formation of a task force to start the process to produce a guide for protective relaying application to wind plants.

Next meeting for the Joint Working Group is in conjunction with the PES General Meeting, July 27 - 31, National Harbor, MD.

Next meeting for the C17 PSRC Working Group is in conjunction with the PSRC meeting, May 11 - 15, Fort Lauderdale, FL.

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

**Chair: Deronja, A.**

**Vice Chair: Houser, K.**

**Output: IEEE Guide PC37.246**

**Established: September 2011**

**Expected Completion: December 2017**

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

Working group C18 met on January 15, 2014, with 10 members and 15 guests present. 2 guests joined the working group as new members. The quorum was not reached so minutes from the September 2013 meeting will be approved by email.

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

The Working Group proceeded to review the latest revision of the Guide's draft to review assignments not yet received. Writing assignments were made covering a few of the unassigned sections of the Guide's Outline or assignment of a second volunteer to provide section data assigned and not yet received (WG chair will contact the original assignees, to determine status prior to second volunteer proceeding with section). Thank you to active members for your participation and volunteering.

4.1. Joshua Park; not received (a second volunteer for this assignment is Joe Valenzuela).

4.2.1.1 – materials have been received.

4.1 - Doaa Galal – Comment: treat the renewable energy sources separately from other generation; possible new section (7.9); also incorporate knowledge learned from WG C17).

Section 4.2.2.1.f (Rich Young volunteered to handle integrating C17 work).

Section 4.2.2.1.g (Collector system volunteer Rich Young & Doaa Galal volunteered).

Section 4.2.2.1 j (tie ground grids or not tie grids – move to 7.3.8).

Section 4.2.2.1 m (PQ, Voltage Flicker and Harmonics are moved to subsection 4.2.1.2h Other Information (Assignment: Keith Houser to revise/update).

4.3 – Jim O'Brien; update – Work in progress.

5.1/5.2 Mukesh Nagpal; not received (a second volunteer for this assignment is Heather Malson).

Section 6 materials have been received.

Section 7.3.2 materials have been received.

Section 7.3.5 materials have been received.

The remainder of the previously assigned Section 7 materials has been received.

Add Section 7.9 Setting Considerations for Renewable Energy Sources [Assignment: No Contributor]. If anyone reading these minutes, has experience/expertise in this area and would be willing to volunteer for this writing assignment.

There was a comment to add a need of DME/DFE event reports availability for field events investigation and analysis. However, it was felt that this topic may be more appropriately covered in utilities' Interconnection/Interconnection Service Agreements (IA/ISA), whose discussion is specifically excluded from the Guide as indicated in its purpose.

The updated Outline, with the names of the writing contributors, will be sent out with the meeting minutes. The writing assignments are due April 1, 2014. Please email them to the chair of the working group ([aderonja@atcllc.com](mailto:aderonja@atcllc.com)).

Requirements for the next meeting are as follows: single session, meeting room for 40-50 people with a computer projector.

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

**Chair: Gharpure, V.**

**Vice Chair: Kanabar, M.**

**Output: Standard**

**Established: May 2013**

**Expected completion date:- TBD**

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

C19 Working Group met on Tuesday, January 14 in New Orleans with 6 members and 10 guests attending the meeting.

- Patent/IP slides were shown
- Introduction of WG C19 was presented including PAR, Assignment, Purpose, and scope
- There was no quorum. Minutes of previous meeting will be confirmed electronically.
- Status on progress on teleconferences / web meetings of the WG. Two functions (Data Forwarding and Time Alignment of Data) have been completed.

- The next few functions to be taken up by the WG were discussed. The group comments are recorded below.
- Data Validation
  - The WG should specify the definition of setting STAT word (especially for invalid / missing data). This would help detailed diagnosis and interoperability
    - Examples are invalid data, lost data, time quality degradation, data sorting etcetera.
    - More contextual information needs to be specified for STAT bits 15 and 14. Especially if data is invalid, the cause (if known), such as missing data, loss of PMU connection, etc.
  - It was proposed to use appropriate NaN, per IEEE standard on floating point numbers (IEEE 754-2008) has multiple definitions of NaN. □ A proposal was made to use the Quiet NaN
  - If the intention of data validation is to include checking PMU health and collecting relevant statistics, the group suggested to carry out data validation at input side (on received data) instead of output data.
- Communications
  - For PMU(s) that stop communicating over a long period, the group suggested that the WG should propose a mechanism to take out the PMU after missing multiple frames or multiple wait time periods. This may need an additional setting. The PDC need not wait for the data from that PMU thereafter.
    - In this case, PDC should attempt to connect with the PMU in case it comes online again.
    - If the PMU in question sends data sporadically, it may result in frequent drop out / drop in events. It may be necessary to require a minimum steady data input from the PMU for it to be pulled back in the output data stream.
- Protocol Conversion
  - Analyze the differences between the new STAT bits of the C37.118.2-2011 standard from 2005 version
  - Analyze the new items added in the CFG-3 frame, such as phase angle offset factor.
  - Refer to the report from WG H21 in the document as an informative Annex, highlighting major data representation / conversion mapping, e.g. Polar / Rectangular, stat bits, etcetera.
- Reporting Rate Conversion
  - Down conversion
    - For P-class data, decimation is fine and it is OK by definition.
    - For M-class, simple decimation may not be appropriate. In fact, it may be difficult to meet IEEE C37.118.1 (Clause-5) requirements without compromising on PDC data latencies.
      - Example was given for converting 60 Hz to 10 Hz.
      - Add details / examples on Latency v/s accuracy trade-off for M-class, possibly as an informative Annex.
    - Data modification flag, STAT bit-9, may have to be modified by the PDC in such cases.
    - Adding error/accuracy requirements for M-class down conversion may not be appropriate, as the data may pass through a hierarchy of multiple PDCs, and each PDC might add an error (which may be specified per PDC). At the end after multiple PDCs the accumulated error would be high.

## **C20 Impact of DC Transmission on Protective Relaying**

**Chair: Mooney, J.**

**Vice Chair: Tualla, I.**

**Output: Report to the PSRC**

**Expected Completion Date: May 2015**

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

The Working Group met with 23 attendees; 6 members and 17 guests.



WG chair provided some background material concerning the need for developing a document concerning the impact of HVDC transmission on AC system protection. He stated that Mike Bahrman of ABB has agreed to present at the May 2014 meeting.

The WG will investigate adding solar convertors to the report and will make a recommendation at the next meeting in May.

A WG member mentioned that application of VSC-based HVdc systems is a rapidly developing and potentially changing environment. As an example, he mentioned that a three-terminal system rated at 50 MW that incorporates offshore wind power was recently commissioned overseas. The system is planned to be expanded to five-terminals to interconnect and feed some local islands. It appears that no studies have been done to determine the effects on the AC protection systems. The WG will need to monitor these developments to see how they may impact the report.

The WG chair demonstrated a simulation of a VSC-based HVdc system using a real time digital simulator. The simulation showed the response of the HVdc system and its impact on the AC power system for fault close-in and remote to the HVdc converter. One of the attendees mentioned that we might want to look at a DC faults to see how the AC system would react.

The WG chair stated that the next couple working group meetings would have material presented to help the WG better understand HVDC systems. The WG has started developing an outline and plans to have it completed at the next WG meeting. The chair asked the WG members to think about content so that writing assignments can be made at the next WG meeting.

Next meeting: one session, 20 attendees, computer projector.

**C21: Guide for Design, Commissioning, and Management of System Integrity Protection Schemes (SIPS)**

**Chair: Hu, Yi**

**Vice Chair: Henneberg. G.**

**Established: September 2013**

**Completion: December 2018**

**Assignment:** Develop a "Guide for Design, Commissioning, and Management of System Integrity Protection Schemes (SIPS)".

Working group C21 met on Tuesday, January 14, 2014 in New Orleans, LA in single session chaired by Yi Hu and Gene Henneberg with 11 members and 9 guests attending. Four of these attending members signed up at this meeting.

Following introductions, working group attendees concentrated on the development of the Project Authorization Request (PAR).

The projected completion date was modified to comply with the maximum allowed four years from submittal of the PAR. The final date will be filled in as the PAR is submitted.

The agreed scope for the project is

This document provides guidance for design, commissioning, and management of System Integrity Protection Schemes (SIPS) based on information exchange among multiple 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.

The agreed project Purpose is

This Guide provides information to help properly design, commission, and manage System Integrity Protection Schemes (SIPS) including Special Protection Systems (SPS) and Remedial Action Schemes (RAS). The document addresses general concepts for architecture and

communication design to achieve functionality and performance requirements, principles for commissioning processes and strategies for management.

The agreed project Need is

Power system conditions requiring mitigation by system integrity protection may have unique problems. However, general design concepts, commissioning principles, and management strategies are applicable to a wide range of SIPS. This guide documents these concepts, principles, and strategies that have been applied in many deployed SIPS. Those working in designing, commissioning, and managing SIPS would benefit from the information provided in this guide.

The expected project Stakeholders will include:

Engineers and technologists working with electric power utilities, consultants and relay and telecommunications equipment manufacturers in general and those working in designing, commissioning, and managing System Integrity Protection Schemes.

The Working Group believes that the PAR is ready for review and approval of the C subcommittee and PSRC main committee.

Requirements for Next Meeting – Room for 25 People, single session, projector, power strip.

### **CTF23 Coordination of Synchrophasor Related Activities**

**Chair: Jim O'Brien**

**Vice-chair: Damir Novosel**

**Assignment:** The ongoing task force will provide three main functions:

- Liaison 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.

Task Force CTF23 met in its second meeting on January 14, 2014, in New Orleans, LA, in a single session chaired by Jim O'Brien with 22 attendees. 13 of the attendees signed up to be members.

Alison Silverstein gave an update from NASPI. NASPI is no longer funded by NERC but will be funded by the DOE at least through 2015. DOE and EPRI will reassess commitment and scope in 2015 as SGIG (Smart Grid Investment Grants) projects wrap up. The PSTT has been renamed to PRSVTT (Performance Requirements, Standards and Verification Task Team). Alison informed that Damir Novosel will be a liaison between NASPI and IEEE PES and Vahid Madani will be a liaison between NASPI and IEEE PES PSRC.

Allen Goldstein gave an update on the ICAP Synchrophasor Conformity effort.

Vahid Madani led a discussion about future work this group should undertake. The following three items were specifically discussed as needed topics:

- Data Archival
- Data Class Requirements
- Data Quality and Delivery

Information about these topics will be sent to the chair for further discussions at the next meeting in Ft. Lauderdale in May.

The chair led a discussion about the title of this group. At our first meeting we had decided to remain an ongoing Task Force similar to CTF3 that had been led by Charlie Henville. The chair suggested this task force be converted to a working group so it wouldn't always look like it was just starting up. Roger Hedding the PSRC chair had indicated the change would be acceptable. The task force agreed to the change in name which was subsequently approved by the C Subcommittee. Going forward, this group will be known as: C23-Coordination of Synchrophasor Related Activities

Damir Novosel had requested to step down as vice chair of the group due to his new leadership duties in PES. It was also pointed out by Mike McDonald (PSRC Vice-chair) that a Subcommittee chair could not chair a working group in that same subcommittee. Since Jim O'Brien is the C Subcommittee chair, a new chair was also needed. Anthony Johnson has agreed to be the new chair and he has been approved by the PSRC officers. A new vice chair will be in place prior to the next working group meeting.

Due to the change to a working group and the PSTT name change to PRSVTT, the following will be the information concerning this group:

New Working Group: C23: Coordination of Synchrophasor Related Activities will be chaired by Anthony Johnson with the following assignment:

"The working group will provide three main functions:

- Liaison with NASPI (North American Synchrophasor Initiative) (specifically the PRSVTT (Performance Requirements, Standards and Verification Task Team)) to keep the PSRC in sync with the changes and needs in the industry with respect to the development and usage of PMU devices. Formalize transfer process of PRSVTT developed documents to PES PSRC including making recommendations which PRSVTT activities should be transferred to IEEE reports, guides and standards.
- Make recommendations to PSRC for assignments that would require the creation of working groups in PSRC and also recommend what the output of those working groups might be (Guides, reports, etc.) based on the needs of the industry.
- Coordinate related activities with other IEEE PES committees".

#### **CTF24: Modifications to Fault Study Programs for Wind Turbine Generators**

**Chair: Sukumar Brahma**

**Vice Chair: TBD**

The task force met on 1/14/14 from 3 to 4:25 PM with 15 attendees. Sukumar Brahma made a presentation to summarize the relevant parts from the C17 report on Fault Contribution from Wind Plants. Attendees discussed the possible formation of a WG and its assignment. We will need at least one more meeting of the task force to discuss all the suggestions that came out during the meeting. Request a room of 25 with projector for May 2014 meeting.

Based on the discussion, these are some of the points that may go towards the creation of a WG report:

- What models the fault programs currently use for type 1 through 5 machines and wind farm equivalencing.
- Drawbacks of the models based on findings in the C 17 report.
- Models of WTGs and wind farm equivalencing suggested by C17.
- What data is needed from WTG manufacturers in order to implement the suggested models?
- As we suggest models, can we highlight how they can positively contribute to protection schemes proposed in C17?

Do we need to survey the industry folks to get their feel on how satisfied they are with the present models in the programs they use? We can probably get that feel from attendees.

#### **OLD BUSINESS**

The C13 WG has not meet for several PSRC meetings since both chair and vice chair have been unable to attend. However, Sinichi Imai, vice chair, expects that he may be able to attend in May. The WG will be scheduled to work on a transactions paper.

## **NEW BUSINESS**

The working group C17 - Fault Current Contributions from Wind Farms has determined that another related subject needs to be explored. This work will develop a "Guide for Protection of Wind Plants." They suggested a new Task Force be formed to explore that subject. Task force CTF25 will be as named above. Dean Miller agreed to chair the task force.

### **D: LINE PROTECTION SUBCOMMITTEE**

**Chair: G.L. Kobet**

**Vice Chair: K. Zimmerman**

**Scope:** Investigate and report on the relaying techniques and systems used for T&D line protection. Develop statistics and recommend protection practices for improving line relaying performance. Develop and maintain standards for line protection.

The Subcommittee meeting was called to order on January 15, 2014 at 3:00 p.m. with 28 members and 33 guests present.

Following introductions, a count of SC membership was made, and it was determined a quorum was present (28 out of 45 members present).

Minutes from the September 2013 meeting in Albuquerque, NM were approved.

The Chair reported items of interest from the Advisory Committee:

- Working groups are asked to schedule a third person (in addition to the Chair and Vice-Chair) as a backup to conduct WG activities, in case of absences or conflicts with other meetings.
- WG D25 technical report, Distance Element Response to Distorted Waveforms, has been accepted to be presented at the 2014 Georgia Tech Relay Conference.
- As WebEx meetings become more popular, WGs are reminded that a minimum 30 days notice is required for any WG meetings or activities.

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: MAY 2014**

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

D3 working group held its meeting on Tuesday January 14<sup>th</sup>, 2014, at 3:00 PM with 11 attendees, of which 3 are guests.

The final draft of the report is complete and the member of the Working Group will ballot the report by February 1<sup>ST</sup>, 2014. When the paper is approved by the member of Working Group, the paper will be submitted to the Line Subcommittee for balloting by March 1<sup>st</sup>, 2014.

#### **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: 7.1**

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

The D6 working group met on Tuesday, January 14, 2014 at 8.00 a.m. with 10 members and 12 guests present.

The final draft 7.1 of the report and the comments from the reviewers were circulated to the members before the meeting and the comments were reviewed. Most of the comments were resolved at the meeting.

The comments on the section 4.1 on Required Accuracy were discussed .John Miller who contributed to this section will review the section and make the necessary changes

Pratap Mysore will review Section 3.8 on mutual coupling. Normann Fisher will review the section 4.2.1 and clarify the questions raised on the calculation of zero sequence impedance of the line. All comments are due by 15 February.

The document will be modified based on these comments and the final draft will be sent out by 15 March for a final review. We are planning to get the final draft reviewed and send out to the members for approvals by next meeting.

**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: 4.0**

**Assignment:** Revise C37.113- 1999, Guide for Protective Relay Applications to Transmission Lines

The D19 working group met in a single session on Tuesday, January 14, with 17 of 21 balloting members present. All present voted to approve the minutes. Also in attendance were 1 corresponding member, and 23 guests. The balloting and correspondence member lists will be revised based on attendance.

The D24 input review team, led by Jeff Barsch, presented their recommendations. Their task was to review the D24 report and recommend input into this guide. Some minor changes to the recommendations were discussed and included adding information about magnetizing inrush current. Also, the team will add discussion to Section 6.6.5 to discuss over-current versus step-distance coordination. The writing assignment is due February 1, 2014.

The Section 5.11 review team, led by Claire Patti, presented their recommendations. The changes were accepted. Stub Bus protection was discussed and the team will add the topic to this section. The writing assignment is due February 1, 2014.

The SIR team, led by Mike Thompson, presented their recommendations. The submittal was discussed and includes very good technical information on SIR. The team leader will modify the submission to provide clarification for the technical detail. The writing assignment is due March 15, 2014.

The D27 input review team, led by Martin Best, is tasked with reviewing the D27 Working Group Draft Guide PC37.243 for input into this guide. Applicable PC37.243 sections include 5 and all of 4.1. The writing assignment is due February 1, 2014.

The Vice-Chairman will combine the various draft reports into a single new draft by April 15, 2014. The intent is to ballot the working group prior to the May, 2014 meeting and be ready to ballot IEEE by September, 2014. The PAR expires in 2015.

**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 13 members, 7 guests, for a total of 20.

The September, 2013 meeting minutes were approved as submitted.

Between the September, 2013 meeting and this meeting, the report was balloted by the D Sub-Committee. An initial 89% approval rating was achieved (40 approve, 3 disapprove, 2 no response). All specific comments were addressed in the report and discussed at this meeting.

Although not required due to the approval rating, the unanimous consensus of the working group is to submit the revised report to the PSRC officers for publication on the PSRC website. The Chairman will verify Table –of-Content page numbers and then send to the working group and to the PSRC.

The work is completed and the D Sub-Committee motioned and approved the working group to be disbanded.

**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: FINAL**

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

The technical report is complete and has been accepted to be presented at the 2014 Georgia Tech Relay Conference.

The working group did not meet. Subcommittee D motioned and approved the WG to be disbanded.

**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 given an opportunity to respond. There were no responses.

The Working Group met with 17 attendees; 12 members (9 balloting and three corresponding) and 5 guests. At the conclusion of the meeting 1 guest that had contributed material joined the WG. There are 17 balloting members, so quorum was achieved to approve the meeting minutes. However, 75% voting quorum was not achieved to approve the changes to the guide at this meeting.

The minutes from the Albuquerque meeting were approved.

The last remaining sections of the guide were reviewed by the attending members. All of the WG members that attended the meeting have approved the guide. Approval by four more balloting Members are needed to reach the required 75% approval vote. The WG chair will contact the remaining voting members via email to obtain their approval. It is expected that getting approval by voting members to reach the 75% consensus will be completed within the next two weeks. Therefore, the WG requested and the Subcommittee approved a motion to request approval of the Main Committee to proceed with balloting pending reaching the 75% WG approval.

**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.

WG D27 met on Tuesday, January 14, 2014 at 11:00am CST in a single session with 12 voting members and 16 guests. A quorum was achieved but not at the beginning of the meeting so the past minutes will be approved via email.

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

The plan to finalize the document was discussed. The chair and vice-chair will finalize the document within two weeks and send to the members. The members will be given two weeks to vote on the document and send comments. A webinar will be setup two weeks later to review the comments. The latest revisions of the document were reviewed and discussed. The following shows the major points:

The chair requested a terminology review from Andre Uribe who is assigned to review this document. The chair noted the scope contained a reference to troubleshooting which is not contained in the document. Don Ware agreed to write a contribution on this subject. The contribution will need to be complete within two weeks to meet the current schedule to finalize the document.

A discussion was had regarding the normative references. The references referred to in the paper will be listed as normative. The section in the Annex entitled “References” will be removed and the remainder of the information currently in the normative reference section and reference section will be moved to the Bibliography section.

The remainder of the document was reviewed and cleaned up including the acronyms section. A couple of previous reviews will be analyzed over the next couple of weeks to determine how to address them.

**D28: (PC37.230): Guide for Protective Relay Applications to Distribution Lines**

**Chairman: Brian Boysen**

**Vice Chair: Claire Patti**

**Established: 2013**

**Output:** C37.230 – Guide for Breaker Protective Relay Applications to Distribution Lines

**Draft :None**

**Expected Completion Date: TBD.**

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

The working group met in New Orleans, LA on Wednesday, January 15th 2014, 8:00am Central time with 19 members and 9 guests. The attendance list is attached.

The patent slides were presented.

The task force minutes from the September meeting were presented and approved.

The proposed PAR was presented and discussed. Claire Patti proposed a minor edit to the Scope. Brian Boysen made a minor change to the Need for the Project. The PAR was approved with no negative votes.

The additions to the guide were discussed and the following additions were proposed:

- Arc Flash
- Alternative current and voltage sources (no volunteers)
- Fault locating
- Distributed generation
- Distribution automation and Smart Grid
- Intentional miscoordination

Bruce Mackie and Brian Boysen agreed to write the section on Arc Flash. Brian will prepare a presentation to the WG for the May meeting.

Karl Zimmerman and Pat Carroll agreed to write the section on fault locating.

Gerald Johnson and Raluca Lascu agreed to update the section on distributed generation.

Ratan Das and Jack Jester agreed to write the section on distribution automation and Smart Grid.

Mike Meisinger pointed out that the reclosing and fuse saving sections need revision/expansion. Mike Meisinger agreed to revise these sections. Martin Best volunteered to help.

**All new writing assignments are due June 30. Word format is preferred.**

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

Assignments were made to review existing sections of the guide:

- Section 4: Fred Friend, Joe Xavier and Chris Walker volunteered to review. Fred will lead the group. Comments are due April 15th.
- Section 5: Mike Meisinger, Ljubomir Kojovic, Don Lukach volunteered to review. Mike will lead the group. Comments are due April 15th.

**Review comments on existing sections are due April 15<sup>th</sup>. Word format is preferred.**

**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 Wednesday 15<sup>th</sup> of January, with 27 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. Kevin Jones from XCEL Energy and Gene Henneberg from NV Energy both gave presentations at the meeting with respect to what they believed were missing from the report and what the new guide if approved should contain. After some discussion it was decided that it would be more useful to generate a “Tutorial on how to set OOS protection”, the tutorial will specifically focus on how to set impedance based methods of OOS blocking and tripping, since these are more prevalent at present. Other methods of detecting an OOS condition do exist, these will be mentioned in the report but it is not envisioned at present to discuss in great detail how to set these.

If a working group was approved to craft a “technical report” on this matter it was agreed that the working group would be chaired by Normann Fischer with Kevin Jones as vice chair.



## **DTF30: Investigate Need For Guide on Distance Element Response to Distorted Waveforms**

**Chair: Karl Zimmerman**

**Established: Jan 2014**

**Task Force Assignment:** Investigate the need to create an IEEE guide on the application of distance elements with distorted waveforms.

The task force met in New Orleans LA on January 14, 2014 with 18 attendees.

The TF chair recounted the activities of Working Group D25, a technical report to the Line Protection Subcommittee on distance element response to distorted waveforms. The technical report was completed in September 2013, and is scheduled to be presented as a paper to the Georgia Tech Relay Conference in May 2014.

There is high interest in continuing this activity, mainly to expand the applications and setting guidelines for specific elements including mho elements, quadrilateral elements (reactance, resistance, and directional) for various issues: CVT transients, CT saturation, transformer inrush, series-compensated lines, the impact of ferroresonance, and transients from faults. The group also discussed the possibility of incorporating other applications, like fault contributions from wind farms, the effect of nonlinear loads, and off frequency operation.

The group engaged in a lengthy discussion of the merits of creating an IEEE guide versus creating another technical report. The result of the discussion is that a report would be more accessible to the industry, and could eventually be transformed into a guide in the future.

We propose a new working group be formed.

**Proposed New Working Group Assignment:** Write a technical report to the Line Protection Subcommittee on the application and setting of mho and quadrilateral distance elements on transmission lines.

The D SC approved the formation of the new working group with Karl Zimmerman as Chair and Ted Warren of Southern Companies as Vice-Chair.

### **SC Motions to be made to Main Committee**

On request of the D26 Working Group, the Chair made the following motion to the Main Committee: "Mr. Chair, the Line Protection subcommittee requests approval for transmittal of the Guide for Determining Fault Location on AC Transmission and Distribution Lines, C37.114, to the IEEE SA for balloting, contingent upon 75% working group approval of the document. Provided the ballot is favorable, the proposal will be sent to the IEEE Standards Board for approval and transmittal to ANSI for adoption as an American National Standard."

The motion was seconded by Miriam Sanders and was passed by the Main Committee vote.

### **Coordination Reports**

None

### **Liaison Reports - Fred Friend**

The T&D Committee / Distribution Subcommittee met during the JTCM in New Orleans, 13-16 January 2014.

Their next meeting will occur during the PES General Meeting in Washington, DC, 27-31 July 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 sessions are planned for the 2014 T&D Conference & Exhibition in Chicago: '*Advanced Distribution Management Systems IT and OT Converge - Utility Operational Experience and why IT matters*', '*Distribution Operations with High-Penetration of Beyond the Meter Intermittent Renewables*', '*Trends in Advanced Outage Management*' and '*Restoring Distribution Grids from Natural Disasters using Smart Distribution Technologies*'.

Four panel sessions are planned for the 2014 GM in Washington, DC: '*Smart Distribution Applications*', '*Smart Distribution Analytics to Integrate Distributed Energy Resources and Microgrids for Flexible Distribution Grid Operations*', '*Advances in State Estimation for Distribution Networks – Panel #1*' and '*Advances in State Estimation for Distribution Networks – Panel #2*'.

Volt-VAR Control Task Force

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

Two panel sessions are planned for the 2014 T&D Conference & Exhibition in Chicago: '*Technologies for Advanced Volt/Var Control Implementation*' and '*Assessment Strategies and Benefits of Advanced Volt/Var Control*'

Dr. Murty Yalla will lead the effort to develop a tutorial

Distribution Management System (DMS) Task Force

Continued discussion regarding DMS issues and the output for the Task Force.

Working Group on Switching & Overcurrent Protection

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

Fred Friend, Chair

Casey Thompson, Vice Chair

Joe Viglietta, Secretary

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

Scope: To provide guidance for the placement of switching and overcurrent protection devices on non-network distribution circuits through 35 kV.

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

#### **Old Business**

None

#### **New Business**

None

#### **General Discussion**

None

#### **Line Protection operations of interest**

None

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 January 16, 2013 with 24 members of 38 total, comprising a quorum. 31 guests were also present. Minutes of the September 2012 Portland, OR meeting were approved without objection.

New procedures from SA for WGs involved in standards development were announced:

- WG rosters must list name and affiliation of each WG and voting member. This procedure is to be enforced at future meetings.
- No PAR extensions will henceforth be granted.
- A replacement or re-approval of a given standard must be in place prior to the expiration date of that standard.
- 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. The SC will need to maintain a list of standards and corresponding expiration dates for which the SC is responsible.

SC members are asked to consider the scope of the H SC and whether all of the WG are doing work that belongs under H SC.

WG chairs and vice-chairs are reminded to manage the rosters of their WGs.

SC members are reminded that a response to e-mail ballots is required.

WG business:

The H2 working group has completed its assignment and requested SC approval to disband.

*The SC voted unanimously to approve the disbanding of the H2 working group.*

The H7 working group has completed its assignment and requested SC approval to disband.

*The SC voted unanimously to approve the disbanding of the H7 working group.*

In the course of a previous e-mail ballot of the SC, 3 comments on the report from the H9 working group were received. Those comments were incorporated into the report, and H9 asked the SC to approve the report as revised. The WG will submit a proposal for the development of a tutorial based on the report.

*The SC voted unanimously to approve the report of the H9 working group.*

The H13 working group asked for SC approval to move to ballot subject to the condition that the WG approve its document prior to the May meeting of the H SC.

*The SC voted unanimously to conditionally approve the balloting of the draft standard of the H13 working group.*

*The SC voted unanimously to approve the creation of working group H23 with Rick Cornelison as chair, Eric Allen as vice-chair, and the following assignment: Develop an IEEE Guide for naming Intelligent Electronic Devices (IEDs) based on the report of Working Group H10.*

*The SC voted unanimously to approve the creation of working group H24 with Galina Antonova as chair and the following 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...*

Old business:

IEEE C37.94 has achieved dual-logo status as IEC 61850-85-1.

New business:

IEEE Standard C37.94 expires in 2018 and hence will need to be reviewed by H SC starting this year.

*The SC voted unanimously to approve the creation of the HTF25 task force to start the renewal process for this standard.*

## **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 7 members and 3 guests. After introductions, it was explained that the guide was submitted to RevCom and is on their March agenda. The members discussed forming a task force to discuss possible changes to C37.94.

### **H2: Relay Applications Using the Smart Grid Communications Infrastructure**

**Chair: M. Simon**

**Vice Chair: G. Antonova**

**Output: Report to the Subcommittee on title subject**

**Established: 2006**

**Expected completion date: September 2012**

**Assignment:** Create a working group report to the Relaying Communications Subcommittee that describes example protective relay applications that can make use of the communication infrastructure provided by the Smart Grid. Protective relay applications will include potential capabilities and the communication requirements necessary to provide suitable communication architectures, services, capabilities, and any other pertinent characteristics.

The working group has completed their assignment and has disbanded. The document has been posted on the PSRC web site.

The link is:

[http://www.pes-psrc.org/Reports/Protection\\_using\\_the\\_SG%20FINAL\\_10\\_1\\_2012.pdf](http://www.pes-psrc.org/Reports/Protection_using_the_SG%20FINAL_10_1_2012.pdf)

### **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 with 10 members and 12 guests in attendance. The patent policy slides were shown, and no issues were identified.

The WG discussed the issue of time tag attributes at some length – what data items are necessary in a time tag. Alex Apostolov made a suggestion to get a copy of COMFEDE (the most recent PSRC standard to include time tags) to distribute to WG members, for consideration as a starting point. Other issues, discussed at the September meeting, are still on the table and the volunteers did not make much progress in addressing them between meetings.

Jim Hackett will work with Kristi Gluchowski from IEEE SA to get us a copy of the COMFEDE standard. Due to new SA rules, this standard, as well as the work in progress of our group, can only be distributed to active working group members. Guests can see only copies of material, such as minutes, which are publicly available on the PSRC website.

Jim will distribute the COMFEDE standard, along with the work completed under the previous PAR, which was collated into IEEE format by Marc Lacroix, to the members. Members were asked to read both documents and we expect an on-line discussion to follow.

The meeting was completed in a single session, due to a conflict with the newly-created HTF-24 which met at 4:30. This was, however, adequate; and we intend to schedule future meetings for a single session to help PSRC officers minimize conflicts. More of the discussion and work will be completed via email.

#### **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 # 23

This standard is one of the critical standards identified by IEEE SA for Smart Grid activity.

The Group met on January 15, 2013, with 11 members present – 9 of them are voting members out of 17 voting members. Four guests were also present which include Krista Gluchoski (IEEE-SA). The minutes of the previous meeting held at Portland were approved.

Murty Yalla updated the working group about the status of IEC FDIS circulation which is expected before January 31, 2013. Krista Gluchoski from IEEE SA confirmed that C37.111 draft approval is in the agenda of RevCom meeting scheduled on Jan 23, 2013. If the IEC FDIS is circulated after the Jan 2013 RevCom meeting then the C37.111 draft approval will be moved to the March RevCom meeting. C37.111 PAR extension will be taken up during the January NesCom meeting.

Chair updated the working members about the summary paper submitted for IEEE PES summer meeting. Coordinators were identified for the summary paper to be submitted for relay conferences – Scott Anderson (WPRC), Jim Hackett (Fault and Disturbance Recording Conference at Georgia Tech) and Stan Thompson (Texas A&M Conference) graciously agreed to coordinate the activity based on the final paper for the IEEE PES summer meeting.

Ravi Subramaniam from IEEE suggested exploring certification of device and COMTRADE reader based on the latest standard. The issue was discussed during the working group meeting. It was decided to explore the issue further during the May meeting as this activity can also be taken up after the standard approval.

The WG will meet again in May 2013 to evaluate the progress of the standard publication and to discuss about the summary paper for different meetings/conferences.

**H5-a: Common Data Format for IED Configuration Data**

**Chair: J. Holbach**

**Vice Chair: D. P. Bui**

**Output: Report**

**Established: 2003**

**Expected completion date: June 2013**

**Assignment:** Define a common format for IED configuration data.

The WG H5 did not meet in Memphis. The working group report is in the process of being approved by the working group.

**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 18 members and 10 guests present.

The minutes from the September 2012 meeting were reviewed and approved with no comment.

Charlie then reviewed the report outline and assignments of the working group and led a discussion on the writing assignments that were submitted since the September 2012 meeting. Jim Bougie's assignment discussing typical substation networks was then presented.

Rene Aguilar next presented discussion on testing for the network reconfiguration time. Rene's paper described how to determine switch dead time and the network reconfiguration time. He also gave a brief explanation of the reconfiguration times based on RSTP (Rapid Spanning Tree Protocol) and STP (Spanning Tree Protocol).

Charlie presented a PowerPoint that he had just received from Mark Adamiak that discussed Parallel Redundancy Protocol (PRP) and High-availability Seamless Ring (HSR). Mark indicates that RSTP is slow for real time applications and self-healing communication networks are required. He describes a PRP Network Architecture that uses two separate Ethernet networks that operate in parallel and thus should a fault in one LAN occur, then communications is not disrupted. He also explained an HSR network that uses a single ring with each node having two interfaces.

Remaining writing assignments were reconfirmed and are requested to be provided by March 1, 2013.

**H7: IEEE 1588 Profile for Power System Applications**

**(Joint Working Group of Substations Committee C7 & PSRC H7)**

**H7 Chair: Galina Antonova**

**Substations C7 Chair: Tim Tibbals**

**Vice-Chair: Bill Dickerson**

**Output: Standard**

**Established: 2008**

**Expected completion date: December 2013**

**Assignment:** Develop an IEEE Standard "IEEE Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications" in close coordination with IEC TC57 WG10 and other technical committees with similar interests.

Joint WG H7/Sub C7 met on January 15, 2013 in Memphis, TN, in a single session with 22 attendees (11 members and 11 guests). Quorum was achieved. September 2013 meeting minutes were approved.

After introductions, co-chair presented meeting agenda and opened a discussion on summary paper.

Working Group paper was presented at multiple industry conferences in 2012. Next presentation is planned for Distributech 2013. Rene Midence volunteered to present, this was supported by the group. It was suggested to present the paper at the IEEE PES General Meeting in Vancouver. The paper shall not exceed 5 pages. It was agreed to generate a 5-page version from the existing 6-page version. Alex Apostolov volunteered to help. Volunteers were obtained for several presentations at industry conferences in 2013.

Co-chair invited participants to HTF-24 meeting. This group was tasked to investigate the need for IEEE C37.238 revision.

Co-chair invited attendees to participate in the revision of the IEEE 1588-2008 standard, to be started soon.

As Working Group completed its assignment, it was suggested to recommend to H Subcommittee to disband this Working Group. Christoph Brunner moved, Veselin Skendzic seconded. After discussion, a vote followed. Working Group vote passed unanimously with one abstention.

**H9: Understanding Communications Technology for Protection**

**Chair: R. Midence**

**Vice Chair: Vacant**

**Output: Report**

**Established: 2005**

**Expected completion date: June 2013**

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

The Working Group H09 met in the Salon Natchez, Memphis Marriott Downtown, in Memphis, TN, USA on January 15, 2013 at 9:30 am. Eight (8) members and thirteen (13) guests were present.

**Discussion**

For the benefit of new participants that attended the meeting for the first time, the chair provided an overview of the Report. The chair informed that that the report was submitted to subcommittee and it was approved with comments, which were already incorporated in the last document. The final document will be re-submitted as final after the meeting. Since most of the comments were editorial comments, all present agreed that the final document can be re-submitted after the meeting and request that the assignment is considered completed.

The chair indicated that contributions were received since last meeting in September 2012 for the production of a tutorial as recommended by the working group during the meeting of May 2012. The working group recommended discussing this initiative with the Sub-committee as it is not part of the original assignment for working group H09.

The chair also indicated that a draft of a promotional paper was produced and that it will be circulated for review. The promotional paper consists of a condensed version of Section 1 of the report with some content of the other sections.

The following members are listed as volunteers to work on the Tutorial: Juan Gers, James Ariza, Vajira Pathirana, Alfredo de la Quintana, Chris Chelmecki, Emmanuel Duvelson, André Uribe, Tony Bell and Ed McHale.

The chair requested more volunteers to produce slides based on the content of one or more sections. The chair explained that now that the report is completed, contributing should be a straight forward task of preparing presentation slides based on report content.

**H11: C37.118.1 Standard for Synchrophasors for Power Systems**

**Chair: K. Martin**  
**Vice Chair: B. Kasztenny**  
**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, January 16, 2013 at 8:00 AM in a double session with 10 members and 15 guests. The attendees were reminded of the applicable IEEE intellectual property rules.

The chair introduced the proposal from IEEE to restart the joint IEEE-IEC working group to develop the 60255-118-1 standard. The project was originally started 2 years ago but the IEEE withdrew from the project after a year. Murty Yalla explained that the IEC TC95 was proposing to develop their own synchrophasor standard if we do not go ahead with the joint project. The joint project will keep the organizations harmonized and allows IEEE direct participation. The work will probably involve 1-3 meetings outside the US and will take 2-3 years. After discussion, the WG voted unanimously with a scant quorum to proceed as a joint project. The group reviewed the current PAR and suggested a couple minor changes (which will have to be done on-line). Once done, the PAR can be submitted.

The chair introduced the other major issue that there are requirements in the current standard that are difficult or impossible to meet. Ken Martin and Allen Goldstein have each implemented the M class model presented in Annex C with which they are testing all the requirements for compliance. It has become apparent that the model does not meet some of the requirements, which is supposed to. In discussions with several vendors who are also trying to create projects that will meet the model, they have found similar problems. After a discussion, ken showed the results of his testing so far, which includes results that have been corroborated by Allen. The WG would like to correct these problems right away so they can produce PMUs that will comply with the spec rather than waiting for the full revision. Erin from IEEE-SA explained the means of modifying the standard using a corrigendum or an amendment. Either one only opens the PAR to a limited scope which is what the WG would like to do. Erin also confirmed that we can have one of these limited PARs open at the same time as a revision PAR. The WG elected to submit an amendment PAR that will only address a selected set of tables where the numbers are not reasonably realizable. In the meantime Allen and Ken will finish their tests using the reference algorithm and come up with a way to modify them to meet the requirements. This will be distributed to the WG, and include all vendors who want to participate. All will be able to provide their comments on the proposed or other changes. The proposals will then be considered by the WG; at the May meeting the WG anticipates being able to finalize the decision for ballot. The process can then be completed as quickly as the balloting and resolution process will allow, probably a total of 10 months.

The chair mentioned that the WG paper is almost finished, lacking only a conclusion. There was not enough time to consider what needs to be done to finish the paper.

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

**Chair: E.A. Udren**  
**Vice Chair: M. Zubair**  
**Output: Report**  
**Established: 2008**  
**Expected completion date: December 2013**

**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 January 16, 2013 with 8 members and 24 guests. The Chair went over Revision 12 of the report, in which detailed sections were moved to an appendix. Members and guests accepted specific assignments for supplying or reviewing specific sections of the report:



1. Introduction and overview of substation Ethernet (Rene Midence)
  - a. Add fibers
  - b. Add Functional mapping
  - c. Add 61850 example
2. Reliable redundant networks (Christoph Brunner)
3. Switches and routers (Richard Harada)
4. Large LANs (Mark Adamiak)
5. Security (volunteer TBD by Chair)
6. Practical design considerations (EAU)

The Chair will supply the new revision for editing by these and the other WG members by February 22.

**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.

Presentation was made by Steve Mix from NERC on the main differences between CIP version 4 and 5. This was well received by the group and forward referenced his more detailed presentation to the Main committee on Thursday.

All writing assignments for the document have been completed, except for Section 7, which was a recommended section by Stan Klein. Nothing has been created by Stan for this section, and it was brought up by Dan Nordell that in fact Stan has been ill, which is the reason we have not had communications with him.

We will plan on doing an email circulation of the document, to the WG members, to get comments to all completed sections, in addition to recommendations on keeping the final uncompleted section or dropping it from the document.

The WG would like the H subcommittee to consider giving conditional approval to move the document to sponsor ballot, given email approval of the final document by the WG. Without this conditional approval by the H subcommittee, sponsor ballot approval would be delayed until the Sept PSRC meeting, the next joint meeting between PSRC and Substations.

**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.

8 members and 14 guests were present.

After introduction of the attendees, Christoph Brunner reviewed with the participants the scope of the working group, including what CIM is and how it relates to COMTRADE and IEC 61850.

The outline of the document was later discussed. Some new volunteers are going to contribute to some sections of the document as reflected in the updated outline.

This was followed by a presentation by Christoph Brunner of his contribution on the relationship between IEC 61850 and COMTRADE based on the IEEE PSRC WG H5c report.

Some comments during the discussion included a proposal to add a table about extensions in COMTRADE based on IEC 61850. The use of this approach to support double ended fault location calculations based on COMTRADE files was also discussed.

**H19: C37.118.2 Standard for Synchrophasor Data Transfer for Power Systems**

**Chair: Ken E. Martin**

**Vice Chair: Gustavo Brunello**

**Output: Standard**

**Established: 2010**

**Expected completion date: December 2013**

**Assignment:** This standard defines a method for exchange of synchronized phasor measurement data between power system equipment. It specifies messaging including types, use, contents, and data formats for real-time communication between Phasor Measurement Units (PMU), Phasor Data Concentrators (PDC), and other applications.

WG H19 met on Tuesday, January 15, 2013 in a single session with 4 members and 7 guests. The quorum was not reached so the September minutes will be approved by Email.

The present status was reviewed. The standard was completed and published in December 2011. No new comments have been received on issues with the standard, so the WG anticipates there is no need to continue the WG for this purpose.

The draft IEEE Transaction paper on the Standard was reviewed. It has been completely reviewed and edited again since the September meeting. The WG reviewed and completed the conclusion, the only remaining part of the paper to complete. The paper will be balloted by the WG and then presented to PSRC for committee approval.

Further action by the WG in support of the WG for a PDC standard or other support of the 118.2 standard was discussed. It was decided to leave the issue open and postpone the dissolution of the WG until further action establishing the PDC WG has occurred. The WG also should remain in place until the paper has completed all the required reviews.

The WG does not expect to meet again.

**H21: Communications Mapping between IEEE C37.118.2 and IEC 61850-90-5**

**Chair: Yi Hu**

**Vice Chair: TBD**

**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 Monday, January 14, 2013 in single session chaired by Yi Hu and Allen Goldstein with 22 people attending.

After reviewing working group's assignment, the working group proceeded to discuss the scope of work of the report. Working group had agreed that the scope of work of the report shall include:

- Bi-directional mapping between IEEE C37.118-2005, IEEE C37.118.2-2011 and IEC 61850-90-5 standards, and
- Testing as part of the document

Mark Adamiak provided a presentation of an IEC 61850-90-5 implementation agreement that had been implemented by several vendors. After a brief discussion, the working group agreed that it will need more time to review and discuss the presented implementation agreement before developing a detailed outline of the report.

Working group chairs will distribute the current version of the IEC 61850-90-5 implementation agreement and the presentation to all meeting participants, who will review and provide feedback and comments before next working group meeting. Working group H21 will meet at next PSRC meeting in May 2013 to review and discuss received feedback, and discuss and develop an outline of the reports.

**H22: Guide for Cyber Security for Protection Related Data Files**

**Chair: Stephen Thompson**

**Vice Chair: TBD**

**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 January 15 2013 with 16 attendees

Introductions were made. Kevin Easley agreed to take the minutes.

H22 is providing a guide to file security that will be used in conjunction with the work completed by H18.

There was discussion of what H18 has completed. Example standards for cyber security include: NERC CIP-002 through CIP-011; NIST Cyber Security for Smart Grid; IEEE P1711 Cryptography for SCADA; IEEE 1686 Cyber Security for IEDs; IEC 61850 Security Impact on Automation; and IEC 62351 Data and Communication Security. Protection related data file types identified by the H18 Report include: Manuals, ratings, settings, measurements, access, testing, generator dispatch orders, maintenance schedules, and programs (p. 4).

H22 should consider analysis of risks by file type, and recommendations and observations.

Statement of purpose of H22: Develop a guide on security of data files for protection. The scope of this working group will be defined so that a PAR can be raised. It is clear that H22 will consider protection files only. A PAR must be produced by the chair by mid-February 2013 and discussed within the group by the first week of March, to get onto the June agenda for approval. See the H18 report, page 1 for its purpose: "3 Major Areas". Note that these are NOT requirements for H22, but may be valuable to help define H22's scope and PAR. A CIP standard requirement justifies this work. PAR must state how much time is required.

1. The guide should be able to assist the reader in developing an information protection policy that supports the cyber security of the information that they have
2. The guide should include the "why" for security to aid the reader in justifying the language of their cyber security policy
3. The guide should discuss differing approaches to information security and cyber security, acknowledging that different information should have different protections based on the sensitivity of the particular information

Only files stored outside the protective relay will be considered. Responsibility of data stored within the IED is considered to be within the IED's security measures.

A request for thoughts of major topic headings produced encryption, access, and transmission of files.

We may reference standards; note "standard vs. guide terminology". We should expect the H18 standard to reference our guide (if left as a guide). We need to determine if this is acceptable.

Discussion of scope of HTF22:

Must include which types of files we want to include, and what type of protection for each file type  
Must include what functions to include, and what type of protection for each function  
Should we reference NERC-CIP, or other?

NERC representative does not recommend linking to NERC-CIP

Should not specify any password scheme, due to aging of schemes and technology changes  
Consider that archived files must remain accessible through password and technology changes  
Consideration of inter-company and intra-company file transfer and accessibility requirements  
Consideration of file accessibility by different personnel groups within a company  
Explain “why” requirements are important to aid understanding and adoption.

Example: incorrect settings are chief causes of misoperations. Who is making changes?

Say why settings files are more sensitive than fault reports.

Consider work flow as files move between creators and users. Provide use cases, etc.

How handled, who by, and associated risks in order to understand security implications.

File must often exist “outside of encryption” for upload/download. Consider “clean-up”

Recommend how to mitigate associated risks.

Key management – consider old files, old encryption mechanisms, where the key is maintained

Schemes for these will not be defined; direction will be provided to existing standards.

Configuration management tools could be discussed as they may be used in managing security.

Consider controls around logging of access to files – who receives copies, etc.

Should require file-protection procedure to maintain the application of security.

There was general consensus for members to read the base documents and be prepared to better discuss at the next meeting. The H18 report will be sent to persons on the sign-in sheet for this meeting.

A request was made for volunteers to consider each type of file. Please email Stephen Thompson with file type(s) to volunteer.

There needs to be liaison with NERC/FERC, and possibly other groups to provide consistency and avoid duplication of effort.

### **HTF23: Standard or Guide for Naming IEDs (COMDEV)**

**Chair: R. Cornelison**

**Vice Chair: TBD**

**Output: WG**

**Established: January, 2013**

**Estimated Completion Date: January, 2013**

**Assignment:** Determine how the work started by WG H10 is to progress.

The Task Force met on Wednesday January 16, 2013 with 8 attendees.

The purpose of this meeting was to determine whether or not the work started by WG H10 should continue and if so, what should be the assignment of the new Working Group.

During the discussions, Eric Allen asked if a trial use of the naming convention recommended by WG H10 had been implemented. Amir Makki mentioned that some limited use has been used. Rick Cornelison volunteered to provide some files that use the recommended naming convention. The group plans to provide such examples throughout the work of the proposed Working Group.

A suggestion was made to include information to relate the monitored lines to help in double ended fault locations.

The attendees agreed to recommend that a working group named “Guide for Naming Intelligent Electronic Devices (COMDEV)” should be formed whose assignment is “Develop an IEEE Guide for naming Intelligent Electronic Devices (IEDs) based on the report of WG H10” with Rick Cornelison to serve as Chair, Eric Allen as Vice-Chair, and Amir Makki as Secretary.

Seven of the eight attendees volunteered to be members of the Working Group.

### **HTF24: Investigate Need to Update C37.238**

**Chair: G. Antonova**  
**Vice Chair: TBD**  
**Output: WG**  
**Established: January, 2013**  
**Estimated Completion Date: January, 2013**

**Assignment:** Investigate need to update C37.238.

HTF24 met on January 15, 2013 in Memphis, TN, in a single session with 23 attendees. 16 attendees indicated that they would like to be members.

After introductions, Chair provided the status of IEEE C37.238 and IEEE 1588

- C37.238 was approved in June 2011
- A revision of IEEE 1588 will be started in 2013

A number of possible corrections to the C37.238 were suggested, in particular, IEC TC57 WG10 requested to make the following 3 requirements optional:

- IEEE 802.1Q tags support
- TLV check for BMCA purposes
- SNMP MIB support by grandmaster-capable devices.

It was discussed and agreed that C37.238 should be updated. A discussion on possible approaches followed. Corrigendum, Amendment and Revision were discussed. Advantages and disadvantages of Amendment and Revision were discussed in length. Finally, an agreement was reached to recommend to Subcommittee H to form a Working Group and proceed with a Revision. Working Group Assignment was discussed and agreed.

#### ***Liaison Reports***

##### **PES Substations Committee** **S. Sciacca**

No report

##### **PES Communications Committee** **S. Klein**

No report

##### **IEC TC 57 WG 10, 17, 18, and 19** **C. Brunner**

IEC TC57 / WG10 will meet first week of February in Mexico City. WG10 has currently the following projects:

1. Finalization of Edition 2 of IEC 61850:  
Parts 1 and 5 are in the publication phase; part 3 in preparation as CDV, Part 2 has not yet been initiated – the other parts are published.
2. Preparation of an Edition 2.1 of IEC 61850 for some of the major parts  
As the work to create a UML model of the IEC 61850 logical nodes and data is more or less completed for the parts 7-3 and 7-4, it is now planned to issue the first set of auto generated documents of these parts as Edition 2.1. The Edition 2.1 will include the TISSUE resolution up to the date of publication of these parts. Also, an Edition 2.1 of Part 6 is planned. A WG draft for that is currently available. That will reflect the latest schema changes and extensions that have been made based on TISSUES. The associated schema version shall be the basis for Ed 2 conformance testing.
3. Technical reports that are under preparation
  - IEC 61850-90-4 – network engineering guidelines is in preparation to be published.

- IEC 61850-90-3 – using IEC 61850 for condition monitoring shall be released for circulation as a first draft following the meeting in Mexico City.
- Work on IEC 61850-90-11 – modelling of logics, IEC 61850-90-12 – Wide area network engineering guidelines and IEC 61850-90-14 – Using IEC 61850 for FACTS data modelling is ongoing.
- A technical report IEC 61850-100-1 on functional testing is in preparation.
- Technical reports IEC 61850-7-5 and -7-500 about the usage of the models to create application are still in preparation. It is planned to release the IEC 61850-7-5 to be circulated as a first draft after the meeting in Mexico City.

4. Additional task forces address issues of System management and Alarm handling. In Mexico City, we will have as well a new task force dealing with usage of IPv6 in the future.

5. SCL has been extended with regard to the modelling of the functional part of a system. So far, the functional part was limited to model a substation with a single line diagram. This has been extended to model as well other functionality like e.g. Hydro power plants or wind farms. Also, an enhanced way to describe structured functions has been added. As part of this, function names and models of functions may be standardized in the future. A task force will investigate in the requirements during the meeting in Mexico City.

6. The new work to define mapping between DLSP/COSEM (IEC 62056) data and IEC 61850 has been accepted. A new task force will handle this and prepare a TS IEC 61850-80-4.

7. Response to user feedback

Recently, some user organizations like the ENTSO-E have raised concerns on the usage of IEC 61850. To address these concerns, a TF within WG10 under utility user leadership has been created. The task of that TF is, to classify and prioritize the raised issues and to propose solutions how to address the issues.

IEC TC57 / WG17 will meet next week in Denver CO, US 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

Before starting with the preparation of the new mapping IEC 61850-8-2, the WG did an analysis of the requirements for various applications. These requirements have recently been published as draft TR IEC 61850-80-3. Currently, the WG deals with the comments received.

IEC TC57 / WG18 will meet in March as part of the TC57 plenary in Nice, France. 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 received and will be addressed during the upcoming meeting with WG10 in Mexico City.

IEC TC57 / General:

TC57 will have its plenary meeting in March in Nice, France.

## **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 January 15, 2014 with 26 members in attendance – a quorum was achieved.

- Approved minutes of ISC meeting held in Albuquerque NM in September 2013 with the addition of the formation of ITF27 Investigation of Protective Relay Self-Monitoring Capabilities under new business items
- Items of Interest:
  - Rich Hunt will hold Working Group training sessions in September 2014
  - The Long Range Planning working group is investigating WebEx session options for future meetings
  - PSRC website is being updated by Russ Patterson which is an opportunity to get the I Subcommittee website updated. Working Group Chairs should provide their pertinent information to Fred Friend, Jeff Pond, and Brian Mugalian
  - IEEE 1547 Distributed Resources document being revised. Phil Winston is looking for a PSRC representative to monitor and attend
  - Future PSRC Meetings
    - January 2015 – Garden Grove CA (tentative)
    - May 2015 – San Antonio TX
    - September 2015 – La Jolla CA
  - Standard Interpretations
    - There is no provision from SA to interpret standards. Questions would be directed to the working group chair that worked on the standard and it is the chair's opinion, it is not the opinion of the PSRC. Any changes would be looked at during the next revision of the standard
  - Presentations for future Main Committee meetings – working group would consider a presentation upon wrap up of their activity
- Administrative items:
  - Chairs are to send out working group and task force agendas two weeks prior to meeting
  - Standards Association membership is required for working group chairs and vice-chairs
  - Working group rosters and attendance reports must include affiliation. The sign in sheets may be scanned and forwarded to the Sub-Committee Vice-Chair for update of the PSRC directory which occurs in September
  - Always use the IEEE Patent Slides at the start of the working group meeting
  - Email items to post on the I web 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 Wednesday, January 15, 2014 with 9 members and 2 guests.

Minutes from the September meeting in Albuquerque were reviewed and approved.

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

Updates were given on the status of each of the standards giving attention that acronyms also have a definition.

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

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 My Project 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.

#### **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 January 15, 2014 with 6 members & 2 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:

- 60255-121 – Functional Requirements for Distance Relays – USNC voted in favor; now approved as an International Standard. This creation has been a massive effort from many groups and individuals, but here we give special thanks to PSRC WG D21 headed by Alex Apostolov and Alla Deronja which helped the IEC Maintenance Team under Murty Yalla.
- 60255-27 Safety Standard for Measuring Relays – Safety Standard for Measuring Relays – Discussed extensively in I4 at last meeting and before; now approved as a new International Standard.
- Since 60255 is accepted, the old 60255-5 on insulation requirements becomes obsolete.
- Request for Smart Grid Protection experts for new WG (95/307) – A new Ad Hoc Group AHG2 "New protection requirements for the smart grid" had its first meeting in Hyderabad, India on Dec 2, 2013. The Convener is Norbert Rochow of Germany. It has 7 members; Murty Yalla participates for the USNC.
- IEC/IEEE 60255-118-1 Ed. 1, Part 118-1 Synchrophasor for power system measurements – Convener Ken Martin called a meeting for New Orleans (after PSRC) to restart this joint work, based on the now-corrected IEEE C37.118.1-2011.
- 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. Murty Yalla's MT 4 is close to issuing a Committee Draft of 187-1.

Murty Yalla plans to host the TC 95 2014 Plenary Meeting in Florida in December 2014 – the TA to USNC for TC 95 (Eric) will request an invitation.

#### **I5: Schematic Representation of Power System Relaying**

**Chair: Kevin Donahoe**

**Vice chair: Rich Young**

**Output: Report**



**Established: 2008**  
**Expected Completion: 2013**

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

Working Group 15 met on Tuesday afternoon with 9 members and 2 guests in attendance. Following introductions, Kevin reviewed the minutes from the last meeting. Minutes were approved unanimously.

At the last meeting, out of the 26 members invited to ballot we had received 17 approvals, many with comments, 5 comments, and 4 no replies. Outstanding issues from September's meeting were the inclusion of a Table of Contents and the improvement of a number of the figures addressing both readability and vendor designations.

One of the comments from the Sept. meeting was about the Protection Zone Diagram (PZD). The level of detail of the PZD was discussed. Should CTs be shown, or is it implied? Since the PZD is intended to dictate where CTs should be located to ensure overlapping zones of protection, the PZD comes before the actual selection of CT locations. A sentence was added to make that clear. Many other comments were addressed. Some comments although valid, were not directly pertinent to the scope of the document, and were rejected.

Many of the diagrams were made more readable, and had manufacturer-specific identifications removed. The truth table associated with the Boolean logic diagram was modified to remove impossible states.

A hand vote was taken on the document as revised, and was approved unanimously by the working group members. Kevin will convert the document to pdf format and present it to the I Subcommittee within a couple of weeks for approval and publication on the PSRC web site. Kevin will make a PowerPoint presentation of the paper, suitable for presentation at conferences, and for use in training those who create schematic diagrams.

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

**Chair: Gary Kobet**

**Vice Chair: Alex Lee**

**Output: IEEE Guide**

**Established: May 2012**

**Expected completion date: December 2016**

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

Working Group 17 held its meeting in a single session on Tuesday, January 14, 2014. This was the sixth meeting for this working group.

There were 6 members present and a quorum was reached. Eleven 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.

September 2013 meeting minutes were reviewed. Alex Lee motioned to accept the September 2013 minutes and seconded by Mark Schroeder. WG members voted to approve the minutes.

Draft 3.3 was previously distributed to working group members by posting to the WG site on IEEE-SA Central Desktop.

Remaining comments were reviewed and resolved.

Request Working Group members for final review the Guide and approve when there are no further comments by March 1<sup>st</sup> 2014.

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 Studio 3, New Orleans Marriott, in New Orleans LA on January 14, 2014. Thirteen members and four guests were present. A quorum (>50%) was achieved.

The IEEE-SA ballot of Draft 7 was completed on November 13, 2013 with 100% approval and a total of 44 received comments. The working group reviewed the comments and provided disposition on each of them. A conference call with the working group members will be held the week of March 3 to review a revision, Draft 8. A 10 day recirculation ballot will be initiated before the May 2014 meeting upon working group member approval to proceed (>75% required for approval).

A two year PAR extension was approved at the December IEEE SA-SB meeting expiring in December 2015.

**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**

Standard was approved in December 2013. Working group has been disbanded.

**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 6 members and 6 guests present. Did not have a quorum, the minutes of the previous Sept meeting were reviewed but could not be approved.

Bruce discussed the Agenda.

Farnoosh led an overall review of the document-updated the current Draft to rev 3.

Action items were assigned:

PT needs to be replaced with VT in doc

Move section 4 to Annex

Farnoosh & Eric to review 3.3-4.8

Rich Hunt to redraw figures with Visio

7.3-7.4 Farnoosh and Christoph to revise

Chapter 5- TW

Chapter 6- Farnoosh

Chapter 7- Christoph  
Chapter 8- Vahid  
Chapter 9- Dylan  
Chapter 10- Michael  
Chapter 11- Brian  
Chapter 12- Farnoosh to move to Annex A2

Annex A- needs more Bibliography references- Farnoosh to provide 10, Rich to provide at least 2, others to contribute too

Farnoosh to provide new draft to WG by email by 1/15/14

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

**Chair: Andre Uribe**

**Vice Chair: Mal Swanson**

**Established: 2011**

**Expected Completion Date: 2014**

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

The Working Group I-12 met on Tuesday, Jan 14th, 2014, New Orleans, LA in single session chaired by Andre Uribe with a total of **18 attendees** (8 members and 10 guests).

September meeting minutes were reviewed.

The I12 working group covered the following:

1. Reviewed and approved the assignment statement
2. Reviewed and finalized 10 out of 15 sections of the paper
3. Agreed that we will finish the remaining 5 sections in May's meeting
4. Agreed that we are at final stage and plan to submit our report for Sub-committee approval in September

**I21: Analysis of System Waveforms and Event Data**

**Chair: Jerry Jodice**

**Vice Chair: George Moskos**

**Output: Report**

**Established: 2012**

**Expected Completion Date:**

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

Working Group I21, met in single session on Jan 14, 2014. There were 9 Members and 14 guests in attendance.

The signature waveform and accompanying text for 19 topics being compiled for event analysis were discussed.

The following working group members in attendance agreed to provide the following topics in electronic form.

1. Mike Kockott - Fuse Failure
2. Yanfeng Gong – Breaker Clearing Time and Fault Location
3. Mark Taylor – Harmonic Analysis
4. Elmo Price – Carrier Holes in Blocking and Unblocking Scheme
5. Amir Makki – Harmonic Analysis, Transformer In-rush and CT Saturation
6. Mansour Jalali & Qun Qin – Imbalance Conditions

All working group members were asked to provide their writing assignment in the format provided by Amir Makki.

The following template will be use for all topics.

- I. Topic
- II. Detail description of topic
- III. Analysis
- IV. Waveforms

**DEADLINES:**

February 14, 2014 All writing assignments are due. Send by e-mail to Jerry Jodice, George Moskos and Alex Lee.

March 14, 2014 First draft of the report will be distributed to all working group members.

**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, January 14, 2014 at 4:30pm CST in a single session with 12 members and 18 guests. After introductions, the existing draft was reviewed and discussed with specifics detailed as follows:

Security features may be a driver for determining end of life.

One of the participants asked if auxiliary relays are included in the assignment. The group indicated that auxiliary relays could be included.

A suggestion was made to include case studies from utilities. Charlie Henville of BC Hydro and Jonathan Sykes of PG&E agreed to provide these.

A comment was made that the environment section should also discuss the different environments that relays have to perform in and how this will affect the useful end of life.

A discussion ensued regarding the lessons learned from the nuclear industry. Marie Nemier discussed the nuclear industry's process to extend the planned end of life by running destructive testing on the relays. Marie will write a contribution regarding this information. She also discussed the difference between harsh versus mild environment. The nuclear industry has discovered that some of the things that decrease end-of-useful life include: whether a coil is normally energized; how often it is cycled; and whether the device has good airflow or not.

PG&E stated they use the term "practical end-of- life" rather than useful end-of-life. A statement reflecting this term may be added.

Jonathan Sykes of PG&E discussed their efforts at determining how risk drives the replacement strategy. He will write a contribution on their efforts.

A discussion was started on how to manage end-of-useful-life. One suggestion was to create a check list based on heuristics specific for each utility to use to determine a beneficial strategy for managing useful end of life. This list could include fault risk as well as reliability indexes in determining the priority for managing useful end of life.

Another suggestion for a driver of end-of-useful-life is to upgrade the relays to provide better monitoring to extend the life of other assets such as circuit breakers.

Robert Frye asked if recovery issues, when one discovers that many relays need to be replaced could be discussed in the paper. His suggestion included the idea of reducing the cost of replacements by replacing in-place without wiring changes (other than removing the wire and putting on the new relay in place). Some thought this was outside the scope of the report.

The question was asked if utilities informed manufacturers that relays failed after the warranty had expired. It was recommended that the paper discuss the sharing of information between manufacturers and utilities.

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

**Chair: Bruce Magruder**

**Vice-Chair: Will Knapek**

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

**Established: May 2013**

**Expected Completion Date: 2018**

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

Working Group I23, Revision of C57.13.1 - Guide for Field Testing of Relaying Current Transformers, was held in Studio 2, Marriott Hotel, New Orleans, LA, on January 15, 2014 at 9:30 am. Eleven members and eleven guests were present and a quorum was met. September 2013 minutes approved.

Comments to the PAR were discussed. The PAR was approved at the December meeting. Copy is posted on Central Desktop.

The old guide is available for review by committee members on Central Desktop in an RTF format for editing.

Assignments made to review the old guide for typos and other errors by section. The review should put the section in the format agreed to in the PAR in the following subtopics.

1. Safety
2. Type of test
3. Acceptable methods
4. How to interpret the test results

Assignments are as follows.

Section 5	Will Knapek
Section 6	Rene Aguilar
Section 7	Alex Lee
Section 8	Don Sevick
Section 9	Don Sevick
Section 10	Lee Bingham
Section 11	Lee Bingham
Section 12	Rene Aguilar
Section 13	Bruce Magruder
Section 14	Bruce Magruder
Section 15	Bruce Magruder
Section 16	Will Knapek
Annex A	Jason Strebe
Annex B	Rene Aguilar
Annex C	Rene Aguilar
Annex D	Will Knapek

Decision was made to not add Rogowski coils but reference the document that includes them.

Bruce Magruder will add the comments from the reaffirmation process to the draft.

Conference call will be set in February/March time frame to make sure writing assignments are on track.

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

**Chair: Jim Niemira**

**Vice-Chair: Jeff Long**

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

**Established: January 2013**

**Expected Completion Date: September 2014**

The Working Group I-24 met on Tuesday, Jan 14<sup>th</sup>, 2014, at New Orleans, LA in single session chaired by Jim Niemira with a total of **15 attendees** (4 members and 11 guests). 4 Members have status changed to Guest due to lack of attendance. 1 additional Member could not attend this meeting but remain on the roll as a Member by request to the Chair prior to the meeting. Membership is currently 6. Quorum was met.

Dr. Amir Makki gave a presentation on the results of a small experiment called "Hall Auditors" wherein he used a high current test set to audit and compare the output results of Hall sensors with the test set under conditions of inrush, ringing, and arcing.

- Desired to benchmark Hall Effect Sensors against actual fault records replayed through a relay test set
- Hall Effect sensor can go down to DC; measures DC as well as AC.
- Difference from recorded wave shape to regenerated wave may be limitation of the test set. The test set cannot reproduce capacitor ringing wave shape at approximately 21<sup>st</sup> harmonic (about 1260 Hz) – future experiments will compare Hall Effect sensor against a calibrated resistive shunt.
- Showed saturated CT measurement reproduced by Hall Effect sensor.
- Showed transformer inrush measurement

It was mentioned that Hall Effect sensors are often used on digital fault recorders (DFR); sensor is typically installed on CT secondary wiring where there is less insulation required. Any inaccuracies to the primary current that are introduced by the CT will be

John Buffington mentioned the company he works for (ITRON) uses Hall Effect sensors for revenue grade commercial and residential meters. He will search for a subject matter expert from his company to make a presentation at the next meeting.

The latest revision of the draft and outline was reviewed. Writing assignments have been received from Jeff Long, George Semati, Jeff Burnworth, Phil Zinck, and Jim Niemira. Members will review the report before the next meeting.

New writing assignments were made:

- Calibration of Hall Effect sensor is important. – Dr. Makki offered to write section on calibration for the report.
- Dr. Makki to add contribution regarding distance and positioning of Hall Effect sensors. He will contribute a picture of a chip placed on the conductor. Will add to the 'Types of sensors' section of the report.
- Alex Stanojevic offered to contribute to the 'Applications' section of the report.
- Jim Niemira will send Rogowski Coil information to active working group members to use as references when writing this report.
- Joe Perez offered to contribute to the 'Limitations' section of the report regarding VFD and motor applications.
- John Buffington will engage someone at ITRON to contribute to the 'Advantages' section of the report.

## **I25: Commissioning of Substation Protection and Control Devices**

**Chair: Rafael Garcia**

**Vice Chair: Kevin Donahoe**

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

**Established: January 2014**

**Expected Completion Date:**

**Assignment:** Write a report to provide guidance in the commissioning of power system protection systems. This report will cover overall system testing procedures for generators, lines, line reactors, transformers, capacitors, and special protection schemes.

I-25 met today for the first time as a working group with 19 members and 17 guests.

The assignment and the motivation for the assignment were reiterated.

The group briefly reviewed those sections of C37.233 that specifically address commissioning tests.

Assignments were made to review the entire guide and how it addresses commissioning testing of the five areas of a protection system and to identify gaps and address those gaps.

Volunteers to review applicable sections of C37.233 and submit a write-up are as follow:

VTs – Craig Bryant  
CTs– Craig Bryant  
T-Line Relays – Tony Seegers, Anthony Newman  
Bus Relaying – Heather Malson  
Capacitor relaying –Satish Samineni  
Reactor relaying – George Moskos  
Communication –Brian Moores  
    Transfer Trip  
    Pilot Schemes  
Batteries and Chargers – Don Ware  
Reclosing – Tony Seegers, Anthony Newman  
Breaker Failure – Jeff Barsch  
Transformer protection - Alex Lee  
    Voltage regulation  
    Alarms  
SCADA/DFRs/HMI/Alarms  
Control Systems – Nilesh Bilimoria  
    IEC 61850  
    Auto transfer scheme  
Generation Protection – Hasnain Ashrafi, Vinod Yedidi  
AC/DC control circuits – Mike Wright

Validation of Relay Settings – Don Ware  
Common Practices – Heather Malson?

Writing assignments due by April 15.

### **Reports from the TF Chairs**

#### **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: Revise Transactions Paper**

**Established: January 2014**

**Expected Completion Date: TBD**

**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.

The Task Force ITF26 met on Tuesday, January 14, 2014, at New Orleans, LA in single session with a total of 14 attendees. The Task Force discussed whether or not a new WG should be formed to revise the Transactions paper and decided that the WG should be formed. The WG will decide on its assignment and output. The suggested assignment is to write a Report to the Subcommittee to discuss mathematical modeling of instrument transformers. Starting point for the Report will be the existing Transactions paper and with additional developments since publication of that paper in 1998. A Report to the Subcommittee is suggested to avoid length restrictions of Transactions papers. Once complete, a summary paper of the Report may be appropriate for publication in the Transactions.

The Task Force recommends that a new WG be formed to revise the Transactions paper. Revisions should include reorganizing contents for better flow, adding information from the PSRC CT saturation calculator and other work done since 1998 including updating EMTP/ATP models, and describing other

types of simulation/modeling tools such as real-time simulators including guidance for best determination and validation of model parameters. Discussions on modern transducers should also be considered keeping in mind the length limitations on Transactions papers. The new WG will determine whether or not the output should be a Report. The Task Force requests the Subcommittee query the Main Committee for volunteers to participate and lead the new WG.

### **ITF27: Investigation of Protective Relay Self-Monitoring Capabilities**

**Chair: Bob Beresh (designate)**

**Vice Chair: Yuchen Lu (designate)**

**Established: 2014**

**Output: Report**

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

**Scope:**

**Expected Completion Date: 2015**

ITF27 met on Tuesday, January 14, 2014 in a single session with 39 people attending the inaugural meeting. 16 people have indicated that they wish to become members at this time.

After introductions, the background to this TF was discussed as well as the need for this work. As those who were in attendance agreed that this was an important issue for the industry, it was decided to proceed and a preliminary assignment was fleshed out. Much discussion was held on the output product and the TF determined it was best to focus on a report and then a Recommended Practice or Guide later, if necessary.

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

Further discussion was entertained as to whether the scope should focus on “boxes” (protective relays) or “systems” (protection schemes/systems). At this time the TF/WG will focus our efforts on “boxes” until the impact of looking at the self-monitoring of systems (such as a protection with remote communications) can be better discerned.

Possible items to include in an outline were considered and these include:

- Define self-monitoring
  - What is it? Needs to be well defined.
  - Define terms used (so that this is common and understood by all).
- What is being monitored in commercially available “boxes”?
- What methods/algorithms for self-monitoring are currently available?
- Are performance requirements necessary for self-monitoring?
- How to deal with existing devices that may not have documented self-monitoring features or may not monitor all portions of the device?
- How will a device indicate it is okay or if its self-monitoring features are okay (self-reporting of the self-monitoring)?
- Testing, verification, calibration of self-monitoring (alarm on deviation of self-monitoring?)
- What does the device do when it gets an interrupt? Can interrupts be monitored, and if so, what can be done with that information?
- List the various self-monitoring functions; describe how they work; describe benefits/inadequacies.
- Examine how to evaluate functionality from a utility’s perspective (self-healing or reporting only?).
- What does the device do in the event of a problem? Is there a fail-safe mode?
- Describe possible testing methods.
- Documentation requirements (what documentation would utilities would like to receive from manufacturers?)

As those in attendance indicated support for the work of this TF it was decided to approach the I subcommittee and request that ITF27 become a working group at the May 2014 meeting.

### **Liaison Reports**



a. Instrument Transformer Subcommittee – no report

**Coordination Reports**

None

**Old Business**

None

**New Business**

New Task Forces will be created.

ITF28 – Revision of C37.108 Guide for the Protection of Network Transformers

ITF29 – Revision of C37.110 Guide for the Application of Current Transformers for Protective Relaying Purposes

ITF30 Revision of C37.235 Guide for the Application of Rogowski Coils Use for Protective Relaying Purposes

All three of these Guides expire in December 2018. The Task Force assignment is to review the guides and determine whether a revision is required. If no revision is required, a recommendation is made to reopen the Guide for balloting – this can be performed anytime up to 2016. A Task Force can also recommend withdrawal of a Guide

If there are any recommendations for the formation of new working groups, please send them to Jeff Pond and Brian Mugalian

**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.

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, Jan 14, 2014 with 16 members (achieving quorum 16/29) and 21 guests. There was a call for the approval of the minutes of the Sep 2013 meeting in Albuquerque. These minutes were approved by the subcommittee members.

**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. 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.

Due to an emergency, the Working Group did not meet.

A double session with space for 50 persons and a computer projector is requested for the May 2014 meeting.

**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, January 14, 2014 at 9:30 a.m., in New Orleans, LA with nine (9) members and seven (7) guests.

1. Chairman welcomed WG J6 attendee, and briefly explained the status of this WG. Also, he had distributed of this meeting agenda, Albuquerque meeting minutes & the draft copy of the paper.
2. WG attendee introduced themselves.
3. Chairman thanks to WG members who contributed the draft of write-up including paragraphs and figures. Albuquerque meeting minutes was approved. The draft was reviewed and discussed the following topics:
  - 1) Topic-1 (Abstract & Introduction) - Mike Reichard brought up that "Abstract" should be a paragraph not a multiple paragraphs. WG had adapted this comment and combined 1st and 2nd paragraphs, and removed 3rd paragraphs to "Introduction" section.
  - 2) Topic-2 (Protection Requirement) – Since the technology has been changed drastically since 1975 survey. Dale brought up some statements should be included in this section, and he will write up some paragraphs for this section.
  - 3) Some device numbers were not included in 1975 survey, and this section should be revised to include the devices such as 11, 24, 27TN, 32, 64S, 78, etc. Bob Pettigrew brought up the description of device 78 is not correct. Bob will revise the description of device 78.

- 4) Topic-3 (Figures 1 & 2 by Bob Pettigrew) – Norman Fisher brought up figure-2 (multifunction relay) should be combined into figure-1 (discrete relays) and eliminated. WG members discussed this issue and indicated there are some benefits to separate two figures as long as putting a table of device numbers used in this connection.
- 5) Topic-4 (Figures in general) – Kevin Fredric rose that figures need to be in consistent. Some figures are “M/G” and “GEN/MTR.”
- 6) Topic-5 (New Section) - WG discussed a new section is required for; (1) Double induction motor start-up (Norman will provide information), (2) TVA’s experience (Harmonic blocking capacitor), (3) PGE’s experience (Rotor pole repairs), (4) Etc.
- 7) Topic-5 (Redundancy Protection) – Hasnain had brought up to making why do we need the redundancy of a transformer differential protection (87T)/a generator differential protection (87G/M) with an over-all differential protection (87U). The figure-1 & -2 are a typical example connection for explaining how protective relays are arranged. Also, the modern P/G units are large MVA as shown on the distributed North-America’s P/G plants list. Units listed in 1975 survey were included many smaller units. According to the justification of many installations in Websites, the technical/economical issues are big factors for the decision. Murty Yalla rose that this tendency of unit sizes should be in the “Introduction.”

4. The assignments are following WG member

- 1) Protection Requirement – Dale Finney will provide new motor start-up method (double induction motor or Variable speed)
- 2) Figure-2 – Bob Pettigrew will revise the figure-2 including a table with used elements (device numbers) for generator & motor modes
- 3) WG members review the section of “Analysis/Summary of survey” and comments back to Chairman by February 15, 2014.
- 4) Some discussions/recommendations on the significant issues from the survey - any issues to Chairman.

5. The assignments are due Februarys 15, 2014. Chairman will consolidate the documents and distribute to WG members for review and comments will due by March 15, 2014 for May meeting (Fort Lauderdale, FL) Orleans, LA).

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

**J7: Avoiding Unwanted Reclosing on Rotating Apparatus**

**Chair: Mike Reichard**

**Vice Chair: Steve Conrad**

**Established: 2011**

**Output: Report to Subcommittee**

**Status: Seventh Meeting**

**Assignment:** To review and provide comment on the protection and control vulnerability known as “Aurora”

The working group met with 10 members and 12 Guests on January 14, 2014 in the Marriott Hotel, New Orleans, LA

The meeting minutes from the September meeting were approved. The chair discussed the assignment of the WG and the status to date.

Mark Zeller-SEL discussed the paper Myth or Reality-Does Aurora Vulnerability Pose a Risk. The presentation discussed the use of sync-check to prevent an undesired closing. The emphasis is to ensure that the synch-check element is disabled while the breaker(s) is closed. This is to allow the measurements to be renewed upon opening.

Dale Finney discussed the SEL paper on the (ROCOF) Rate of change of frequency paper

The chair will send out to the WG the paper outline prior to the next meeting in May.

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: 2nd<sup>t</sup> Meeting**

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

The group met on 1/15/2014 in New Orleans, LA with 10 members and 11 guests in attendance.

The meeting was attended Jorge Felix and Eduardo Reyes of CFE.

Jorge made a presentation on the generator ground fault accelerated detection scheme.

The scheme logic has been derived by analysis of sequence voltages resulting from the time-domain simulation of faults applied to an arbitrary power system. The power system was modeled after a generator that experienced a transmission system ground fault. The model has been validated by comparing the output of the simulation with captured oscillography.

CFE presented new logic to address intermittent faults and also off-line unit logic

This scheme is now a standard on CFE generators. It has been installed on a number of machines in the CFE system. One of these machines experienced a ground fault and the new scheme operated correctly and produced an accelerated trip.

The attendees had a number of questions on the magnitudes of sequence voltages at the various fault locations, the behavior of the scheme during a VT secondary fault and for a blown VT fuse condition.

The working group will have its 3<sup>rd</sup> meeting in May 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:** Investigate and report to the J Subcommittee on plant protection issues associated with black start. The task force met on Tuesday, January 14th, 2014 with 8 members and 12 guests.

Minutes from the 3<sup>rd</sup> meeting (Albuquerque) were review and approved. Chair went over the background and history around the establishment of the task force.

Task force reviewed assignments. Chris Ruckman presented the findings from his literature review. He primarily searched the IEEE Xplore library and found a total of three documents. He reported that the transactions paper, "Protective Systems Issues During Restoration", M. M. Adibi, et al, IEEE Transactions on Power Systems, Vol. 10, No. 3, August 1995, seemed to be the most applicable to the task force efforts. W. Hartman presented a typical diesel engine generating set one-line and some supporting write-up. T. Sawatzky talked about a hydro facility black start application. C. Ruckman presented a combustion turbine generator one-line. He also shared some of the practices that he has observed from some utilities particularly in the northeast.

There was discussion around potential changes to turbine controls, generator excitation controls and generator protection. It was observed that these systems may be affected depending on the black start

strategy applied. Some of the challenges that members raised during the discussion included the challenges of testing black start capability, the fact that the literature searches have not yielded any material on successful black starts in the public domain.

The task force recommended that the Chairman draft an assignment and proceed to the J subcommittee to establish a working group to continue this important work.

J14 Working Group status was approved by a 16/29 SC vote; 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 20 members and 17 guests present. A quorum was achieved.

Minutes of the September 11, 2013 meeting were approved unanimously.

Mike Basler provided a detailed presentation on synchronous machine limitations and their dependency on voltage, and excitation system controls and limiters. The presentation included discussion of operating characteristics, settings, and coordination of overexcitation and underexcitation limiters. Due to time constraints Mike was unable to include material on power systems stabilizers (PSS). The chair and vice chair will work to schedule a follow-up presentation on PSS.

The presentation of Ashok Gopalakrishnan on available simulations tools and the availability of dynamic relay models will be postponed until the material on generators control can be concluded.

The chair and vice chair will begin work on an outline of the report to be prepared as the outcome of the working group discussions. The working group will discuss the outline at the next meeting.

The next meeting will be a double session with the first session devoted to finishing the presentation of Mike Basler on PSS and the second for the group discussion.

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

### **K: SUBSTATION PROTECTION SUBCOMMITTEE**

**Chair: M. J. Thompson**

**Vice Chair: D. G Lukach**

The K-Subcommittee met on Wednesday, January 15, 2014 in New Orleans, LA, with 20 of 28 members and 33 guests in attendance. A quorum was achieved. Charlie Henville motioned to approve the September, 2013 subcommittee meeting minutes. Chuck Mozina seconded. Vote was unanimous to approve.

Will English has accepted an invitation to join the K subcommittee which brings our membership to 29.

## **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 double session. Ten members and nine guests were present. After the introduction, a call for quorum was made and quorum was achieved. Motion for approval of the minutes from the September 2013 meeting was made and the minutes were approved.

The IEEE Patent disclosure slides were presented.

Revised diagrams prepared by Dean Miller and Mike Thompson were presented.

It was agreed to prepare two types of phasor diagrams, one showing transformer vector groups and one showing system phasor relationships. Dean and Mike agreed to prepare the diagrams showing both types of phase relationships. They will also slightly modify Mike's three line diagrams to more explicitly relate them to the connection diagrams in C57.135. Mike agreed to provide descriptions for the PST diagrams.

Paul Elkin and Brandon Davies continued (from the previous meeting) presentation of their contributions showing specific PST protection applications. The PST applications were discussed, and it was decided to place them in the annex. Paul and Brandon agreed to work further on the diagrams from their submitted document and make them generic, so that they can be used for protection applications in the main body of the guide.

Time did not permit discussion of Eli Pajuolo's draft section on fault studies, but members were requested to review and comment on the draft.

Revised contributions and review comments are requested to be sent to Lubo and Charlie by 28<sup>th</sup> February.

Two new members joined the working group.

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

**Chair: Bruce Pickett**

**Vice Chair: Paul Elkin**

**Established: Sept. 2010.**

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

**Expected Completion date of a proposed WG: December, 2014**

**1. Paper-Draft 13- 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 Jan 15, 2014 with 6 members and 2 guests

Introductions were done and previous minutes were discussed.

Subcommittee comments from 28 members to the paper and subsequent revision was discussed, with all ballot comments incorporated, missing a response from one member out of the country.

(At the Subcommittee Meeting it was indicated that per instructions from the Main Committee officers, the Subcommittee Chair would recirculate the full final paper with all the revisions to the K Subcommittee. Pending no further changes, then it would go back to the Main Committee officers.)

Expectations are for 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 continue dialog with Erin on format questions and then start formatting into Transactions paper.

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

**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 single session on Tuesday Jan. 14. A total of 7 members and 5 guests were present. A quorum was achieved. The meeting was chaired by the Vice Chair in the absence of the Chairman. The minutes of the Sept. 2013 WG meeting were approved as written. The Vice Chair opened the meeting with a discussion of the progress to date and the path forward. The Chairmen has applied for and received a one year extension of the PAR from the Standard Board. The new completion date is now 2014. The standard has been successfully balloted and received greater than the 75% required response and a 98% approval. There were two negative ballots and a total of 92 comments most of which were editorial. Both negative ballots were resolved with the Chair resolving one of the negative ballots through a conference call. At the WG meeting the members present reviewed the updated standard with the revisions highlighted that responded to the balloting comments. Minor changes were made at the meeting to the document to respond to one of the ballot comments. The WG members present at the meeting voted unanimously to proceed with the re-circulation ballot. Plans are to conduct the re-circulation ballot and review the results at the May PSRC meeting.

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 working group met on January 13<sup>th</sup> 2014. Patent Slides were shown. Sign up sheets, agendas and copies of Draft 1.13 were handed out. A quorum was met as 20 voting members attended. (We require 14). The number of total attendees was 41 including both members and guests.

The minutes from the previous regular meeting in New Mexico were shown and approved. (ref. Rich Young, Phil Tatro)

The minutes from Nov 13 2013 one-line meeting, were reviewed and also approved. (ref. Claire Patti, Bob Beresh) – Approved.

New sections progress was presented by Roger W. to the group. There were no significant comments/discussions.

- Special considerations of Generator unit breakers, (Michael Thompson)
- Generator breaker CT location, (Jeff Long)
- Reset of BFP scheme (Bob Beresh)
- BFP of adjacent, in-series breakers (Sam Sambasivan)

We continued line-by-line review at section 8, “Factors Influencing Settings”

Lots of discussion on the pg 41 in the beginning of section 8. We didn't really move beyond pg 41. There were several ideas presented by different workgroup members of their companies' philosophy about how to set the 50BF element(s). Some set right at the minimum expected fault current but above maximum load if possible; and others set closer to minimum tap values to maximize the sensitivity of the 50BF elements for various reasons such as unknown response of the elements when the breaker and or CT might be in failure mode.

It was agreed that several bullets were more about protective relay testing than about how to set the breaker failure relay functions. Also there was redundant information included about how to set the BF timer.

Claire Pattie will rewrite line 12 to 28 to address these described issues, move the testing concerns information to the testing section (10), eliminate redundant descriptions, and add a sentence or two to include each different utility philosophy, method, and reasoning. Roger will work with Claire to achieve completion before next on-line meeting.

Some comments : - do search and replace for “break failure” to “breaker failure”. Capitalize all mentions of DC, AC, CT.

There was a brief discussion about opening resistors (line 12-13) as to what it is. In the end the group decide to remove this sentence because it does not influence setting.

Sam Sambasivan also submitted his writing assignment.

Meeting adjourned. Roger will setup (Live-Meeting) on-line meeting between now and the next meeting.

Roy Moxley requested to become a member of the working group.



## **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 6.0**

**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, January 15<sup>th</sup>, in a single session with 9 members and 7 guests. The working group currently has 13 members.

After introductions, the working group made revisions to the report based on final review comments received from Gene Henneberg. Charlie Sufana volunteered to verify the document references. Gene Henneberg volunteered to merge the technical report and survey document into one MS Word file with similar formatting and continuous page numbering. The working group members then voted unanimously to approve the document for submittal to the Substation Protection Subcommittee.

Our current plans are to meet again in May to address any significant comments received from the subcommittee review.

## **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 Jan 14, 2014 in New Orleans, LA with 4 members and 8 guests in attendance. We covered the status of P1547.7 Guide to Conducting Distribution Impact Studies for Distributed Resource Interconnection, which has been approved and will soon be in print. After the upcoming Feb 2014 meeting, P1547.8, "Recommended Practice for Establishing Methods and Procedures that Provide Supplemental Support for Implementation Strategies for Expanded Use of IEEE Standard 1547" will be ready for ballot, as well as P1547.1a which is the amendment of the 1547.1 Compliance testing standard. An amendment to 1547- 2003, P1547a has been balloted, re-circulated, and approved. P1547a 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).

Minutes for the 1547a and 1547.1a are posted on the SCC21 web site under 1547a and 1547.1a "logistics" for anyone that would like to review them. A workshop was held in New Jersey the first week of Dec 2013 to discuss revision of 1547-2003, Standard for Interconnecting Distributed Resources with Electric Power Systems. Based on feedback from the attendees, a decision was made to move forward with a PAR to open the standard for review and revision. The first meeting is scheduled for some time in April in Las Vegas. All revisions to this standard have to be completed by 2018. If you are interested in participating in the revision of 1547-2003, please let me know and I will forward information on meeting locations and schedules. I would also ask that Mike announce the same during his subcommittee report at the main meeting tomorrow morning.

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

### **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 16 members and 6 guests in attendance for the January 13, 2014 meeting.

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

Wayne Johnson provided a short update on the NEI activities that are presently going on. Prior to the meeting, Charlie had provided the working group a copy of the latest draft document Guidance Document for Open Phase Condition (OPC) Initiative and encouraged everyone to read it.

The next order of business was to go over the report section by section. Charlie indicated that there are several holes in the report that need authors, so he encouraged additional contributors to volunteer. Writing assignments are due by March 1.

For clause 2, there were comments that the title needs to be changed. The new title is to be 2 Open Phase Events. Wayne Johnson reported that the EPRI Report 3002000764 is now available on the EPRI website.

Zeeky Bukhala will develop clause 3. Charlie suggested that the recently released NEI draft document Guidance Document for Open Phase Condition (OPC) Initiative might be helpful. He also suggested that everyone review the NEI document.

Bob Arritt will be working on clause 4. He indicated that the EPRI report 3002000764 has most of this so he will be using it.

The working group also felt that clause 4.6 Transformer designs that should not be used should be removed.

Clause 5 stills needs an author although the subject matter might actually be incorporated into one of the other clauses.

Mike Urbina is working on clause 6. There was discussion on the formatting for the clause and thus Mike might be completely revamping the clause. The intent of the clause is identify protection schemes (either singly or in multiple combinations) and the exact placement of these schemes that might be able to detect an open phase condition.

In addition to the already listed schemes (current based, voltage based, impedance based, and frequency based), there was some discussion on other possibilities. Dale Finney suggested that perhaps anti-islanding protection might be useable and so will write up something.

Active detection whereby a test signal is continuously sent out and the protection is looking for a signature might be usable. Charlie will do some investigation on this subject.

The working group also discussed a little about throw-over logic. This could be a subject that might be needed.

The working group also discussed how loading would impact the ability of the protection to detect an open phase. It might be possible to have each normally unloaded transformer loaded just enough for protection to work. This might include moving non-critical load to the transformer or using a shunt load, such as a 3 phase loading resistor. Mark Schroeder will investigate the subject.

Because the low currents that might present during an open condition, the type of instrument transformers used would be important. There was a little discussion on clause 6.7.2 Rogowski coils as they can work with very low currents.

Clause 7 was lightly discussed. The section discusses security or dependability concerns.

The last clause discussed was 8 Transformer data. Mike Urbina will provide a write up.

There was also some discussion on software to be used for doing these types of studies. It is unknown if ETAP (which is being actively pushed by some circles in the NEI working group) is really the program of choice for doing these open phase studies. The working group is encouraged to suggest software that might be better suited.

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.

PSRC WG K12 had its 3rd meeting and 1<sup>st</sup> joint meeting with the SC-I9 working group all day on Monday, January 13, 2014. K12 had 7 members and 13 guests present.

IEEE patent slides were shown.

The meeting minutes from the September Albuquerque meeting were approved.

The joint working group began a review of Draft 4 of the Guide. The group agreed that standard IEEE definitions would be used in the Guide whenever possible. Roger Whittaker and Joe Warner of I9 will review the definitions in Section 3.0 and ensure that they match with standard IEEE definitions.

The need to provide WG members with access to IEEE reference standards and technical papers related to the Guide for the life of the working group was identified. Joe Warner will work with John Wang to make these reference standards and technical papers available on the Mentor web site.

There was some concern that Figure 1 in the General Requirements of an SVC Protection System of Section 4.2 needed some additional explanation. Joe Warner volunteered to add a more detailed explanation of Figure 1.

The group was in general agreement that much of the discussion on the differences between high and low impedance bus protection in Section 4.4 can be moved to Section 7 where the specific protection schemes are to be discussed. John Wang will work with Mikael Halkonen of I9 to condense it to one paragraph.

The Current Transformers of Section 6.0 was reviewed in detail and revised. Martin Best will add some figures from the IEEE CT Saturation Calculator showing CT saturation under both symmetrical and asymmetrical overcurrent conditions. Michael Thompson will review the figures.

The joint working group appreciated contribution from Martin Best on VT considerations. Anders Bostrom of SC-I9 volunteered to review and revise it as necessary. Martin Best will also provide a copy of the L. Gyugi paper titled, "Power Electronics in Electric Utilities: Static Var Compensators" that he used as a reference in Section 6.2.

The group generally reviewed comments on specific SVC protection schemes in Section 7 and protective control functions in the SVC system in Section 8. There is much additional work to be done on these sections.

New or pending assignments should be submitted by the first week in March.

The next meeting of the SC-I9 group will be May 18-22 in Portland, OR.

The next PSRC K12 meeting will be May 11-15 in Ft. Lauderdale, FL.

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

**Chair: Ilia Voloh**  
**Vice Chair: Joshua Park**

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

This was the first meeting of the WG with a total of 15 people in attendance, including 3 members of the T&D Capacitor Committee.

The Scope of the WG was redefined to make it clear that Fixed Series Capacitor Banks are described only and exclude the treatment of Thyristor Protected Series Capacitor Banks.

The WG started reviewing the comments made by the T&D Capacitor Bank committee during 2007 balloting which will be continued.

Mark McVey, from the T&D Cap Bank Subcommittee, agreed to review the existing Application Guide and highlight the comments made that his T&D WG.

**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

The KTF14 task force met for its second of two scheduled meetings on Tuesday January 14, 2014 with 11 members and 29 guests.

The chairman opened the meeting with introductions and a brief description of the status of the TF. The existing guide has a need for editing Annex A, also discussed was to remove the phase shifting transformer clause as this material is being covered by the K1 working group. There was also some discussion on whether to include GIC mitigation.

The consensus of the TF was to continue on with requesting a PAR to commence work on the guide.

The proposed TF assignment and scope follow:

The scope of this guide includes general philosophy, practical applications, and economic considerations involved in power transformer protection.

Emphasis is placed on practical applications. General philosophy and economic considerations in protecting transformers are reviewed. Types of faults in transformers are described. Technical problems with the protection systems, including the behavior of current transformers (CTs) during system faults, are discussed. Associated problems, such as fault clearing and re-energization, are discussed as well.

**WG Assignment:**

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

**K15:    Centralized Substation Protection and Control**

**Chair: R. Das**  
**Vice-Chair: M. Kanabar**

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

Meeting # 1 (January 15, 2014)

The working group met on January 15, 2014 with 46 participants (12 members and 34 guests). 9 guests expressed interest to join the working group.

We had two presentations: Dr. Sakis Meliopoulos presented on “New Approaches for Centralized Substation Protection and Control” and Mr. Francisc Zavoda presented on “Universal Controller for Smart Grid”. Both presentations were very well received by the large number of attendees as evidenced from questions and answers.

We will re-circulate Report Outline to the members for review and assignments responsibility. We intend to have one presentation during the May meeting

**Old Business:**

No Old Business was discussed.

**New Business:**

The KTF14 chairman motioned to form a working group that will open C37.91 IEEE Guide for Protective Transformers for revision. The motion carried unanimously for a new working group. KTF14 will be K16, chaired by Will English and Vice-chaired by Steve Conrad.

NERC has formed a Geomagnetic Disturbance (GMD) Task Force and is interested in input from the PSRC regarding the effects of GMD relative to protective relaying. The K sub-committee members voted unanimously to form Task Force KTF17. Qun Que will be the chairman of the task force.

This item came up at the main committee meeting after the K subcommittee meeting. C37.108 IEEE Guide for the Protection of Network Transformers is due to expire in 2018. The K subcommittee plans to form a task force to meet at the May meeting to examine what is required for this document. The task force will be KTF18. The subcommittee is looking for someone to volunteer to chair this task force meeting.

**General Discussion:**

No general discussion took place.