



**POWER SYSTEM RELAYING COMMITTEE
OF THE IEEE POWER and ENERGY SOCIETY
MINUTES OF THE MEETING –Final-Approved
May 15, 2014
Ft. Lauderdale, FL**

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 Jan 2014 meeting in New Orleans, LA was moved Steve Conrad and seconded by Jerry Jodice and was approved unanimously.

The financial status of PSRC is in good standing.

III. Chairman's Report Roger Hedding

No report

IV. Reports of Interest

A. Report from the Vice- Chair – Mike McDonald

a. Technical Paper Coordinator's Report.

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 11th 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 27th. 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 Garden Grove CA
May 2015 San Antonio TX
Sept 2015 La Jolla, CA

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

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

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

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

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

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

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

The US has 26 papers accepted for the 2014 conference.

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

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

C. IAS Power System Protection Committee - Mozina

- **Color Book Reorganization Progress** – The IAS Industrial & Commercial Power System Dept. — I&CPS (responsible of the IAS color books) met on May 20 – 23, 2014. 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). Slow 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 were part of the balloting body for PSRC guide C37.95 -- *Guide for Protection of Utility-Consumer Interconnections* which was recently approved by the Standards Board.
- **Arc Flash** –The Petroleum and Chemical Industry Committee (PCIC) of IAS is the sponsor of IEEE standard 1584, the key Arc Flash standard. The WG responsible for updating this standard normally meets twice a year, once before the start of PCIC conference and again in conjunction with IAS Electrical Safety Workshop (ESW). The next meeting of the WG will be held in Sept. 7 in San Francisco, CA before the start the PCIC conference. During the next phase, testing on actual equipment will be performed to validate models and verify calculated results of the incident energy that 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 Convenors.

The US National Committee will host the next plenary meeting of TC 95 in Largo, FL on December 5, 2014. Anyone interested in attending the TC95 plenary meeting as part of the USNC delegation should contact Eric Udren or Murty Yalla.

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

- 60255-121 – Functional Requirements for Distance Relays – from MT4 under Murty Yalla - Standard published in March 2014 and now available for purchase from IEC.
- IEC 60255-187-1 - Functional requirements for biased (percentage) differential relays – another project of MT4. The development has three different parts:
 - IEC 60255-187-1 Differential protection for transformers, generators and motors.
 - IEC 60255-187-2 Bus Differential protection.
 - IEC 60255-187-3 Line current differential protection.

A new draft of 187-1 will be created before the next MT4 meeting in London on June 10-12, 2014. It is planned to have a CD after the London June 2014 meeting but before the December 2-4, 2014 MT4 meeting held just before the TC 95 plenary meeting in Florida. 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.

Other projects of interest:

- Ad Hoc Group AHG2 “New protection requirements for the smart grid” had its first meeting in India in Dec 2013. The Convenor is Norbert Rochow of Germany. It has 7 members; Murty Yalla participates for the USNC. The group is working on an outline and will be meeting in London on June 13 to discuss developing a report to TC95.
- IEC/IEEE 60255-118-1 Ed. 1, Part 118-1 Synchrophasor for power system measurements – Convenor Ken Martin held a meeting in New Orleans in January after PSRC to restart joint IEC-IEEE work, based on the now-amended IEEE C37.118.1-2011. The participants are looking at whether or when to make further improvements to the synchrophasor measurement process. The next meeting has not been scheduled.

The IEC Standardization Management Board (SMB) subgroup Advisory Committee on Electricity Transmission and Distribution (ACTAD) coordinates standards development work among IEC and other organizations. Joe Koepfinger is USNC representative on ACTAD. ACTAD Recommendation 1306/2 recommends that the SMB allow ACTAD to establish liaison with IEEE-SA. IEEE-SA has not previously had a seat at the ACTAD table - this is important going forward. With work by Sam Sciacca, this recommendation already has massive USNC support. It is likely to be accepted at the SMB meeting in Frankfurt on June 7.

TC 57, Power systems management and associated information exchange

TC 57 WG 10 continues development of parts of IEC 61850. Notably, all of the base parts have now been published in Edition 2 versions except the Glossary Part 2, whose development work begins during the next WG 10 meeting in Quebec City during the week of June 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 Convenor Christoph Brunner under the Relaying Communications Subcommittee H report below.

E. Standard Coordinators Report – Phil Winston

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

RevCom Activity:

Standards Approved

C37.95-2114 Guide for Protective Relaying of Utility-Consumer Interconnections
C37.118.1-2114 Amendment to modify selected performance requirements of IEEE Standard for Synchrophasor Measurements for Power Systems

Standards submitted for approval

None

Standards due for 10 year review

None

Ballot Activity:

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

- PC37.114 Guide for Determining Fault Location on AC Transmission and Distribution Lines
- PC37.240 Standard for Cyber Security Requirements for Substation Automation, Protection and Control Systems
- PC57.13.3 Guide for Grounding of Instrument Transformer Secondary Circuits and Cases-Invitation

NesCom Activity:

PARS approved:

- PC37.91 revision Guide for Protecting of Power Transformers
- PC37.230 revision Guide for Protective Relay Applications to Distribution
- PC37.250 new Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes

PAR (applied for): New, Revision, Modified, or Withdrawal

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

PARS expiring at the end of 2014

- PC37.114 Guide for Determining Fault Location on AC Transmission and Distribution Lines
- PC37.240 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:

Submittal Deadline	Meeting Date
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

Did not meet with PSRC

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. The report will be presented to the NERC Planning Committee in June.
- b. Order No. 754: The Section 1600 Request for Data or Information associated with FERC Order No. 754 is in progress. NERC is presently reviewing the protection system single point of failure data for facilities 200 kV and above with members of the SPCS and the System Analysis and Modeling Subcommittee (SAMS). Single point of failure data for buses operated at 100-200 kV is due September 30.
- c. Loadability Considerations for Unit Auxiliary Transformers
The SPCS has been requested to develop a report addressing load-responsive protective relays applied on the low-voltage side of a unit auxiliary transformer. This request is related to minority comments on NERC Reliability Standard PRC-025-1, Generator Relay Loadability. SPCS expects the Planning Committee will assign this task at the June Planning Committee meeting.

2. Protection-Related 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 development of a guidance report concerning the commissioning of protection systems. NERC is working with the IEEE PSRC I25 working group 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 filed with FERC on February 14.

PRC-005-4¹ – The Protection System Maintenance and Testing drafting team is revising the standard to address the FERC directive in Order No. 758 to include sudden pressure relays and other devices that respond to non-electrical quantities that affect reliable operation of the Bulk-Power System. The drafting team is using an SPCS report, *Sudden Pressure Relays and Other Devices that Respond to Non-Electrical Quantities: SPCS Input for Standard Development in Response to FERC Order No. 758*, as a reference document. The standard is posted for a 45-day formal comment period through June 2, with an initial ballot during the last 10 days.

- b. Protection System Misoperations: A formal comment period and additional ballot of PRC-004-3 concluded on March 12. The draft standard achieved an approval of 62.63%. The drafting team is developing responses to stakeholder comments and revising the draft standard as necessary to address comments. The drafting is working to post the standard by May 16 for a 45-day formal comment period and additional ballot.
- c. System Protection Coordination: A formal comment period and additional ballot of PRC-027-1 concluded on December 31. The draft standard achieved approval of 65.71%. The drafting team is developing responses to stakeholder comments and revising the draft standard as necessary to address comments.

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

- d. **Generator Relay Loadability:** FERC issued a Notice of Proposed Rulemaking (NOPR) on March 20 proposing to approve PRC-025-1 (Generator Relay Loadability) and associated changes to PRC-023-3 (Transmission Relay Loadability). PRC-025-1 establishes loadability criteria for relays applied at the terminals of generators, generator step-up transformers, unit auxiliary transformers, and on collector systems for dispersed generation. Modifications to PRC-023-3 resolves potential gaps or overlap between the two standards.
- e. **Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection:** FERC approved Reliability Standard PRC-019-1 in Order No. 796 on March 20. This standard establishes requirements for coordination of generating unit facility or synchronous condenser voltage regulating controls, limit functions, equipment capabilities, and protection system settings.
- f. **Generator Performance During Frequency and Voltage Excursions:** FERC approved Reliability Standard PRC-024-1 in Order No. 796 on March 20. This standard establishes requirements for generator protective relays to allow generating units to remain connected during defined frequency and voltage excursions.
- g. **Disturbance Monitoring:** The draft standard uses a results-based approach to establish requirements for Dynamic Disturbance Recording (DDR), Fault Recording (FR), and Sequence of Events Recording (SOER). A formal comment period and ballot of PRC-002-2 concluded on December 16. The draft standard achieved approval of 43.29%. The drafting team has responded to stakeholder comments. The revised standard is posted for a 45-day formal comment period through June 23, with an initial ballot during the last 10 days.
- h. **Protection System Response to Power Swings:** This project responds to a FERC directive in Order No. 733 that NERC establish a standard addressing protection system response to stable power swings. The drafting team is using an SPCS report, *Protection System Response to Power Swings*, as a reference document. The standard is posted for a 45-day formal comment period through June 9, with an initial ballot during the last 10 days.
- i. **Special Protection Systems:** This project will revise the definition of Special Protection System (SPS)/Remedial Action Scheme (RAS) and revise several SPS-related Reliability Standards. The drafting team is using a joint SAMS-SPCS report, *Special Protection Systems (SPS) and Remedial Action Schemes (RAS): Assessment of Definition, Regional Practices, and Application of Related Standards*, as a reference document. The 30-day informal comment period for the revised definition of SPS (excerpted from the SAMS-SPCS report) ended on April 9. The drafting team is considering comments in developing a revised glossary term for formal comment and initial ballot.
- j. **Undervoltage Load Shedding:** This project will consolidate four existing standards into one revised standard, PRC-010-1. As part of the project the drafting team has developed a draft definition for Undervoltage Load Shedding (UVLS) Program. The drafting team will be coordinating with the Protection System Misoperations and SPS drafting teams. The 30-day informal comment period for the draft definition and standard ended April 16. The drafting team is considering comments in developing a revised glossary term and standard for formal comment and initial ballot.
- k. **Standards Applicability for Dispersed Power Producing Resources:** This project has been initiated in response to a stakeholder-submitted (Standards Authorization Request (SAR) to review applicability of NERC Reliability Standards to dispersed power producing resources. The drafting team has posted a white paper to inform industry of proposed applicability changes and is presently drafting revisions to three high-priority standards. This review includes the PRC series of standards.
- l. **Data for Power System Modeling and Analysis:** FERC approved Reliability Standard MOD-032-1 in a Letter Order on May 1. This standard establishes requirements for development of power system models and expands upon the existing standards to include short circuit data. The standard requires entities to provide data to according to data requirements and reporting procedures specified by their Planning Coordinator and Transmission Planner.

- d. 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.
- e. 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.
- f. 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.

3. Standards Activities

- m. 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.

- n. 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.
- o. 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.
- p. 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.
- q. 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.
- r. Generator Performance During Frequency and Voltage Excursions: PRC-024-1 has been filed with the appropriate regulatory authorities and is pending regulatory approval
- s. 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.
- t. 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.

- u. 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.
- v. 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

No Report

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 Fort Lauderdale meeting was 218, which is considered a healthy number for us.

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

One management support letters was 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 – Reviewed for re-organization

Chair: T.S. Sidhu
Vice Chair: M. Nagpal
 No Report

B8: Long Range Planning

Chair: Bob Pettigrew

No report.

B9: PSRC Web Site

Chair: Russ Patterson

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

VI. Items from the Main Committee meeting:

No Items to report

VII. SUBCOMMITTEE REPORTS

C. SYSTEM PROTECTION SUBCOMMITTEE

Chair: J. O'Brien

Vice-Chair: G. Henneberg

Scope: Evaluate protection system responses to abnormal power system states. Evaluate and report on special protection schemes, remedial actions schemes, monitoring and control systems and their performance during abnormal power system conditions. Recommend corrective strategies and develop appropriate standards, guides, or special publications. Evaluate and report on new technologies which may have a bearing on protection system performance during abnormal power system conditions. The C System Protection Subcommittee met on Wednesday, May 15, 2014 in Fort Lauderdale, FL with 15 (of 38) members and 45 guests in attendance. Quorum was not reached.

Minutes of the January 2014 C Subcommittee meeting were subsequently approved by email ballot.

C Subcommittee had no changes in membership since the January meeting.

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

Reports from the Working Groups

C2 Role of Protective Relaying in the Smart Grid

Chair: Apostolov, A.

Vice Chair: Moxley, R.

Output: Report to PSRC

Assignment: Identify the functions and data available in Protective Relaying Devices (PRD) that are used at different functional levels and different applications and can be used within a Smart Grid.

Describe the use of interoperable data formats for protection, control, monitoring, recording, and analysis.

5 Members and 8 guests in attendance.

We reviewed the last working draft of the report with the following points and assignments:

- Add "References" list to each applicable section. - Moxley
- Check formatting for big gaps - Moxley (and all other edits except as noted)
- Fig 4 (will become fig. 5 in next draft) resolve mix of IEC and IEEE symbology – J. Gers
- Make capitals in Major and first subcategories consistent
 - Section 10 ALL CAPS
 - Section 10.1 First Letter Capitalized
- Section 14, add "Where are we today" as section 14.1
- Section 14.3 Find or remove ref [8] (couldn't find...removed)

- Section 14 references. Renumber references 9-12 as 1-4 in this section.
- Section 15.2.1 Check synchrophasor solutions list. Reference C14 paper if more details wanted
- J. Gers added references to his contribution in section 12 that will be added to the references at the end of the section.

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 May 13, 2014 in Ft Lauderdale, FL in a single session with 9 attendees (4 members and 5 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: a new write up on phasor-assisted state estimator was submitted after January PSRC meeting.

Discussion on whether to include this new information followed. It was decided not to include it as it is not a part of the guide nor a part of new standardization effort. A venue for paper submission was discussed next. It was decided to submit the paper to the same journal where IEEE C37.118 summary paper was published (Transactions on Smart Grid). Discussion on editorial items followed. Figures to be checked and updated per IEEE guidance. Final version to be distributed to the group.

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

Chair: Rahmatian, F.

Vice chair: Myrda, P.

Output: Guide C37.242

Established: May 2010

Estimated Guide Completion: March 6, 2013

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

Scope:

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

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

Purpose:

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

Notes:

The Working Group met on May 13, 2014 in a single session. The session was chaired by Farnoosh Rahmatian. There were participation from 3 members and 6 guests.

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

All participants introduced themselves.

The minutes of the January 2014 were reviewed, but not approved due to lack of quorum.

Session Chair updated the attendees on presentation of C37.242 material as part of an IEEE Tutorial on Synchrophasors (including IEEE-PES ISGT February 2014, IEEE PES T&D April 2014) with very good reception. Next tutorial presentation will be at IEEE PES GM July 2014.

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

The meeting adjourned at 10:45 AM.

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. The Working Group has completed its work and is now disbanded.

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 Working Group met for its final time. Yi Hu presented the Working Group's report during the Main Committee meeting. The Working Group has completed its work and is now disbanded.

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 7 members and 10 guests in attendance.

The document is out for subcommittee review and approval. The deadline was 5/12 but only 20 out of 38 subcommittee members have responded. Tony Seegers, the working group vice chairman, will send out one last solicitation for review with a final deadline.

The working group discussed preparations for presentations following the final approval of the report.

C17 Fault Current Contributions from Wind Plants

Transmission and Distribution Committee (T&DC): Reigh Walling, Chair
Electric Machinery Committee (EMC): Ron Harley, Chair
Power System Relaying Committee (PSRC):
Chair: Dean Miller
Vice Chair: Gene Henneberg
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.

C-17 met on May 13, 2014 with 7 members and 11 guests. Since this meeting of C-17 was not a Joint Working Group meeting, the January meeting minutes of the JWG were not reviewed.

The JWG report is final and posted on the PSRC web site. The bulk of this meeting discussed the plans for a four-hour tutorial. The first presentation is scheduled at the Joint Technical Committee Meeting on the Monday in January 2015. Dean Miller is applying to present the tutorial at the July 2015 PES General Meeting (not yet decided). Mr. Miller discussed the development schedule needed to meet these meeting requirements.

The following presenters are scheduled:

Topic	Presenter	Minutes
Introduction	Dean	5
Wind Power Plant Design	Wayne	30
Type I & II Wind Turbine Generator Response to Fault	Sukumar	30
Type III & IV Wind Turbine Generator Response to Fault	Reigh	50
Fault Interrupting Equipment Issues	Conrad	5
Wind Plant Protective Relaying	Jim	40
Data Requirements	Charlie & Ashok	30
Actual Performance / Experience	Dean	30
Conclusion	Dean	5
		225 Total

Mr. Miller developed the abstract by editing the introduction to the paper. He will send the PowerPoint template to the other presenters. Jim Niemera will draft the profit sharing agreement between the presenters and IEEE. Mr. Miller presented the slides he has developed for the tutorial.

Marion Cooper volunteered to apply for and present the JWG paper at the next Georgia Tech Relay conference.

The next Joint Working Group meeting is at the PES General Meeting, July 27 - 31, National Harbor, MD. C-17 will next meet at the September 2014 PSRC meeting in Milwaukee, WI.

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

Chair: Deronja, A.
Vice Chair: Houser, K.
Output: IEEE Guide PC37.246
Established: September 2011

Expected Completion: December 2017

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

Scope:

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

Purpose:

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

Working Group Membership was reviewed by the chair and grouped into Members and Corresponding Members.

Working group C18 met on May 14, 2014, with 11 members and 17 guests for a total of 29 present. 5 guests joined the working group as new members. The quorum was not reached, so minutes from the January 2014 meeting will be approved by email.

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

The Working Group proceeded to review the latest revision of the Guide's draft (with Joe Uchiyama's comments) and review assignments not yet received. Writing assignments were made covering a few unassigned sections of the Guide's Outline or assignment of additional volunteers to provide assistance to those working on assignments not yet received. Thank you to active and new members for your continued participation and volunteering to take on additional assignments.

4.1 General design approach. Joseph Valenzuela promised by September meeting. Mike Jensen will contribute material on solar generation.

4.2.1.1.2 Specific protection requirements to coordinate with transmission system. Joe Uchiyama had several comments on protection coordination. TX DIFF, Bus DIFF and Line DIFF do not need to coordinate (fixed zones). Utility looking into Generation facility; coordination of line zones need to coordinate (set short to under-reach differential zones). Will English and Abu Bapary will re-write/edit this sub-section to generalize or reword section titles to clear up confusion (leave functions in/re-word; add notations, etc. Mike Jensen has included more depth on this in section 7.8).

4.2.1.1.3 Specific protection requirements to assure power system stability during upset, transient, or swing conditions. Joe Uchiyama has basically written 4.2.1.1.2 while doing a review. Thank you, Joe. Mike Jensen and Manish Patel will review Joe Uchiyama's contribution.

4.2.1.1.5 Specific reclosing practices on both normal and alternate supply facilities. Mike Jensen will generalize this section and refer for details to Section 7.6.

4.2.2.1.6 Wind and solar generation inverter data (including maximum fault current output, PF capability, voltage output; how the inverter is programmed to respond to faults). Rich Young will integrate the C17 work and promised his contribution by September meeting. Mike Jensen will provide the material for solar generation.

4.2.2.1.7 Collector system configuration and impedances for wind and solar generation facilities. Rich Young & Doaa Galal volunteered previously. Rich Young promised by September meeting. Mike Jensen will provide the material for solar generation.

4.3 Specific considerations (ownership demarcation, long -term outages, momentary outages, interconnection protection requirements, degraded grid voltage schemes and set points, under-frequency/over-frequency schemes and set points). Jim O'Brien, Ian Tualla, and John Miller will work to have the material by September meeting.

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

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

7.9 Setting Considerations for Renewable Energy Sources. Mike Jensen will address the solar generation while Dean Miller will address the wind generation.

We will start working on Definitions section. There is a need to distinguish: Not Utility System, but Transmission System. Not Generator, but Generation facility. Use appropriate/established ANSI/IEEE Terminology (utilize IEEE 102, etc.).

Galina Antonova will review the C37.95 section on the generator protection portion to assure no overlap with the present Guide.

A clarification has been made by Erin Spiewak of IEEE-SA that a Guide does not require a Conclusion; however, a Conclusion is not prohibited either.

Chair/Vice Chair will find better way to track drafts via numbering (revisions) and date.

The updated Outline, with the names of the writing contributors, will be sent out with the meeting minutes. The writing assignments are due August 15, 2014. Please email them to the chair of the working group (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, Output: IEEE Guide PC37.???

Established: May 2013

Expected completion date:- TBD

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

Attendees: 12 (6 members and 6 guests attended the meeting)

- Patent/IP slides were shown
- WG C19 review was presented including PAR, Assignment, Purpose, and Scope
- No Quorum. Previous minutes will be confirmed electronically.
- Status of teleconferences / web meetings of the WG was presented.
- Discussion on PDC Functions Disposition
 - o Cyber Security: current disposition is "To be done". It was suggested that cyber security is not a PDC function, and hence, not to be included in the PDC standard.
 - Include in Overview chapter as a recommendation, e.g. "Cyber security should be part of overall synchrophasor system design".
 - o Data format & coordinate conversion: It was suggested that WG re-consider including this function in the PDC standard.
 - This is important for utilities to change format and co-ordinates at PDC/substation

PDC level.

o Phase & Magnitude adjustment: It was suggested that WG re-consider including this function in the PDC standard.

- Phase shift for converting phase rotation directionality.
- It was clarified that with existing protocol/ configuration management (e.g. C37.118) this function may not be supported.

• Format Validation

o “Synchrophasor CRC check” alone is enough for format validation to determine Data format is valid or not.

o Other format related items such as Data/metadata content/size (fnom, angle, etc.) can still be included as a part of local performance monitoring.

o There were discussions on whether to extend C37.118.2 or to propose extended datagram for PDC which covers additional items required from PDC functions. However, it was concluded that at this stage the PDC to include these items in local performance monitoring function. The protocol extension may be taken up later, if required.

o Use of existing STAT bits-15, 14 may be okay for now, if WG decides to extend the protocol (C37.118.2), the cause and location (PDC ID) can be incorporated from this function.

• Reporting Rate Conversion

o Up conversion

- Interpolation would add latencies. This may not be so with extrapolation, however, it would still add computations.
- The preferred approach is to insert “missing data tag”, i.e. NaN value.
- WG to consider “multiple output streams” in case the Up conversion is not an integer multiple.
- Data modified flag can be used to notify this.

o Down Conversion

- The proposed approach is acceptable: Discourage M-class decimation; include informative Annex: explaining pros/cons of decimation; End applications cannot compensate for Aliasing problems introduced by decimation. Therefore, this M-class decimation should be avoided.
- Data modified flag can be used to notify this.

• Communications

o Only include “Capability to receive/send synchrophasor data”

o Do not include other items, such as support of multiple protocols; physical layer ports; transport or internet layer protocols (TCP/UDP; IPv4 and IPv6).

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 28 attendees; 6 members and 22 guests.

WG chair provided some background material concerning the need for developing a document concerning the impact of HVDC transmission on AC system protection because of the large number of new attendees.

Working group member Harold Kirkham made an impromptu presentation on paper titled “An Introduction to High Voltage DC Networks” that was written by Harold and some of his colleagues at Pacific Northwest National Laboratory.

The WG had several discussions, one in particular that dealt with HVDC breakers. The technology is still developing and that normally the AC breakers would be expected to clear the fault for the system.

One attendee discussed a need to do studies on the grounding points between the AC and DC systems and its effect. This topic will be reviewed further to see if it is within the scope of the report.

An ABB employee has tentatively scheduled a presentation for the September meeting.

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 worked on 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, 30 attendees, computer projector.

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

Chair: Hu, Yi

Vice Chair: Henneberg, G.

Output: IEEE Guide PC37.250

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.

Working group C21 met on Tuesday, May 13, 2014 in Fort Lauderdale, Florida in single session chaired by Yi Hu and Gene Henneberg with 13 members and 11 guests attending. Three of these attending members signed up at this meeting. However, at the beginning of the meeting we did not reach a quorum to approve the minutes from January 2014; these minutes will be circulated by email for approval. Yi Hu reviewed the IEEE patent slides.

The PAR has been approved by IEEE SA and assigned the number C37.250.

Following introductions, working group attendees concentrated primarily on the draft outline. Several people volunteered to write specific sections.

1. Overview

2. Normative references -- Roger Whitaker and Phil Beaumont volunteered to research any normative references from IEEE and CIRGE, respectively.

3. Definitions

4. SIPS Overview

4.1 SIPS design process overview (Manish, Alex, Wang)

4.2 Types of SIPS(Yi)

4.3 SIPS covered in this guide (Tony)

5 Engineering A SIPS

5.1 Detailed system engineering design process

5.2 SIPS engineering design considerations

5.3 SIPS engineering design considerations

6 SIPS Implementation

6.1 SIPS implementation process overview

6.2 SIPS testing during implementation

7 SIPS Management

7.1 SIPS management philosophy

7.2 SIPS operation management

7.3 SIPS maintenance management

8 Summary

Annex A (informative) Bibliography

WECC RAS Design Guide (2006)

NERC SPS white paper (2013)

IEEE C37.233

Other subjects not yet assigned to specific sections

Redundancy

Reaction to failures to operate, operation when not intended

NERC and other standard-setting organizations

Arming and alarms

Operator interface (local, remote)

C23: Coordination of Synchrophasor Related Activities

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

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

Output: Coordination with other industry groups

Assignment:

The ongoing task force will provide three main functions:

- 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.

Meeting Agenda

1. Introductions: 7 members and 9 guests attended
2. Approval of the January 2014 meeting minutes
3. Update from March 2014 NASPI meeting
 - a. EATT
 - i. : working on the RAPIR report, data sharing (mechanisms for facilitating sharing data with researchers).
 - ii. gathering datasets for the upcoming workshop, voltage stability and oscillatory stability.
 1. reported that we have had some vendor interest for the workshop, working on facilitating more vendor participation
 - iii. Next EATT conference call is TBD.
 - b. DNMTT
 - i. reported there are four sub-teams:
 1. Gateway – developing use cases, leveraging WISP
 2. Network – this one is getting the most traction. Pushing the survey, panel on networking, getting current projects to talk about network effectiveness, data quality issues, standards implications, interrelated issues.
 3. Cyber security – still somewhat vague
 4. Data – request for broader input on any experiences with data quality to coordinate with this sub team.
 - c. CRSTT
 - i. reported that video libraries have been collected and posted to the website
 1. we need to get an announcement out announcing that these have been posted
 - ii. Identified 7 areas where they are working on documents, see presentation previously posted
 - iii. Presented at Feb. NERC ORS meeting, will have a presence at the Sept. meeting
 - iv. Contributing to section 5 (applications) of the RAPIR report.
 1. will provide a status update of the RAPIR report.
 - d. PRSVTT
 - i. discussed three outstanding projects:
 1. guide of PMUs in multifunction devices, guide sent out for comments, will be finished during the May 30 conference call, send to IEEE
 2. Application requirements and benefits – TBD

3. Data repository and archiving – the IEEE PSRC will be the week of May 12 (how much data for what purpose, how fast to retrieve, data storage architecture, redundancy, data clients, storage, capabilities, etc.)
 - a. please send drafts to the leadership team so the other task team leads can engage as necessary for things they are interested in pursuing.
 - ii. we need to get a list of all of the guides, linked from NASPI website (references page)
 - iii. Farnoosh introduced the IEEE tutorials that Vahid has been facilitating at IEEE IGST in January, T&D Expo last month, upcoming PES GM in July
 1. we will ask IEEE to see if we can get this material posted, most of the content has all been previously posted on the NASPI website, although the tutorials do get updated as new information becomes available., particular around success stories.
 - a. previously received permission from IEEE to post materials because of the relationship and coordination of NASPI and DOE in the development of the materials.
 - e. October meeting in Houston TX. SAVE THE DATE: Oct 22-23 plus some time to attend some CIGRE sessions by invitation
 - f. Use the NASPI website to access any of the task teams
 - i. <https://www.naspi.org/>
4. IEEE Workgroup Activity

	Title	Status
C4	Guide for Phasor Data Concentrator Requirements for Power System Protection, Control, and Monitoring	Complete
C5	Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMU) applied in Power System Protection and Control	Complete
C19	Standard for Phasor Data Concentrators (PDC) for Power Systems	In progress
H11	Revision of C37.118 Synchrophasor Standard	Complete
H21	Development of standard Mapping between C37.118 and IEC61850-90-5	PAR Approved?

5. Synchrophasor Related IEEE standards, guides, etc.

Standard Number	Name	
1344-1995 (R2001)	IEEE Standard for Synchrophasors for Power Systems	Superseded by C37.118-2005
C37.118-2005	IEEE Standard for Synchrophasors for Power Systems	Active
C37.118.1-2011	IEEE Standard for Synchrophasors for Power Systems - Measurements	Active
C37.118.1a-2014	IEEE Standard for Synchrophasors for Power Systems – Measurements	Active
C37.118.2-2011	IEEE Standard for Synchrophasors for Power Systems – Communication	Active
IEC 61850-90-5	Use of IEC 61850 to transmit synchrophasor information according to IEEE C37.118	Active
C37.111-2013	Measuring relays and protection equipment – Part 24: Common format for transient data exchange (COMTRADE) for power Systems	Active
PC37.242	Guide for PMU Synchronization, Calibration, Testing, & Installation	Active

C37.244-2013	IEEE Guide for Phasor Data Concentrator Requirements for Power System Protection, Control, and Monitoring	Active
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6. Other updates
7. Future work
 - a. guide of PMUs in multifunction devices
 - b. Data repository and archiving (Guide, report, what?) Likely not to be housed in PSRC but in another IEEE group.
 - c. Application requirements and benefits
 - i. Harold: Applications Reqts. and benefits was a guide started by DNMTT, Harold is tasked by NASPI with continuing the effort.
 - ii. Farnoosh: Someone at PNNL worked on that document.
 - iii. Question: is there a parallel effort going on within NASPI?

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

Chair: Sukumar Brahma

Vice Chair: George Bartok

Output: TBD

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

The task force met on 5/13/14 from 3 to 4:25 PM with 18 attendees (11 members and 7 guests). For the benefit of the new attendees, Sukumar Brahma repeated the 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. The following draft scope of the WG was developed:

For the first part, the insight developed from the results documented in C17 report will be used to form questions for the WTG manufacturers. Their opinion will also be taken as to what they think can be of value.

Members voted to form a WG with the above draft assignment. 12 votes were in favor. C SC has given approval with a condition that we look for similar activities in the PSACE committee. The chair has already contacted them, and in most likelihood, they do not have any activity that would warrant their involvement with this WG, but I will keep you posted.

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

Chaired by: Dean Miller

Note Taker: Gene Henneberg

Output: TBD

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

The task force met with 15 attendees on May 13, 2014 at the PSRC meeting in Fort Lauderdale, Florida.

The primary purpose of the discussion is to determine interest in developing an IEEE Guide on the protection of wind plants. There are significant differences between wind plant collector systems and distribution systems, including:

- The wind plant transformer connecting to transmission voltage is much larger than distribution, with sizes of 100 – 200 MVA not uncommon.
- The large transformers then result in large fault current contributions from the transmission system, perhaps 30 kA or more versus 10 kA, both phase and ground
- Negative sequence quantities on the collector system do not math traditional sources since usually the WTGs do not contribute unbalanced fault currents.

- Feeders have lots of connected generation, but no load.
- Most feeders are concentric neutral cable.

The anticipated subject of the guide would be protection of the wind farm equipment from the transmission line (where applicable), interconnection transformer, the individual feeders, grounding transformers, step up transformers (from the generator to collector voltage, e.g. 34.5 / 0.69 kV), but would not include the generator protection.

None of the participants in today's discussion had specific experience with wind plant collector design and protection. Therefore a decision to produce a Guide seemed at best pre-mature.

CTF-25 requests another meeting at the September PSRC meeting to further explore this topic and see if experienced collector system designers are willing to participate. Request a room for 25 with a computer projector.

OLD BUSINESS

The C13 WG was scheduled but did not meet. Since the WG has not met for several years and its work is complete, it is being disbanded

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

NEW BUSINESS

The C37.233 Testing Guide is also up for re-affirmation. A prospective Task Force for this purpose will be discussed at Milwaukee.

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 May 14, 2014 at 3:00 p.m. with 23 members and 20 guests present.

Following introductions, a count of SC membership was made, and it was determined a quorum was present (23 out of 44 members present).

Minutes from the January 2014 meeting in New Orleans were approved.

The Chair reviewed items of interest from the Advisory Committee:

Eight working groups gave reports on their activity.

Reports from the WG Chairs:

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

Chair: Meyer Kao

Vice Chair: Elmo Price

Output: Report to the Line Subcommittee of the PSRC

Established: September 2009

Expected completion date: MAY 2014

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

D3 working group held its meeting on Monday May 12th, 2014, at 4:30 PM with 20 attendees, of which 9 are guests.

The final draft of the report has been balloted and approved by the members of the Line Subcommittee. Comments from the members of the Line Subcommittee were addressed during the meeting. The final revised report will be submitted to the Line Subcommittee.

There was a discussion of creating a presentation for this paper to present to the Main Committee and for future technical conferences. The chairperson will work with the vice-chair and creating a presentation. Gary Kobet will also assist with the presentation. A draft of presentation will be distributed to the members of the working group for discussion at the January 2015 meeting.

The D3 working group will not meet at the next PSRC meeting in September 2014.

D6: AC Transmission Line Model Validation

Chair: Tony Seegers

Vice Chair: Sam Sambasivan

Established: January 2009

Assignment: 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, May 13, 2014 at 8.00 a.m. with 5 members and 6 guests present.

The D6 working group has completed its report and approved draft was sent to all the subcommittee members. The vote from D-SC member is required for this report, due **July 1, 2014**. Reminders will be sent two weeks and one week prior.

The next steps for the working group were discussed during the meeting. The working group will prepare a presentation to be given at the Main committee and the required slides will be prepared after the approval of the document. In the next meeting, any comments coming from the review will be discussed and resolved.

For the September 2014 meeting, a single session is requested for 30 people with a computer projector.

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

Chair: Rick Taylor

Vice Chair: Don Lukach

Established: September, 2011

Expected Completion Date: September 2014

PAR Expiration Date: 2015

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

WG Draft Guide (Draft 5.1)

The D19 working group met in a single session on Tuesday, May 13, with 15 of 19 (78.9%) balloting members present. All present voted to approve the minutes. Also in attendance were 3 corresponding members, and 18 guests. The balloting and correspondence member lists do not require revision at this time based on attendance.

Between the January and May meetings, Gary Kobet revised the draft into the new SA format. All contributions outstanding from last meeting were then incorporated into Draft 5.1 and sent to the WG members prior to the May meeting.

At this May meeting, all comments were discussed with resolutions determined. The changes are to be incorporated by the Vice-Chairman, as discussed at this meeting, into a new draft. A vote was taken and passed unanimously to submit the new draft for balloting. The new Draft will be 6.0. The proposed timeline for the ballot would be July – August in order to support comment resolution at the September meeting.

The September meeting will require a double session, computer projector, and a room for 40 attendees. No conflict with D28 and K6 is requested.

Revised: As of July 28 2014 e-mail, the WG decided to defer meeting in September due to the balloting process.

D26: Revision of C37.114 Fault Location Guide

Chair: Joe Mooney

Vice Chair: Randall Cunico

Output: IEEE Standards Guide

Established: 14 Jan, 2010

Expected Completion Date: December 2014

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

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

There were 21 attendees with 12 members (10 Balloting & 2 Corresponding) and 9 guests. There are 17 balloting members on the Working Group so a quorum was achieved.

Minutes from the January 2014 meeting in New Orleans were approved.

The guide went to ballot on April 8. Balloting was closed on May 8, 2014. The ballot met the 75% returned ballot requirement. The guide received a positive response with a 95% approval rate; 80 total votes, 76 approved, 4 disapproved. There are a total of 219 comments. The working group will be evaluating comments and providing responses.

The working group was able to address 32 of the comments during the meeting. The remaining 187 comments will be addressed by a group of 6 volunteers who will be independently addressing roughly 30 comments each over the next 30 days. The chair will assign the comment range to be addressed by each volunteer; Joe Mooney, Randy Cunico, Brian Boysen, Karl Zimmerman, Pat Carroll and Tony Seegers.

Once the comments are addressed, the guide will be recirculated for 10 days with comment resolutions, revisions or rejections.

RevCom SASB Submittal Deadlines remaining in 2014 are July 11 and October 20. The Working Group is confident that we will complete the recirculation and submit to RevCom by the October 20 deadline.

The requirements for the next meeting are a single session, meeting room for 30 people with a computer projector.

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

Chair: Solveig Ward

Vice Chair: Bruce Mackie
Established: September 2010
Output: IEEE Guide PC37.243

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

Scope: This guide presents practical line current differential schemes using digital communication. Operating principles, synchronization methods, channel requirements, current transformer requirements, external time reference requirements, backup considerations, testing considerations and troubleshooting are included. It also provides specific guidelines for various application aspects including multi-terminal lines, series compensated lines, mutual coupled lines, line charging current, in-zone transformers and reactors, single-pole tripping and reclosing, as well as, channel and external time source requirements.
Par expiration date: Dec 31, 2014

WG D27 met on Tuesday, May 13, 2014 at 9:30am EDT in a single session with 3 voting members and 13 guests. A quorum was not achieved so the past minutes will be approved via email.

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

The scope of the PAR was reviewed.

A ballot pool is being formed so the document is ready.

The terminology review suggested many words which could be included in the definition section. A team was formed to review these words and make a recommendation.

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

Chairman: Brian Boysen

Vice Chair: Claire Patti

Established: 2013

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

Draft :1

Expected Completion Date: 2018

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

The working group met in Ft. Lauderdale, FL on Wednesday, Wednesday 14th 2014, 8:00am Eastern time.

There were 18 members and 3 guests. The attendance list is attached.

The patent slides were presented.

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

The working group now has an active PAR as of March 28th, 2014.

The working group reviewed the comments submitted by the review teams for sections 4 and 5 of the draft. The review was completed through section 5.4.1 and will continue starting with section 5.4.2 in September

Fred Friend agreed to harmonize the list of fault sources in section 4.1.1 with the terms used in T&D standard P1782.

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

Fred will follow up with Chuck Mozina to determine which standard has replaced the IEEE Red Book for the references in section 4.

Section 5.1.1.5 will be re-titled “Impedance grounded system”

There was discussion about references to reports and guides and the group decided that references should be more in the format of “For additional information see...” as opposed to “<chunk of information> as included in...” to prevent the guide from getting out of sync with the referenced material.

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

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

Writing Assignments:

Assignments were made to add or revise the following sections:

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

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

Review Assignments:

Assignments were made to review existing sections of the guide:

- Section 6: Joe Mooney and Jacob Lien volunteered to review.
Review comments on existing sections are due August 1st. Word format is preferred.

Old Business:

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

For September we would like a single session with room for 40 and a projector. We would appreciate if we can avoid conflicts with D19, I2, K16, and K5.

D-29 WG Tutorial on Setting Impedance-Based Power Swing Blocking and Out-Of-Step Tripping Functions on Transmission Lines

Chair: Normann Fischer

Vice chair:Kevin Jones

Assignment:The tutorial will focus on methods of setting impedance-based power swing blocking and out-of-step tripping functions. Specific relay setting examples will be provided. Other methods of detecting an out-of-step condition do exist but will not be discussed.

Established: January 2014

Output: Report

Expected Completion: ??

D-29 met on May 14, 2014 with 14 members and 11 guests; 8 of these members, including 1 corresponding member, signed up at this meeting. Gene Henneberg chaired this meeting in the absence of both Normann Fischer and Kevin Jones. Meyer Kao took notes.

Following introductions, Gary Kobet told the group that we are now Working Group D-29. Gene showed the minutes for the January meeting of the task force.

The Working Group discussed the earlier D6 report (2005) and the difference from this tutorial / report. This new report is intended essentially as an appendix to the original D6 report, so that repetition of that earlier material is not necessary in this report. It was strongly suggested that all WG members download the D6 paper from the PSRC web site and become familiar with it before the next meeting.

Gene provided a draft Title and Assignment statement. There were many participants in the discussion of both, with the results as indicted above.

Gene provided a draft outline for the WG's consideration. After a very active discussion, the following tentative outline was agreed, with some work assignments as indicated.

D-29 OUTLINE

1. Introduction
 - a. Definitions
 - b. Review of relevant material, i.e. D6 paper (2005)
 - c. Power Swing Detection Methods
 - d. PSB and OST Protection Philosophy
 - e. The above items are intended to emphasize that this paper is essentially a settings calculation example appendix to the D6 (2005) paper, which is a vital "previous" document for proper application of this material.
2. Stability Modeling Studies--Phil
How do we convert stability modeling results into relay settings?
3. Relay Loadability Issues—Gene Henneberg
4. Power Swing Blocking
 - a. Concentric characteristic schemes
 - i. Circular
 - ii. Multiple quadrilateral – Joe Mooney and Normann Fischer
 - iii. Multiple lens
 - iv. Blinder Schemes
 - v. Single blinder—Joe Mooney and Normann Fischer
 - vi. Double blinder—John Bradley and Josh Perkins
5. Out-of-step Tripping
 - a. Concentric characteristic schemes
 - i. Circular
 - ii. Multiple quadrilateral – Joe Mooney and Normann Fischer
 - iii. Multiple lens
 - b. Blinder Schemes
 - i. Single blinder—NA, see D6 paper
 - ii. Double blinder—Manish Patel
6. Summary and conclusions
7. References

As testing issues arise, they should be referenced through C37.233.

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

Chair: Karl Zimmerman

Vice-Chair: Ted Warren

Established: Jan 2014

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

The working group met in Fort Lauderdale FL on May 13, 2014 with 11 members and 3 guests.

The WG Chair gave an overview of 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 was presented at the Georgia Tech Relay Conference in May 2014.

The working group discussed the assignment, and decided the new effort should be a tutorial on applications and setting guidelines for specific elements including mho elements, quadrilateral elements (reactance, resistance, 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. Several of the outlined applications were discussed and working group members volunteered for various sections:

CVT transients – Karl Zimmerman
CT Saturation – Rene Aguilar
Transformer Inrush – Alex Lindemeier
Series Compensated Lines – Aaron Martin

We would like the tutorial to expand on applications and settings of distance elements for these and other unique system events, whether actual power system events or simulated power system events (e.g. RTDS testing). We are actively looking for event and simulation data to use for the tutorial.

Another important step is to determine a format for showing the events. Also, we would like to discuss what other applications should be added (e.g. should tutorial include “non-distorted” events like mutually coupled lines, off frequency operation, etc.)

SC Motions to be made to Main Committee

On request of the D19 Working Group, the Vice-Chair made the following motion to the Main Committee: “Mr. Chair, the Line Protection subcommittee requests approval for transmittal of the Guide for Protective Relaying Applications to Transmission Lines, C37.113, to the IEEE Standards Association for balloting.”

The motion was seconded by Don Lukash and was passed by the Main Committee vote.

Coordination Reports

None

T&D Committee / Distribution Subcommittee

The T&D Committee / Distribution Subcommittee 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 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’

Dr. Murty Yalla is leading an 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

We had a discussion about the IEEE device numbers for out-of-step relays (68, 78), and that there is confusion over which is the proper device number to use. We are in the process of trying to contact John Tengdin about this.

Also, we had a discussion on setting additional distance zones for backup protection based on the need for local and/or remote backup, depending on the utility’s philosophy.

General Discussion

None

Line Protection operations of interest

Gary Kobet reviewed the misoperation of a summation bus differential due to a lifted residual wire on a breaker CT’s contribution to that circuit.

The meeting was adjourned at 5:45 p.m.

H. RELAYING COMMUNICATIONS SUBCOMMITTEE

Chair: Eric Udren

Vice Chair: Eric Allen

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

The Subcommittee met on May 14, 2014 with 19 members of 32 total, comprising a quorum. 46 guests were also present. Minutes of the January 2014 New Orleans, LA meeting were approved without objection.

The Chair presented several announcements:

- WG Chairs were reminded that minutes are to be provided to the SC Vice-Chair within 1 week following the meeting and to attendees and WG members within 2 weeks following the meeting.
- Working groups who use web meeting capabilities to accelerate were congratulated. Working groups are reminded that web meetings are official meetings and the P&P meeting rules must be followed.
- Working groups are reminded to pay attention to their PAR completion dates.
- A number of IEEE Guides maintained by PSRC subcommittees are scheduled to expire in 2018. Subcommittees are asked to consider letting some Guides expire and instead be kept as working group reports to the Main Committee. Such reports could also be available on the IEEE Store with free access for IEEE PES members.

- Members are encouraged to prepare presentations of their work for future meetings of the PSRC Main Committee. No working groups indicated readiness to present at the May or September 2014 Main Committee meetings. H11 was identified as a WG which is ready to make such a presentation.
- A new P&P manual was issued on March 28, 2014. There are serious requirements for attendance tracking, record keeping, and other factors that impact the operation of meetings and handling of membership lists.
- SC members are reminded of the standard format for e-mail ballots. WG Chairs are strongly encouraged to use this format for conducting any e-mail votes within the WG.

WG business:

The name of WG H22 was changed to: "Guide for Categorizing Security Needs for Protection Related Data Files," as a PAR application with a previous name for the WG was rejected, ostensibly due to the inclusion of the word "cyber" in the WG name.

The H24 working group requested subcommittee approval to move the revised standard C37.238 "IEEE Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications" to sponsor ballot.

The SC voted unanimously to approve the movement of the revised standard C37.238 that is proposed by the H24 working group to sponsor ballot.

Reports from the WG Chairs

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

Chair: Marc Benou

Vice Chair: Iliia Voloh

Output: Guide

Established: 2006

Expected completion date: December 2013

Assignment: Develop a summary paper of C37.236.

The H1 working group met with 4 people. After introductions, it was explained that the guide was already published. The task of the working group is to write a paper and a presentation on the Guide.

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

The chair will create a paper and distribute it to the members and guests to review and comment. The goal is to have the paper to a point where it can be submitted to WPRC has been missed. We will move as quickly as we can.

Status: Draft 1

H3: Time Tagging for Intelligent Electronic Devices (COMTAG)

Chair: W. Dickerson

Vice Chair: J. Hackett

Substations C4 Co-Chair: M. Lacroix

Output: Standard

Established: 2006

Expected completion date: December 2016

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

The WG met on Tuesday, with 6 members and 7 guests in attendance. The patent policy slides were shown, and no issues were identified.

The group continues to show declining attendance due to remaining conflicts, and perhaps off-campus alternative attractions.

The latest draft, version 0.3, is now in a 'clean' IEEE standards format. The WG spent the session discussing several issues, the most interesting of which is the best method to handle UTC and TAI time tagging. The group seems to be moving toward a consensus on this issue.

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

H6: IEC 61850 Application Testing

Chair: C. Sufana

Vice Chair: B. Vandiver

Output: Report

Established: 1999

Expected completion date: December 2014

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

Introductions were done after a welcome by Chair Charlie Sufana. There were 12 members and 13 guests present for the May 13, 2014 meeting.

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

Herb Falk gave a quick update on IEC-61850 standards writing activities. He indicated that there is work going on concerning Encoding Rules. Herb also said that the UCA Interoperability Report should be coming out in a few weeks.

Herb then asked what was meant by testing. There was a lively discussion. Veselin Skendzic said there are really 3 levels of testing; design, commissioning, and periodic.

Herb indicated that the testing could have issues if, for example, all breakers of a RAS (Remedial Action Scheme) system were to be operated at one time. He indicated that he would be able to provide a Southern California Edison white paper that discusses the testing.

Discussion followed on editing sections of the report. Some of the clauses will be moved and some will be incorporated into another. Topics that were also discussed that could be added to the report include: testing each group if there are multiple setting groups, defining the test philosophy, and whether simulated signals are to be injected into the current/voltage inputs or into the relay as a file.

The Chair also petitioned the group to provide any user installed implementation of GOOSE based schemes – either a write up of the application and what was tested or documentation of the actual test cases used to verify the operation. Aaron Martin, Chris Chelmecki, Dan Reckerd, Herb Falk, Rene Aguilar, and Mouad Oubidar all volunteered to provide addition clauses.

Remaining writing assignments are requested to be provided by August 15, 2014.

H9: Understanding Communications Technology for Protection

Chair: R. Midence

Vice Chair: A. Oliveira

Output: Report

Established: 2005

Expected completion date: June 2013 (Completed)

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

The Working Group H09 met in Room Crystal Salon II, Hotel Hyatt Regency Pier Sixty-Six, Fort Lauderdale, FL, USA on May 12, 2014 at 4:30 pm. Six (6) members and ten (10) guests were present.

Discussion

The chair provided updates on the tutorial presentation in the TEXAS A&M on March 31st, 2014. The following are the highlights of the event:

- The Tutorial was delivered by Miriam Sanders – SEL, Chris Chelmecki – Basler Electric, and René Midence – ERLPhase Power Technologies
- There were about 25 participants most of them stayed through the entire event
- The Tutorial was scheduled for 6 hours but lasted about 7 hours
- The Tutorial includes a great deal of information difficult to assimilate in 7 hours, however the objective of covering the basics was achieved
- A second objective of the Tutorial is to communicate the fact the IEEE PSRC is a good source of information on the matter of communications for protection and control
- The objective of promoting the IEEE PSRC was also achieved
- Due to the amount of information available on the report that was produced by the working group, the Tutorial could be tailored to cover the topics of interest for a particular technical conference

The chair informed that communications were sent to the Western Protective Relay Conference and PAC World Americas Conference requesting the tutorial to be included in their programs.

If the Tutorial is accepted in both conferences, the chair requested for volunteers to help delivering the material at future conferences since those we delivered the Tutorial at Texas A&M may not be available at future events. The chair requested for volunteers to have a pool of members capable of delivering the material. The following participants volunteered to assist:

- Herb Falk – SISCO
- Tony Bell – Ametek
- Galina Antonova – ABB

For additional volunteers, the chair will make a request to the members that were not present during the meeting.

The working group made suggestions of other events where the Tutorial can be proposed as follows:

- Wester Protective Relay Conference
- PAC World Americas
- PAC World Europe
- PAC World Brazil
- GA Tech
- IEEE PES General Meeting
- IEEE T&D Conference
- CIGRE Meeting in Toronto
- Power and Energy Automation Conference former Western Power Delivery Automation Conference
- IEEE IAS Petroleum and Chemical Industry Committee (PCIC)
- Utility Telecom (UTC) – This conference was suggested as a venue to educate communication engineers on the communication challenges of Protection & Control Engineers
- Hands on Relay Conference

The next task for the working group now that the Tutorial has been completed and delivered successful at Texas A&M, the chair suggested that it was time to focus on the promotional paper that was put on hold while work was focused on the completing the Tutorial. It was agreed that that the last draft of the paper will be reviewed and revised as required. It was agreed that the length of the paper (32 pages) should not be an issue for certain conferences; therefore the effort should not be to condense it but to polish it. Jim Niemira volunteered to review the paper.

It was also suggested that the paper could be a good subject to be covered in magazines such as the one published by PAC World. It was suggested to break the document in three parts and propose the publisher to include the paper in three parts. Bob Beresh volunteered for the task of splitting the paper in the three parts.

H11: C37.118.1 Standard for Synchrophasors for Power Systems

Chair: K. Martin
Vice Chair: A. Goldstein
Output: Standard
Established: 2006

Expected completion date: December 2013

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

Introductions and attendance list: Total attendees: 21, Members: 10 of 20, 11 Guests

Patent announcement and slides shown

Minutes from January 16 / 17 2014: New Orleans (approved by email vote)

Status of IEEE Std. C37.118.1a-2014:

Now available to the general public online at IEEE XPLORE.

Status of Transaction Papers:

The H11 paper was finished in February and submitted for the H subcommittee for approval in March. Yesterday we received comments from Sam Sciacca. The H Subcommittee vote is this afternoon at 3 pm. The process states that is needed to be followed by Main RC approval and then we can send to a journal for publication.

The H19 paper has been accepted for publication in IEEE Transactions for the Smart Grid. A presentation will be developed and given by Ken Martin at the January 2015 PES meeting

PSRC H11 / IEC TC95 Joint Working Group 1 (JWG1): IEEE – PSRC 60255-118-1

Proposed time line: CD#1 October 2015, CD#2 March 2016, CDV December 2016, FDIS July 2017, IS December 2017.

(CD = Committee Draft for Comments, CDV = Committee Draft for Vote, FDIS = Final Draft International Standard, IS = International Standard)

Discussion of prioritized changes spreadsheet:

Display of revised spreadsheet sorted in order of high, medium, low priority with an additional column for Task Force Leaders.

Volunteers solicited to organize and lead task forces to discuss, develop use cases (which may or may not be included in the final standard) propose, and draft standards clauses for the high priority changes. Task force leaders:

Reduction of the number of required reporting rates: Jay Murphy/ Gustavo Brunelli

Clarification that PMU only needs certification for 50 or 60 Hz, M or P class (not necessarily all): Jay Murphy/ Gustavo Brunelli

Clarification of latency requirements (if needed): Goldstein

Edit the compliance verification requirements; as presently stated they may not be adequate: Goldstein

Clear up ambiguities in testing requirements: Dan Dwyer/Dean Oulette

Temperature testing: Bill Dickerson

Should testing under other environmental conditions be included? Bill Dickerson

Leaders are expected to form task forces, work on proposals on teleconferences, and present them at the next (double session) meeting in September. Allen will send an email to TF leaders and all members/guests to introduce the task forces.

New Business

Allen will lead a task force to work on a proposal to hold a 3-day work meeting of the Joint IEC/IEEE synchrophasor working group. Possibly to take place Q4 2014 or Q1 2015. Possibly to be located at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD, possibly to be co-located

with IEEE Joint Technical Working Group meeting in Garden Grove, California, or possibly to be hosted by an IEC JWG member country other than the United States.

Detailed discussion and editing of the H11 working group transactions paper. The revised paper has been sent to the H subcommittee and to all members and past guests of H11.

Chair asked for other new business, there was none.

Meeting Adjourned.

Next face to face meeting: September 8-11 PSRC meeting, Milwaukee, WI

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

Chair: E.A. Udren

Vice Chair: R. Beresh

Output: Report

Established: 2008

Expected completion date: December 2014

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

The Working Group met on May 13, 2014 with 11 members and 19 guests. The Chair briefly reviewed the existing draft with outstanding items, and told the group it would be recirculated by the end of May.

Herb Falk presented the draft UCA IUG PICS (Protocol Implementation Conformance Statement, per IEC 61850-10 conformance testing process) for an Ethernet switch to be used in IEC 61850 networking. There is a particular focus on properties or behavior of a switch that could impact GOOSE handling, as well as reliability services like RSTP. The WG had a number of suggestions, comments, observations, and learnings:

- Herb explained that not all switches have 8 separate queues for 8 priorities – a fact to establish with vendor and PICS.
- RSTP times depend on simple ring versus complex network mesh. In some situations, turning on auto-negotiation for ingress and egress ports speeds up RSTP recovery, counterintuitively.
- A UCAIUG report will be available on the results of the previously reported IOP interoperability tests for networking equipment.
- Mixing switch vendors can lead to unpredictable results – implementations of standard services vary. Need compatible versions or interpretations of RSTP. Should test RSTP in lab.
- Ken Fodero proposed to update RMON in table.

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.

29 attendees.....quorum not met (quorum was not expected since Substations does not meet jointly during the May meeting)

Proposed comment resolution was completed. WG ballot to go forward with recirculation will be initiated next week (via email). Submission of the document to RevCom is expected to occur in Sept-Oct (3 months before expiration of PAR).

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.

4 members and 5 guests were present.

Christoph Brunner presented the WG work so far.

There is a current version of the report that will be sent to the participants.

Sergiu Paduraru commented, that there are multitude of WG that are working pretty much disconnected on the subject matter and still don't tackle the problem he sees: (1) Do we want to run disturbance recording in a traditional way (by files written in COMTRADE) or we want it run in a streaming way ("almost real time"), with saving data only as a by-product of the process. (2) whatever decision on point 1, isn't the target to get disturbance information in a structured, XML way that would allow to pinpoint the source? Conclusion on point (1) was, that so far, the work analysis what we have today; but it may be part of the report to recommend future work that goes in the direction of streaming disturbance data.

It was discussed that, when the information is coming from a MU, the whole SCL file needs to be analyzed in order to correlate the disturbance recorder channel to the actual information source.

Schedule was discussed – target is to have finalized the use case capture by the end of 2014 and to have results of the use case analysis (so a complete draft) at the end of 2015. Analyzing the gaps will be of outmost importance and requires the right people with a broad knowledge.

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

Chair: Yi Hu

Vice Chair: A. Goldstein

Output: Report

Established: September 2012

Expected completion date: December 2016

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

Working group H21 met on Tuesday, May 13, 2014 in single-session chaired by Yi Hu and Allen Goldstein with 18 people (6 members and 12 guests) attending.

The working group reviewed and discussed the updated outline and the progress of the assignment. Mark Adamiak has prepared some initial text for the purpose of the document, and will send this to WG chairs for include it in the next draft. For topics discussed at the meeting, several WG members had volunteered to work on the initial materials for specific sections.

- Use cases – Mital will provide descriptive text.
 - Conceptual architecture – Mark Adamiak will work on this section. Herb Falk will assist. Consider substation committee's WG C14 DNP-61850 mapping powerpoint about the Conception Architecture from P1815.1. When ready we will have a conference call.
 - o Question: What is the difference between the conceptual architecture and use case?
- Have a look at what Mark/Herb come up with and discuss moving or combining the sections.

- o Question: Mapping of a 118 CFG global ID? Mark, Allen, Herb.
- Discussion of Section 7: Mapping of data structure. What occurs when a logical device outputs multiple data streams? Should they mapped into multiple streams or aggregated first? Allen, Mital, Mark will discuss this offline,. Yi Hu will ask Ken and, Christoph if they want to participate.
- Discussion of the 64K limit of c37.118 – Data and config messages that are too big – (should this be addressed in the PDC guide?)
- Mapping of abstract communication service interface.
 - o example: of 61850 getDeviceConfiguration
 - o Can be done with a UML diagram.
 - o Question: Are we going to allow dynamic configuration of the data sets?

The need to form small task force to work on specific topics was discussed. Two task forces will be formed to address the following topics:

- Conceptual architecture and use cases – Mark lead
- IEEE C37.118.2 and IEC 61850-90-5 encoding details – Allen lead

The lead of each task force will organize and lead the discussion and development work of the assigned topics through teleconference calls between PSRC meetings and provide results for WG member to review and discuss at next meeting.

H22: PC 37.249 Guide for Categorizing Security Needs for Protection Related Data Files

Chair: Caitlin Martin

Vice Chair: Dylan Jenkins

Output: Guide

Established: September 2012

Expected completion date: January 2019

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

H22 met with 9 members and 9 guests.

Caitlin outlined situation with the PAR and activities since January to gain approval. Major change was to remove the term ‘cyber’.

The group discussed whether we should incorporate Michael Dood’s comments that the scope should be for Protection and Automation related data files. Proposal was approved.

Herb Falk raised that TC57 WG15 is publishing guide shortly for ‘data at rest’ the H22 report should reference this document. Herb will be asked if he can present this information at next PSRC meeting, especially relating to XML.

The PAR was reviewed by the working group and some additional minor changes were made and agreed to. One comment not incorporated into the PAR was that the guide should make reference to the standards ISO 27002 and 0019.

The PAR is expected to be approved before the next PSRC meeting in Milwaukee. Caitlin needs to send the new marked up PAR to Lisa (NESCOM administrator) so that these changes are made in time for the NESCOM next month.

Dylan Jenkins will chair the next working group meeting in Caitlin’s absence. The objective of this meeting will be to identify what types of devices and file types need to be covered in the WG H22 report, and to review the WG 18 report.

H23: Guide for Naming Intelligent Electronic Devices (COMDEV)

Chair: R. Cornelison

Vice Chair: E. Allen

Output: Guide

Established: January, 2013

Estimated Completion Date: January, 2017

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

The Working Group met on Tuesday May 13, 2014 with 7 members and 4 guests.

The minutes from the January meeting were approved.

Draft 1 was distributed prior to and at the meeting.

Discussions centered around what fields are necessary and redundancy and the fluidity of some of the fields. The next draft should address all of these concerns.

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

Chair: G. Antonova

Chair SubC7: Tim Tibbals

Vice Chair: Bill Dickerson

Output: Standard

Established: January, 2013

Estimated Completion Date: May, 2014

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

Working Group H24 met on May 14, 2014 in Ft. Lauderdale, FL in a single session with 21 attendees (8 members, 13 guests). After introductions, the co-chair presented IEEE IP policy slides and asked to identify any potential pattern issues related to this work. None were identified. The quorum was achieved. January 2014 meeting minutes were approved electronically prior to this meeting.

Co-chair provided an update on project status. Working Group comments resolution was completed. PC37.238 draft dated April 30, 2014 was distributed. Working Group vote on submitting the draft to IEEE Sponsor Ballot was conducted. 100% participation and 75% approval was achieved.

A number of editorial and minor technical comments were received. As the quorum was achieved it was decided to reach consensus on these items at this meeting, and update the draft accordingly.

The following decisions were made:

1. Move clause 5.14 into an informative Annex F. Remove "NOTE" and "grandmaster capable" from the text.
2. Include 5 bullets into D 2.3 (multiple local time zones support). Review byte numbering as editorial.
3. Leave requirement for mandatory TLV order unchanged.
4. Keep default domain number as 238.
5. Change wording in the introduction: modify bullet on the MIB and add a bullet on mixed profile operation.

Bill Dickerson moved Jay Murphy seconded to approve these changes to the draft. This was approved unanimously by Working Group members in attendance.

Ways to provide feedback to IEC TC57 WG10 were discussed next. The next WG 10 meeting is on June 2, 2014. It was suggested to issue PC37.238 draft to WG10, and provide an accompanying statement pointing to specific clauses that address WG10 comments. This approach was supported. Erin Spiewak, IEEE-SA liaison, agreed to put a disclosure on the PC37.238 draft for submission to IEC TC57 WG10.

A presentation on clock MIBs was given by Herb Falk, based on IEC TC57 WG15 activities. It was agreed to provide IEEE C37.238-2011 MIB to WG15 as it contains the list of MIB objects for C37.238 clocks.

H25: Review of C37.94

Chair: M. Benou

PSCC Co-Chair: Roger Ray

Vice Chair: D. Jenkins

Output: Standard

Established: September 2013

Estimated Completion Date: December 2015

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

H25 met with 9 members and 3 guests. After introductions, the present status of the working group was reviewed. The par has been submitted but IEEE is waiting for approval from PSCC. We are scheduled for the June meeting and if PSCC has not been heard from by then, a decision will have to be made on whether PSRC should proceed alone on this revision.

The working group thus far has agreed not to change the protocol that is currently in the standard. The WG has also agreed to add 1310 singlemode fiber to the revised standard.

The WG then discussed connector types and the advantages and disadvantages of opening up the standard to include connector types other than ST. After a thoughtful discussion, it was determined to open the standard up to other connector types and remove the ST requirement. This decision was based on:

- The flexibility of having multiple options available
- Preventing a single fiber head vendor from obsolescing a product and therefore obsolescing the standard
- Allowing for the trending of other connector types popularity
- General feedback from utilities that having fiber optic cables with differing connectors at each end is not a hardship

The revised standard will have to have a section added that requires the vendors of C37.94 equipment to specify the type of connectors that will be supplied.

Next we discussed the transmit and receive levels that should be specified. It was agreed that the multimode levels should remain as they are in the current standard. It has been suggested to use the same levels for the singlemode standard as well.

It is the assignment to all WG members to supply the chair the specifications of the singlemode transmitters and receivers they currently use in their equipment. This is to include max transmit level, min transmit level, max receive level and min receive level. Specification sheets are preferred but a written description will be accepted.

Based on the responses, the WG will determine the appropriate singlemode levels for the standard at the next meeting.

The WG has found no other changes that need to be addressed in the revision. Once the levels are determined, the document will be written.

It is asked that Roger Ray, as PSCC Co-chair, contact Dan Nordell, chairman of PSCC, to facilitate his approval of the PAR.

H26: COMTRADE Conformity Assessment

Chair: R. Cornelison

Vice Chair: J. Gosalia

Output: Report

Established: September 2013

Estimated Completion Date: January 2015

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

The Working Group met on Tuesday May 13, 2013 with 8 members and 3 guests.

Minutes from the January meeting were approved.

Draft 1 of the Report was distributed prior to and at the meeting.

Outstanding assignments were discussed. Ratan Das and Amir Makki will collaborate on testing of the DAT file. We decided to address the file format as well as some data in the Testing Methods and Tools section to be written by Jay Gosailia.

Members were encouraged to read and provide comments on the Report

Assignments are due July 1.

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

Chair: C. Chelmecki

Vice Chair: Dylan Jenkins

Output: Standard

Established: September 2013

Estimated Completion Date: September 2017

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

The Working Group met on January 14, 2014. There were 10 members and 14 guests present.

Introductions

Presentations

- 1) Jörg Blumschein, from Siemens, presented the current Siemens SIPROTEC 5 solution for Settings in SCL Files
 - SIPROTEC 5 models all protection settings according to IEC 61850, and can be exported into an ICD file
 - Dependencies between different settings are managed by making certain settings read only
 - Attributes that are not defined in IEC 61850 are declared using separate namespaces according to the rules of IEC 61850
- 2) Christophe Brunner of IT4Power presented: Format Structure Concepts
 - a. Hierarchy of Logical Devices are managed in IEC 61850 Edition 2 (using attribute GrRef)
 - b. Every manufacturer will model hierarchy differently, so should objective of COMSET should be to propose the hierarchy to be used (the 'profile')
 - c. The working group should start a draft proposal for a universal hierarchy
- 3) Chris Chelmecki of Basler Electric presented: Applying XML extensions to COMSET
 - a. Purpose is to outline COMSET validation possibilities so that 'comset compliance' can be proven
 - b. Herb Falk described how 61850 is being converted into UML for this purpose. The CIM tool is used to create 'profiles' e.g. overcurrent protection based on UML model
 - c. Also, ENTSO-E is defining standard profiles for interchangeability - could be some re-use potential for this working group

Scope Discussion

- 1) Retain XRIO as a format for vendor specific settings?

Feedback from group: If there is interest in either standardizing XRIO or creating a guide to using proprietary settings in SCL files, interested parties should present a proposal to the subcommittee.

- 2) Is COMSET export only?

The group will attempt to make settings imports possible. Settings will need to be evaluated on a case by case basis. The method currently used by Siemens to handle settings that are co-dependent is to make one of the settings read only.

- 3) Coverage Detail (What settings should be covered)
 - I. Initially plan to cover all common protection elements
 - II. Other Settings

To make a start on the work package Chris proposed a list of logical nodes that requires feedback. Eric Udren proposed starting by building a profile for a typical distribution feeder relay (Tony volunteered to lead this assignment)

All manufacturers (ABB, Siemens, Basler, Alstom Grid, GE) will share their device manuals that detail available settings for a distribution feeder application for this purpose

Herb Falk asked that an interoperability use case is proposed for UCA-interop event next year

Two outcomes from this work are expected:

1. Definition of the model for distribution feeder (standard model profile)
2. Definition of new setting extensions (using UML) that are missing in IEC 61850

Working Group will need to define if settings are not being used, how will this be managed in COMSET?

Two possible options:

1. Use the mod attribute from 61850 to indicate "off"
2. Remove the LN entirely from the SCL file

To answer this question the WG needs to collect different approaches from different vendors (compare the template files vs configured files)

HTF28: XML COMTRADE Conformity Assessment

Chair: M. Adamiak

Output: Recommendation on formation of a Working Group

Established: January, 2014

Estimated Completion Date: September, 2014

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

About 8 people joined the May 13 inaugural (and final) meeting of the Task Force to address the defined topic of creating an XML-based COMTRADE format. The discussion started with the concept of an XML-based implementation but quickly devolved into "why" make this change. Several reasons for migration to an XML-based format, specifically:

- Ability to open a COMTRADE file in a browser and view immediately view channel data and Header data
- Well-defined support for Unicode (multi-language)
- Record security – specifically for data in Translation
- Inclusion of Fault Reports and Images in the Header file

Subsequent discussion focused on proposed changes to COMTRADE, specifically:

- Incorporation of the Synchrophasor Schema into COMTRADE
- Clear identification of the file Trigger source
- Support for Sequence components (similar to storage of Synchrophasors)
- Support for different rate signal incorporation in the same file
- Support for "sparse" data
- Creation of a template to enable direct migration of a COMTRADE into EXCEL
- Support for Harmonics (e.g. – Complex Variable support)
- Inclusion of Substation State Estimation data
- Inclusion of Setting file (or relevant pieces or setting version number)
- Active setting group
- Inclusion of the substation configuration at the time of the trigger event
- Support for Calculated Data Channels

- Attachment of “APPS” to a COMTRADE record. An APP might compute fault clearing time, breaker operate time, breaker wear, etc.
- Support for automatic time alignment of multiple COMTRADE files (e.g. – support for inclusion of the Time Offset needed to be added to a record to reconcile a record with Absolute Time)
- Support for Digital Signal quality (e.g. – allocate 2 bits for all Digitals or addition of a Quality flag for each Digital)
- Inclusion of an XML format

TF Recommendation: Conclude the TF on XML COMTRADE and open a new TF on COMTRADE Revision to address the above proposals as well as to look at other options.

The TF voted to subsequently disband.

HTF29: Conformity Test Plan for PC37.240

Chair: S. Sciacca

Output: Recommendation on formation of a Working Group

Established: January, 2014

Estimated Completion Date: September, 2014

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

12 people attended the meeting. The scope and expected output of the Task Force was discussed. A general discussion was held regarding how to accomplish the task and suggested sources of information and action items. These will be assigned to the attendees for action at the next meeting which will be via teleconference. A call was issued for a chair.

Liaison Reports

PES Substations Committee

C. Preuss

No report

PES Communications Committee

D. Nordell

No report

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

C. Brunner

IEC TC57 / WG10 will meet in June in Quebec, Canada. WG10 has currently the following projects:

1. Finalisation of Edition 2 of IEC 61850:
All parts except part 2 (Glossary) have been published as second Edition. The work on part 2 has only started.
2. Preparation of an Edition 2.1 of IEC 61850 for some of the major parts
The work to create the Edition 2 based on the UML model of the IEC 61850 logical nodes and data has been significantly progressed over the last quarter. We expect to have drafts of the Amendments for parts 6, 7-2, 7-3 and 7-4 officially circulating in July.
3. Technical reports that are under preparation
 - IEC 61850-90-3 – using IEC 61850 for condition monitoring has been circulated as DC. The comment resolution was circulated and a draft technical report is in preparation.

- 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 are ongoing.
 - The planned work on IEC 61850-90-16 – System Management has been put on hold. We need more input on the use cases from WG17.
 - A new work to prepare a technical report about using IEC 61850 for power quality data has been started at the meeting in Montpellier.
 - A technical report on functional testing is in preparation.
 - A technical report IEC 61850-7-500 about the usage of the Logical Nodes to model applications for substation automation has been circulated as DC and the comment resolution was prepared. A similar report IEC 61850-7-5 explaining the more generic concepts is in preparation.
4. Additional task forces address issues of Alarm handling and function modelling in SCL..
 5. Work on two technical specifications for mappings between IEC 61850 and DLSP/COSEM (TS IEC 61850-80-9) as well as Modbus data (TS IEC 61850-80-5) is ongoing.
 6. Response to user feedback
The task force "user feedback" is established and finished addressing the feedback from ENTSO-E. The task force will be a permanent task force addressing user feedback as needed.

IEC TC57 / WG17 will meet in as well in Quebec 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 technologies
The TF agreed on the approach to use MMS/XER over XMPP. Work on the part 61850-8-2 is in the finalisation stage.

IEC TC57 / WG18 will as well meet in June in Quebec together with WG10 and WG17. The WG is working on the following topics;

1. IEC 61850-90-13 – Extension of IEC 61850 information models to also include logical nodes and data models for steam and gas turbines
2. Interoperability tests for hydro equipment based on IEC 61850 and Communication network structures in hydro power plants
3. Communication network structures for hydro power plants

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

IEC TC57 / General:

TC57 will have a plenary meeting in November 2014 in Tokyo, Japan. An Ad Hoc WG 08 has been established at the last meeting in Nice that will investigate on the usage of IPv6 for TC57 standards. The AdHoc WG shall report at the plenary in Tokyo about the results.

IEC TC38 / WG37 is preparing IEC 61869-9, a standard for the digital interface of current and voltage transformers. They are including in this standard the concepts of the former implementation guideline IEC 61850-9-2 LE with a few modifications.

IEC SC17C / MT30 is revising the standard 62271-3 for switchgear with an electronic interface based on the Edition 2 of IEC 61850.

Old business:

None

New business:

It was noted that for most working groups, the WG reports are assembled by the SC and submitted to the Main Committee for approval before the WG itself approves its own WG meeting minutes, as the WG approval of meeting minutes generally takes place at the subsequent PSRC meeting. The SC Chair and Vice-Chair agreed to consider this situation.

Sam Sciacca requested that a new task force be formed to develop a testing procedure for PC37.240. Such a task force would need a single session for 20 people at the May 2014 PSRC meeting.

Mark Adamiak requested that a new task force be formed to investigate development of an XML extension for COMTRADE (C37.111). Such a task force would need a single session for 20 people at the May 2014 PSRC meeting.

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

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 May 14, 2014 with 21 members in attendance – a quorum was achieved.

- Approved minutes of ISC meeting held in New Orleans LA in January 2014
- Coordination & Advisory Committee Meeting Items of Interest:
 - Rich Hunt will hold one Working Group training session in September 2014
 - 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
 - Future PSRC Meetings
 - January 2015 – JTCM Garden Grove CA
 - May 2015 – San Antonio TX
 - September 2015 – La Jolla CA
 - PSRC Meeting registration is now on-line
 - 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; Mike McDonald requested to get their information as soon as possible to avoid changes in the meeting room schedule
 - 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
 - Subcommittee Members are responsible to vote on papers/reports that require this approval. This information is listed in the O&P manual on the web site
 - 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, May 14, 2014 with 7 members, including one new member: Tony Seegers, and 2 guests.

Minutes from the September meeting in New Orleans were reviewed and approved.

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

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

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

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

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

I4: IEC Advisory Working Group

Chair: E.A. Udren

Vice Chair: M. Yalla

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

Established: 1990

Expected completion date: Meetings are continuing

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

The WG met on May 13, 2014 with 7 members & 1 guest.

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

Vice-Chair Murty Yalla reviewed for the attendees the status of standards documents under development by Maintenance Team 4 (MT4) which he leads:

- 60255-121 – Functional Requirements for Distance Relays – Standard published in March 2014 and available for purchase from IEC.

- 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.

A new draft of 187-1 will be created before the next MT4 meeting in London on June 10-12, 2014. It is planned to have a CD after the London June 2014 meeting but before the Dec 2-4, 2014 MT4 meeting that takes place just before the TC 95 plenary meeting in Largo, Florida. 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.

Other projects of interest:

- Ad Hoc Group AHG2 “New protection requirements for the smart grid” is working on an outline and will be meeting in London on June 13 to discuss developing a report to TC95. Murty Yalla participates for the USNC.
- IEC/IEEE 60255-118-1 Ed. 1, Part 118-1 Synchrophasor for power system measurements – Convenor Ken Martin held a meeting in New Orleans in January after PSRC to restart joint IEC-IEEE work, based on the now-amended IEEE C37.118.1-2011. The participants are looking at whether or when to make further improvements to the synchrophasor measurement process. The next meeting has not been scheduled.

Sam Sciacca described the role of the IEC Standardization Management Board (SMB) subgroup Advisory Committee on Electricity Transmission and Distribution (ACTAD) in coordinating and sharing standards development work among IEC and other organizations. Joe Koepfinger is USNC representative on ACTAD; TC 95 Secretary Serge Volut is TC 95 rep. In the March ACTAD minutes SMB-5308/R, ACTAD Recommendation 1306/2 recommends that the SMB allow ACTAD to establish liaison with IEEE-SA. Sam explained why IEEE-SA has not previously had a seat at the ACTAD table, and why this is important going forward. After the PSRC meeting, the Chair contacted USNC to offer support, and found that this recommendation already has massive support. It is likely to be accepted at the SMB meeting in Frankfurt on June 7.

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 I5 met on Tuesday afternoon with 5 members and 6 guests in attendance. Following introductions, Kevin reported on the results of the I Subcommittee balloting. A quorum was received with 97% approval. One negative vote with comments was received, with one additional person concurring with the comments. The comments had to do with the lack of use of IEEE Device #16 and appropriate suffix letters, as established in the C37.2-2008 and later revisions, for communication devices, such as Ethernet switches, routers, serial data modems, security appliances, and others.

Kevin reviewed the changes he made to address the comments. He added a sentence in section 2 where we talk about C37.2-2008. He added a paragraph covering Device #16 in Section 8.3.1 where we introduce three figures giving examples of communication block diagrams. He added Device #16 nomenclature in the description of Figure 32, and changed the figure to include Device #16 nomenclature.

Following discussion with I Subcommittee chairman Jeff Pond, it was felt that the changes would not necessitate re-balloting the document, since they do not materially change the document, but just identify communication devices in accordance with C37.2-2008. With the subcommittee's concurrence that re-balloting is not necessary, the final version should be ready to go to the Main Committee officers.

Kevin will prepare a PowerPoint presentation for a future Main Committee meeting. The presentation has not been scheduled, yet. The idea is also to disseminate the document to the relay conferences in 2015. Kevin asked for volunteers to present to the conferences. Kevin is planning on presenting at Texas A&M. Bruce Mackie said he would be attending Georgia Tech. Joe Uchiyama said if no one else volunteered, he would take it to the WPRC.

I7: Revision of C37.103 Guide for Differential and Polarizing Circuit Testing

Chair: Gary Kobet

Vice Chair: Alex Lee

Output: IEEE Guide

Established: May 2012

Expected completion date: December 2016

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

Working Group I7 held its meeting in a single session on Tuesday, May 13, 2014. This was the seventh meeting for this working group.

There were 7 members present and a quorum was reached. Four guests attended the meeting. Membership stands at 10 members and 3 corresponding members.

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

January 2014 meeting minutes were reviewed. Meyer Kao motioned to accept the January 2014 minutes. and seconded by Mark Schroeder.

Draft 4.0 was presented and reviewed 4 comments submitted by working group members:

Section 6.3 - Added a caution to consider performing demagnetization procedure any time dc is applied to a CT

Section 8.2 – Revise Figure 9 add Ammeter instead of a jumper.

Section 12.3 – Decided to retain this section “In-service tests for current polarized relays”. Was not able to obtain actual waveforms to illustrate what is expected by the test shown in Figure 29 (“...comparing the peak of the third harmonic in the neutral current with one of the phase-to-neutral secondary voltages. The peak of the third harmonic should be positive at the point where the secondary voltage signal of any of the three phases is crossing zero in the positive direction, assuring that the current is being measured at the point where the polarizing current enters the marked terminal of the relays.”

Section 13.1.1 – Revise Transformer Impedance from (HV-MV) to (LV –TV), zero sequence

Working group balloting is complete with 100% approval and all comments resolved.

The WG will ask the I-SC Chair to request permission from the Main Committee to proceed with sending this document to IEEE-SA 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 Pier Top, Hyatt Regency Pier 66, Ft. Lauderdale Florida on May 13, 2014. Ten members and one guest were present. A quorum (>50% or 12 members) was not achieved. The January 2014 meeting minutes could not be approved, and an email will be sent after the meeting to the working group for approval.

The working group completed the review of the comments received from the IEEE-SA ballot and created a new Draft 7.1. The comments worksheet will be updated with the disposition of each comment and a recirculation letter will be written to include with the recirculation ballot. A 10 day recirculation ballot will be initiated in June. The working group plans to request approval from RevCom at the December 2014 IEEE-SA SB meeting – due date to be placed on the meeting agenda is October 20.

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”

Following introductions, the meeting was opened with a review of the IEEE Copyright and WG Guidelines slides.

There were 10 members and 4 guests present. Had a quorum, the minutes of the previous January 2014 meeting were reviewed & approved with one comment.

Bruce discussed the Agenda and the possibility that Harley may take the role of advisor, chair-emeritus, and corresponding member due to mobility issues if that becomes necessary. If so, new Chair (Bruce or Farnoosh?) to be presented & approved by Subcommittee.

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

Discussed Action items from last meeting:

- PT needs to be replaced with VT in doc
- Move section 4/Chapter 7 renumbering to Annex
- Farnoosh & Eric to review 3.3-4.8
- Rich Hunt to redraw figures with Visio----- complete
- 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- need more Bibliography references- Farnoosh to provide 10, Rich to provide at least 2, others to contribute too

Laid out a schedule and Farnoosh to provide new draft to WG by email by 7/20/14 for ballot group to be formed end of August.

5/30/14 Farnoosh to replace figure and reorganize chapters/sections and submit to team leader task force- in order to accelerate document for balloting.

6/20/14 Task force review cleaned document

7/20/14 WG review doc, conference calls to be scheduled

8/10/14 Final review and send to Subcommittee

8/11/14 Start WG vote, reminder in 1 week

8/23/14 WG vote deadline, send to Subcommittee, form ballot body

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 **11 attendees** (7 members and 4 guests).

January meeting minutes were reviewed.

The I12 working group covered the following:

1. Reviewed and approved the assignment statement
2. Reviewed and finalized 2 definitions
3. Reviewed and finalized 3 out of 16 sections of the paper
4. Agreed that we will finish the remaining 3 sections in September’s meeting
5. New tasks were assigned

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 May 13, 2014.
There were 7 Members and 2 Guests in attendance.

Draft 1 of the report was discussed with the attendees.

All writing assignments will be completed and included in Draft 2 and send to the working group members for the September 2014 meeting.

Working group members were asked to review the draft report and comment prior to the September meeting.

I22: End of Useful Life Assessment for P&C Devices
Chair: Bob Beresh
Vice Chair: Bruce Mackie
Output: Report
Established: 2012
Expected Completion Date: 2014

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

WG I22 met on Tuesday, May 13, 2014 at 4:30pm EDT in a single session with 12 members and 16 guests.

After introductions, the January 2014 meeting minutes were reviewed.

Charlie Henville made a presentation on three case studies for end-of-life replacement from BC Hydro.

The current document was reviewed for the remainder of the meeting. Some additional items from the review are listed:

- Corrected numerous editorial issues.
- In Technology trends, issues with CIM compatibility were discussed.
- It was asked if there are additional ideas for the Safety section (Bruce Mackie will add a contribution on this).
- The section on Security was revised to help those who may not understand RADIUS
- Regarding the section on "How to Determine/Manage End of Life" a discussion began on product maturity and how that can create issues.
- Relay performance was also addressed and reference made to work done by EPRI on this in the past.
- A discussion was held on trying to quantify end-of-useful life to help utilities better manage the issue. George Gresko stated he would write a contribution on this.
- Another idea was presented which was to consider a criterion based on failed calibration performance as a basis for replacing a device.

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 Panorama A, Hyatt Hotel, Fort Lauderdale, FL, on May 14th at 9:30 am. Five members and two guests were present and a quorum was not met.

Patent Conflict slides were shown.

January 2014 minutes reviewed and to be approved by email.

Comments that were received when the Guide was recirculated were discussed regarding their placement into Draft 1 of the Guide. Several comments were still unresolved and Members volunteered to help resolve.

Assignments received by several members were reviewed and will be incorporated into Draft 1.

A suggestion was made to incorporate several annexes of the Guide into new sections. After decision was made to not the annexes into sections since the Guide itself is about field testing of CT's and the annexes deal with other issues such as wiring.

Bruce Magruder will contact other members with writing assignments and incorporate them into Draft 1 prior to the September meeting.

Conference call will be set in August to make sure writing assignments are on track.

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

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, May 13th, 2014, at Ft. Lauderdale, FL in single session chaired by Jim Niemira with a total of **25 attendees** (6 members and 19 guests). Quorum was met.

Minutes from the January 2014 meeting were approved.

Vincent Mosser, from ITRON, gave a 50 min presentation on Hall Effect technology uses and applications.

Dr. Amir Makki, from Softstuf, gave a 10 min presentation on the results of his follow-up experiment from the January meeting.

The group will meet again at the PSRC meeting in Milwaukee, WI, in September 2014.

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:

I25 Commissioning of Substation Protection and Control Devices met with 13 members and 12 guests with one new member. The group went over the assignments, which were to review specific sections of C37.233, Guide for Power System Protection Testing and to provide additional information that should be included in the report. We had good discussions and will continue those discussions in the next meeting. At the next meeting, we also intend to develop an outline for the report.

I26: 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 Working Group met for the first time in a single session with a total of 17 members and guests in attendance. The group agreed that their output should be a report to the main committee. A number of assignments were accordingly identified:

- Find the report of the original C5 group
- Add examples of CT saturation occurrences leading to misoperations
- Add examples of PT Ferro-resonance occurrences leading to misoperations
- Clarify essential aspects of interpretation of CT models
- Survey other work done since 1998 including updating software models
- Discuss PSRC CT saturation calculator
- Discuss modern transducers include Optical, Rogowski, and Hall

The Chair also requested volunteers to help lead the new WG. The subject will be addressed at the next meeting. The group will meet again at the next PSRC meeting. A room for 20 people with a projector and flip chart is requested.

I27: Investigation of Protective Relay Self-Monitoring Capabilities

Chair: Bob Beresh

Vice Chair: Yuchen Lu

Established: 2014

Output: Report

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

Scope:

Expected Completion Date: 2015

I27 met on Tuesday, May 13, 2014 in a single session with 17 people attending.

After introductions, the background to this WG was discussed as well as the need for this work. A draft outline of the document, based on previous discussions, was prepared by the chair and vice-chair prior to this meeting and used as the basis of discussion. The WG mentioned how critical it was to get feedback from utilities in terms of actual device performance, as this could factor into making the document more useful.

The WG also discussed the importance of knowing what is not being self-monitored in addition to what is being self-monitored. The need for a heart-beat to check the self-monitoring features was also discussed.

The issue of a follow-up document such as a paper or standard was also raised.

Numerous assignments were handed out.

Reports from the TF Chairs

ITF28: Revision of C37.108 Guide for the Protection of Network Transformers – moved to the K Subcommittee

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

Chair: Jeff Pond (new Chair to be assigned)

Vice Chair: TBD

Output: Revision of the Guide

Established: May 2014

Expected Completion Date: TBD

The task force met on Tuesday May 13, 2014 with fifteen people in attendance, seven who expressed interest in being members.

C37.110 is due to expire on December 31, 2018.

The task force discussed whether revisions to the guide were required. The task force discussed updating the guide to provide examples of CT sizing calculations. Also, a section on internal CTs of microprocessor relays should be included.

After discussion the task force agreed that the guide should be revised. The task force recommends a working group be formed to revise 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 Used for Protective Relaying Purposes

Chair: Jeff Pond (new Chair to be assigned)

Vice Chair: TBD

Output: Revision of the Guide

Established: May 2014

Expected Completion Date: TBD

The task force met on Tuesday May 13, 2014 with twelve people in attendance, five who expressed interest in being members.

C37.235 is due to expire on December 31, 2018.

The task force discussed whether revisions to the guide were required. Ljebomir Kojovic noted that since the guide was published there have been some changes in the application of Rogowski coils. He stated that the changes were minor but worth incorporating in the guide and recommended revising C37.235.

After discussion the task force agreed that the guide should be revised. The task force recommends a working group be formed to revise C37.235; Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes.

Liaison Reports

a. Instrument Transformer Subcommittee:

The Instrument Transformer Sub Committee spring meeting in Savannah, GA

There are three active working groups. One is writing a new standard for CTs C 57.13.7 with a 250 mill-amp maximum output. It is nearly ready for vote.

The second new project C 57.13.8 is a Station Service Voltage Transformer Standard

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

There is an extra session in Charlotte, NC scheduled for June 3.

Coordination Reports

None

Old Business

None

New Business

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

Amir Makki inquired about how to locate various protective relay testing standards. Gary Kobet recommended review of C37.233. Amir will review and report any items of interest at the September 2014 Subcommittee meeting.

A question about redundancy versus backup definitions was raised at the meeting. It was suggested to discuss with the C Subcommittee, and to review the output report of Working Group I19.

Bob Beresh asked about the updates to the web pages for I, and Russ Patterson is working on this

J: ROTATING MACHINERY PROTECTION SUBCOMMITTEE

Chair: M. Yalla

Vice Chair: M. Reichard

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

The J Subcommittee met on Wednesday, May 14, 2014 with 14 members (achieving quorum 14/27) and 26 guests. There was a call for the approval of the minutes of the Jan 2014 meeting in New Orleans. 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 sent Draft Transaction paper to J SC members for review and comment, which are due by June 27. Following that it will be sent 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.**

The WG meeting was held on 14 May 2012 with 16 members and 20 guests. Mani Sankaran became a new member of the WG. The minutes of the January 10 meeting were approved by WG. More than 50% of the members were present and the quorum was met.

The meeting was mostly devoted to the discussion on single binder scheme. All discussion items were recorded on the draft contribution. Steve Turner, who is author of this section, will go through these items and resubmit the revised draft for the next meeting. Some other assignments were made.

The next meeting will require double session with video projection. It is requested that the schedule conflict between J5 and K4 meetings be avoided. It will allow M. Nagpal who is Vice Chair of J5 and Chair of K4 to attend both meetings.

J6: Protection issues Related to Pumped Storage Hydro Units

Chair: Joe Uchiyama
Vice Chair: TBD
Established: 2009
Output: Transactions Paper
Expected Completion: TBD
Status: Tenth Meeting

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

The J6 WG met on Tuesday, May 13, 2014 at 4:45 p.m., in Ft Lauderdale, FL with nine (7) 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. Joe Uchiyama welcomed to this WG and briefly explained the purpose and goal of this WG product. He had distributed meeting agenda. Also, he mentioned Dale Finney volunteered becoming the Vice Chairman.
4. Chairman stated to review the consolidate Survey Form which was balloted by J-subcommittee members. We met the Quorum with 85% responses.(Approved with comment-10). Whole sessions were spent for discussing those comments. All comments were resolved except one of the comments. Chairman has to ask p;la question to Phil Waudby.

The final document will be submitted to PSRC Officers for "Permission for Survey."

As soon as update the survey questionnaires, Chairman will distribute the final document to J6 WG.

J7: Avoiding Unwanted Reclosing on Rotating Apparatus

Chair: Mike Reichard

Vice Chair: Steve Conrad

Established: 2011

Output: Report to Subcommittee

Status: Eighth Meeting

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

The working group met with 9 members and 19 Guests on May 13, 2014 in the Fort Lauderdale-Pier 66 Hyatt

The meeting minutes from the January meeting were approved. The chair discussed the assignment of the WG and summarized draft 1 of the report. The abstract and conclusion sections of the paper remain to be completed.

It was suggested that C37.2 be added to the reference material to support the index terms.

Discussed the need to emphasize the aspect that heighten security mitigates the aspect of direct control of breakers from within the stations.

Mark Zeller's-SEL paper "Myth or Reality-Does Aurora Vulnerability Pose a Risk" will be included in items A 1 and 2 as added reference material. It was also suggested to include the review of Dominion's practice paper as a reference.

Steve Conrad volunteered to remove manufacturer specific references from the draft paper. Dale Finney will revise the ROCOF section and relate it to the Dominion paper.

The WG recommend the conclusion should be written to prioritize the related issues and appropriate mitigation efforts.

J12: Improved Generator Ground Fault Protection Schemes

Chair: Russ Patterson

Vice Chair: Dale Finney

Established: Jan 2013

Output: Report to subcommittee

Status: 3rd¹ Meeting

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

The group met on 5/14/2014 in Fort Lauderdale, FL with 14 members and 13 guests in attendance.

The meeting began with general discussion of past meetings and the chair announced that Dale Finney would be taking over as chair after the September meeting. Manish Das volunteered to become vice chair.

There was discussion on the need for transient analysis software (ATP etc.) when implementing the CFE method and it was generally agreed that these tools are not required to implement this scheme. Standard phasor based tools would suffice.

The paper by Clyde Maughan was discussed as a good basis for the need for improved stator ground fault methodologies.

The negative sequence current supervision method for accelerated tripping was then described by the chair.

It was suggested that the report should include a discussion on different timer implementations and this recommendation was accepted.

The following writing assignments were made:

- Russ Patterson to write material about the negative sequence current method. Dale Fredrickson to review.
- Sudhir Thakur to write material about the CFE method. Dale Finney, Mike Thompson, Luis Polanco, and Manish Das to review.
- Marion Cooper to write material on Clyde Maughen's paper. Zeeky Bukhala to review.

Writing assignments are due to the reviewers by June 20th and final writing material to be submitted to the chair/vice-chair by June 27th.

J13 : Modeling of Generator Controls for Coordinating Generator Relays

Chair: Juan Gers

Vice Chair: Phil Tatro

Established: September 2012

Output: Report to Subcommittee

Expected Completion: 2016

Status: Forth Meeting

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

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

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

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

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

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

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

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

The requirements for the next meeting are a single session, a meeting room for 40

J14: Plant Issues Associated with Black Starting of Generators

Chair: Chris Ruchman

V Chair: Zeeky Bukhala

Established: May 2014

Output: Report to Subcommittee

Expected Completion: 2014

Status: First Meeting

The working held its first meeting on Tuesday, May 13th, 2014. During the meeting 11 attendees signed up as working group members. There were 7 guests in attendance.

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

Chair provided background around the establishment of the working group. JTF9 met in New Orleans in January 2014 and recommended to the J subcommittee that a working group be established. The J subcommittee voted to establish the working group as J14 and tasked it with generating a report.

Chair presented an outline of the report and there was discussion about what should be considered in scope and out of scope. Items identified as in scope, including writing assignments were:

Engines (Dale Fredrickson will peer review material previously provided by Wayne Hartman).

Combustion Turbines (Luis Polanco)

Hydro Turbines (Dale Finney, Russ Patterson will develop a typical oneline)

Other areas identified as potentially in scope included:

Closing on long transmission lines

Control power for protective relays during blackstart, (DC and UPS)

Harmonics generated by static start systems

Application of interlocks

Black start permissives, specifically ensuring faults have been cleared.

Generator controls (excitation)

Matt Basler volunteered to review and identify protection issues associated with excitation systems during a black start.

Tom Farr volunteered to check with personnel at the Hartwell Dam to see if they have any information or insight about past black starts and protection issues they might have had.

Turbine controls, line protection, dead load pickup were some of the items considered to be out of scope for this working group. There was discussion around getting information from utilities that have experienced black start and sharing lessons learned. The Northeast Blackout, southern California and recent European blackouts were identified as potential data points. Some attendees volunteered to follow up and report back to the working group. Attendees also agreed to follow up with facilities that have known black start capability. Specifically:

Russ Patterson to contact PJM to see if they have any information available about restoration issues associated with the 2003 northeast blackout.

Chris Ruckman to contact ISO-New England to see if they have any information available about restoration issues associated with the 2003 northeast blackout.

Dale Finney to contact Sungsoo Kim to see if he has any information available about restoration issues associated with the 2003 northeast blackout.

Chris Ruckman to contact a utility in the northeast that installed and, to some extent, tested new black start generation to understand what protection issues they had during testing.

A single session is requested for the next meeting with provisions for 30 people and a computer projector.

Other Reports:

C17: Fault current contribution from wind farm plants

Report provided by Gene Henneberg. Nothing significant from last report.

Liaison Reports

Electric Machinery Committee (EMC)

No report.

C. J. Mozina

IAS I&CPS Committee

No report.

C. J. Mozina

Nuclear 1E WG

None?

P. Kumar

NERC (related to rotating machinery)

None

J. Uchiyama

Coordination Reports

None

Old Business

None

New Business

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

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

K: SUBSTATION PROTECTION SUBCOMMITTEE

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

The K-Subcommittee met on Wednesday, May 14, 2014 15, 2014 in Fort Lauderdale, FL, with 19 of 29 members and 23 guests in attendance. A quorum was achieved. Steve Conrad motioned to approve the January, 2014 subcommittee meeting minutes. Charlie Henville seconded. Vote was unanimous to approve.

The PES working group listing will be due before the September meeting. The K-Subcommittee Vice-Chairman will send out the proper format to all of the working group chairs.

Reports from the WG Chairs

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

Chair: Lubomir Sevov
Vice Chair: Charles Henville
Established: Jan. 2012

Output: Guide for the Application of Protective Relaying for Phase Shifting Transformers Expected Completion Date: Dec.2016

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

The K1 working group met in a single session. Seven members and seven guests were present. After the introduction, a call for quorum was made but quorum was not achieved. IEEE Patent disclosure slides were presented. One letter of assurance has been received from a patent holder. This letter has been transmitted to IEEE SA.

Update: Jan 2014 meeting approval request was done via e-mail and was approved -12 out of 21.

Current draft of the document is 4.1a

Charlie Henville volunteered to add information regarding ratings loading and tap changer to Section 5. Farajollah Soudi will add a sentence or two to Section 5 regarding fixed tap changers.

Michael Thompson agreed to draft Section 8 and subsections providing a high level introduction to the issue of protecting phase shifting transformers. Sam Sambasivan will assist Michael.

Brandon Davies agreed to provide a draft for Section 6.1 regarding CT connections
Sam Sambasivan agreed to review and comment on Section 6.2 regarding CT locations

Abu Bapary agreed to provide a draft of Section 9.2 regarding VT requirements.

Brandon Davies agreed to elaborate on Section 11.1.3 to show three phase diagrams showing currents for differential protection.

Michael Thompson offered to draft new sections on sequence component differential and circulating current protection systems.

Farajollah Soudi will add a sentence or two to Section 5 regarding fixed tap changers.

Mahfooz Hilaly volunteered to draft sections 11.2 and 11.3 on phase and ground overcurrent protection.

Stephen Conrad and Charlie Henville are continuing to work with Eli Pajuelo on the fault study section of the guide.

Authors are requested to provide contributions by 30th July.

Abu Bapary and Mahfooz Hilaly 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 WG: December, 2015

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 May 14, 2014 with 6 members and 5 guests

Introductions were done and status of completed paper and paper PowerPoint presentation for 5/15/14 was reviewed with a dry run of the presentation.

Subcommittee comments from 28 members to the paper and subsequent revisions were incorporated into final draft that was submitted, with all ballot comments incorporated.

Per instructions from the Main Committee officers, the Subcommittee Chair would recirculate the full final paper with all the revisions to the K Subcommittee, editorial comment from the Officers were incorporated into draft 15.

“K” Subcommittee Chair sent the paper to Russ Patterson on the Report Section on the website. Next task is to 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

Approved by SA 3/27/14

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

The WG met on Tuesday, May 13. A total of 3 members and 12 guests were present. The minutes of the January WG meeting were reviewed, but they were not approved because a quorum was not achieved.

The guide was approved by the IEEE Standards Association on March 27, 2014. A brief overview of the guide was presented in the meeting. Some questions were asked by guests regarding certain topics. Specifically, issues such as the use of separate batteries between the utility and the consumer, the operation of a consumer’s low-side bus tie circuit breaker, and reclosing were discussed. The extent to which the guide addresses these subjects was reviewed in the meeting.

The plan is for the chair to prepare a summary paper and send it to the working group by the end of July, 2014. It is intended that the group's last meeting will be in September, 2014.

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 : 1.15

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 May 13th 2014. Patent Slides were shown. Sign up sheets, agendas and copies of Draft 1.15 were handed out. A quorum was met as 18 voting members attended. (We required 14). The number of total attendees was 40 including both members and guests.

The minutes from the previous regular meeting in New Orleans were shown and approved. (ref. Rich Young, Bob Beresh)

The minutes from March 12 2014 on-line meeting, were reviewed and also approved. (ref. Mike Thompson, Ray Young) – Approved.

New sections progress was presented by Roger W. to the group. New sections have been added to the document which include BFP for tandem breakers and also a new section to describe BFP of generator breakers.

A Line by line review of section 10 on BF Testing was accomplished.

At the next meeting/online or Milwaukee, we plan to finish the last section on Overall Scheme Test.

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

K6: SUDDEN PRESSURE PROTECTION FOR TRANSFORMERS

Chair: Randy Crellin

Vice Chair: Don Lukach

Established: May 2005

Output: Report (including utility survey)

Expected Completion Date: September 2014

Draft 7.0

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, May 14th, in a single session with 8 members and 5 guests. The working group currently has 13 members; 12 attending and 1 corresponding.

1. After introductions, the working group discussed the comments from our Subcommittee review. We received valuable comments from; Bruce Pickett, Mike Thompson, Dean Miller, Pratap Mysore, Roger Hedding, Will English, Gustavo Brunello, John Wang, and Charlie Henville. Our current plans are to incorporate the accepted changes into the document and send the final version of the report to the working group members for final approval. We hope to complete the document by the middle or end of June.

K10: SCC21 DISTRIBUTED RESOURCES STANDARD COORDINATION

Chair: Gerald Johnson

Vice Chair: TBA

Established, 1999

Output: Standard through the SCC 21

Expected Completion Date: 20xx

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

Working group K10 met on Tuesday May 13, 2014 in Fort Lauderdale, FL with 6 members and 11 guests in attendance. We covered the status of P1547.a which is the amendment to 1547-2003 that includes changes to voltage and frequency ride through and voltage regulation. This document has been balloted and approved. P1547.1a is an amendment to the testing standard to match up with the changes in 1547.a. We are presently at draft 3 on this document and should be ready for ballot in next couple months. Ballot pool is presently being formed for P1547.8, "Recommended Practice for Establishing Methods and Procedures that Provide Supplemental Support for Implementation Strategies for Expanded Use of IEEE Standard 1547".

The par to move forward with revision of the 1547-2003 standard was approved and we had our first meeting 4-22 through 4-25 in Las Vegas. Many utility representatives were present for the meeting.

Minutes for 1547.1a are posted on the SCC21 web site under 1547.1a "logistics" for anyone that would like to review them as well as P1547.8. All revisions to 1547-2003 have to be completed by 2018. If you are interested in participating in the revision of 1547-2003, please check the SCC21 web site for meeting information. The next IEEE 1547-series meeting is scheduled for June 24-27, 2014, in Las Vegas NV. The series includes the P1547.1a Working Group meeting on June 24-25, and the P1547 Working Group meeting on June 26-27; each working group formally adjourns at noon on its second day.

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

K11: Open Phase Detection for Nuclear Generating Stations

Chair: Charlie Sufana

Vice Chair: M. Urbina

Output: Report

Draft 0.5

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

Introductions were done after a welcome by Chairman Charlie Sufana. There were 10 members and 13 guests in attendance for the May 12, 2014 meeting.

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

Dylan Stewart of Alstom and Alan Baker FPL presented a method that they have been developing. Through the use of optical CTs and modified software/hardware, the scheme is able to detect currents in the milliamp range. The scheme is using IEC-61850-9-2LE. FPL is going to employ 2 out of 3 logic in order to determine if a phase is open. Each of the CTs provides 3 outputs to go to the 3 relays in order to perform the logic.

They have tested 2 different transformers to establish proof in concept and are working towards developing the final logic.

Dale Finney of SEL then gave a report on his findings of active injection schemes to see if something would be applicable for detecting open phases. He first presented a scheme that he developed in Simulink to see if an injection scheme that measures the high frequency impedance would work. His conclusion was that it was not usable. He also presented an injection scheme by DX3 Ltd. that is really meant to be

used for determining islanding conditions. Again, his conclusion was that it was probably not usable. DX3 indicated that the signal might work through some transformer types but not through a wye/delta.

Wayne Johnson of EPRI gave an update on the Open Phase detection scheme developed by EPRI. The scheme injects a signal into the transformer neutral. Wayne indicated a report on their testing will probably be coming out in November.

There was also a short review of the current draft 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

Draft 5.0

Assignment: To work jointly with Substations WG I9 to write a guide for protecting transmission static var compensators. PSRC WG K12 will provide guidance and review on topics that are already covered in other IEEE guides to prevent overlap and identify areas where interpretation of existing guides is necessary to meet the specific application challenges unique to transmissions static var compensators.

Workgroup K12 of the Substation Protection Subcommittee met Wednesday, May 14, 2014 at the Ft. Lauderdale Hyatt Pier66 hotel, with 4 members and 3 guests in attendance. Because of confusion of the meeting room location, (Panorama C and D), several members did not attend and a quorum was not achieved. Apologies from the chair John Wang and also from Roger Whittaker who first arrived at the incorrect meeting room, (Panorama B). The minutes of New Orleans meeting was sent to members and approved through email voting.

Chairman John Wang opened the meeting announcing that K12 is tasked jointly with workgroup I9 of the Substation Committee, to revise P1032, "The Guide for Protecting Transmission Static VAR Compensators". Patent slides were shown and introductions and affiliations were announced by each attendee.

With information from Erin Spiewak of IEEE, John Wang informed the group that the IEEE standards definition can be accessed through IEEE standard website <https://development.standards.ieee.org/my-site>. When you sign in, you sign in to "Standards Dictionary" instead of "My Project". Anyone with a myProject account can access it. It is free to create an account if someone does not already have one.

Definitions of terms from section 3 of the guide were discussed. John direct-connected to the IEEE database and displayed the definitions overhead for the workgroup to view. John also displayed a survey which has been activated by the Substation workgroup I9 which is a request to vote on the definitions previously submitted by Roger. It was decided that several of these database definitions for similar terms would not be needed. Roger Whittaker of the terminology workgroup presented a list of existing IEEE definitions for these terms which he obtained previously from the existing IEEE database. After significant discussion between several members and guests regarding different aspects of each of the definitions, the following terms and definitions were agreed to as to be the recommendation from K12 workgroup.

Dependability: That facet of reliability that relates to the degree of certainty that a relay or relay system will operate for any in zone fault, or any abnormal system operating condition.

Restraint current: Some measure of current flowing through a differential zone of protection compared to the operate (differential) current in a percentage differential relay.

Reliability (of a relay or relay system): A measure of the degree of certainty that the relay or relay system will perform correctly.

Also the workgroup decided to recommend that the definition for Security from C37.100 should be used.

Security (of a relay or relay system): That facet of reliability that relates to the degree of certainty that a relay or relay system will not operate incorrectly.

Also the term *operational current* should be called *operate current* however the group decided that there is no need to define this term and it might be removed from the guide as a definition.

3 guests expressed their interests to join K12 and are welcomed on board.

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”.

WG met on Tuesday May 13th, 2014 with 7 members and 10 guests.

IEEE Patent slides were introduced.

Title revision request from last meeting was introduced by Chair. Discussed the proposed change to Scope introduced during last meeting. Revised title from “protective relays” to “protection systems”. Title and Scope agreed by members and guests present without objections.

Request to consider capacitor by-pass information for relays before taking control and/or protection actions was introduced by a member.

There was a request to consider harmonics (& instrument CT protections) issues in this guide. Tapan Manna of Burns & McDonald will provide additional information to enhance Section 3.2.3.

Chair discussed coordination with Substation subcommittee on this guide with IEEE Std 824. New revised guide should complement IEEE Std 824 without any overlaps.

A copy IEEE Std 824 will be provided to members who have requested during the session: Galina Antonova, Sinan Saygin, Renee Midence, Bharad Vascode, Alfredo de la Quintana, Luis Polanco.

Discussed comments from Marc McVey and other suggested improvements:
Annex E – G:

Annex B: SSR – we need to review it and keep if this section provides benefit to protection engineers. Comments will be sent out to members for review before next meeting. This topic could be updated with additional information. Rene Midence to provide about impacts of capacitor location, SSR, harmonics.

Provide a section about modeling of series capacitor bank. Use latest available tools such as RTDS to simulate and analyze the impact of cap banks in protection.

Propose to remove Section 8.3.1 regarding MOV current injection testing.

Section 3.6: Need to revise.

Assignments: Review IEEE Std 824 and IEEE C37.116:

Reviewer(s) by Sections:

Section 3 => Luis Polanco

Section 4 => Joshua Park, Rene Midence

Section 5 => Adi Mulawarman

Section 6 => Rene Midence, John Wang

Section 7 => Mahkooz Hilaly, Joshua Park

Section 8 => Joshua Park

Annex B => Rene Midence

K15: Centralized Substation Protection and Control

Chair: Ratan Das

Vice-Chair: Mital Kanabar

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

Draft 1.1

The working group met on May 14, 2014 with 33 participants (11 members and 22 guests). 5 guests expressed interest to join the working group.

We had one presentation: Dr. Krish Narendra and Rene Midence presented on "Advanced Protection Schemes Using IEC 61850 Architectures". We had interesting discussions on the presentation.

We then went through the report outline as agreed by members and guests previously attended the Task Force and first meeting of the working group. This was done to provide new guests/members to have an opportunity to provide their input on the report outline. At this time, we also sought volunteers for un-assigned sections. We have some new volunteers for writing assignments. Summary of discussions on the presentation and the report is enclosed in the annexure.

We then discussed write-ups received for two sections of the report and received comments.

We will circulate the updated report draft and encourage members to submit their assignments by August 8.

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

Chair: Will English

Vice Chair: Steve Conrad

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

Established: May 2014

Draft: 0

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

The working group met with 28 members and 9 Guests on May 13, 2014 in the Fort Lauderdale-Pier 66 Hyatt

This is the first WG meeting. The chair reviewed and displayed the required patent information slides related to PAR activity of the WG and provided opportunity for participants to identify patent claims. The assignment of the WG was also discussed. As a requirement of standards development work all participants are required to indicate both their Company and Affiliation. The attendance sheet was circulated to collect the required information of each participant.

The chair reviewed some of the identified issues with the 2008 revised standard which related to the Annex A and the slide provided earlier by Russ Patterson.

After general discussions of the evolution of the guide the chair asked for volunteers to review various clauses of the document. The following volunteers agreed to provide reviews of the assigned clauses and report to the chair prior to August 15, 2014

2. Annex A Joe Mooney and Elmo Price
3. Clause 5-7 Jerry Johnson/Rene Midence
4. Clause 8 Alex Lee and Abu Bapary
5. Clause 8.2 Jun Verzosa
6. Clause 8.3/8.4 Meyer Kao
7. Clause 8.5 and 8.7 Asish Kulshrestha
8. Fault Pressure Relay Randy Crelin/Don Lukach
9. PST Transformers Steve Conrad/Mike Thompson

There was some discussion of GMD protection of transformers, which resulted in an assessment to be made after a review of the planned presentation on GMD to be held later in the PSRC meeting.

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

KTF17 Geomagnetic Disturbances (GMD)

Chair: Qun Qiu

Vice-Chair: Luis Polanco

Assignment: To explore the feasibility of a PSRC report to evaluate Geomagnetic Disturbances impacts on protection and control and provide guidelines on P&C harmonic impact studies.

Meeting # 1 (May 14, 2014)

The task force met first time on May 14, 2014 with 64 participants. Chair provided the background for the formation of the task force and gave a high level overview of GMD impacts on power systems, and the NERC GMD Reliability Standards development as well. Dr. Ramsis Girgis from ABB presented the topic on Geomagnetically Induced Currents (GIC) effects on power transformers. We had interesting discussions on the presentation, and the presentation file from Dr. Girgis was forwarded to the PSRC officer to be posted on the PSRC website. It was recommended that an expert from present a topic on the GMD impact on capacitor at the PSRC September meeting. This would be an hour long presentation.

KTF18 PC37.108, Guide for Protection of Network Transformers

Chair: Adi Mulawarman

Vice Chair: Suparat Pavavicharn

Established: May 2014

Assignment: To determine if the guide should be revised and report to the K-Subcommittee.

This is a newly formed group that will meet at the September, 2014 PSRC meeting.

Old Business:

No Old Business was discussed.

New Business:

No New Business was discussed.

General Discussion:

Dr. Yalla informed the committee that a differential protective standard entitled IEC 60255-187-1 will be circulated in January, 2015 to the K-Subcommittee membership for a review of the transformer protection sections within the standard.