

C: SYSTEM PROTECTION SUBCOMMITTEE

Chair: R. Hunt

Vice-Chair: S. Ward

The C System Protection Subcommittee met on Wednesday, September 10, 2008, in Vancouver, BC, Canada, with 14 members and 25 guests in attendance.

8 Working Groups and 1 Task Force met at this meeting. The members of the Subcommittee approved the minutes of the May 2008 meeting.

The Subcommittee approved the formation of Working Group C17, Fault Current Contribution from Wind Plants. The WG Chair will be Dean Miller, Vice Chair Gene Henneberg. The WG will produce a report to the Main Committee.

While the Subcommittee members that attended the meeting all voted in favor of forming the new WG, the number present was not sufficient to reach quorum. Consequently, a ballot via email was performed and the vote to approve the WG was almost unanimous (31 members out of 34).

Thank you to all members that promptly responded by email. However, the exercise illustrates why it is important that all Subcommittee members try to attend the Subcommittee meeting.

New members: The Subcommittee welcomes new members Jonathan Sykes and Rich Young. Jonathan Sykes also volunteered to serve as the new Chair of WG C15, which was temporarily chaired by Yi Hu, now Vice-Chair of the WG.

PSCE liaison report: nothing to report.

PSSC liaison report: Nothing to report.

Reports from the WG Chairs

C4: Global Industry Experience with System Integrity Protection Schemes (SIPS)

Chair: Vahid Madani

Vice Chair: Miroslav Begovic

Output: Survey

Established: September 2004

Expected Completion Date for the Survey: September 2008

Summary Meeting Notes:

WG C-4 met on September 9 in one session with total 17 in attendance (9 M, 8 G).

Tabulated results of more than 900 schemes (from 60-70 respondents) was presented and reviewed by the WG members. Vahid indicated that the task of tabulating requires consistent interpretation and is done by Frankie Au-Yeung, Victor Ortiz, and Vahid Madani. Some of the statistical data in plot format were presented about types and reliability of the reported SIPS systems.

Some of the recent responses have arrived from across the globe, but there are notable absences of information from countries such as China, Russia, Australia, etc. We have received response from a major part of India. Several requests have been sent to Russia and China.

Members highlighted that none of the plots that were discussed / presented focused on the name of the respective company. Also, for WECC as an example, a single entry has been made.

A draft outline prepared by Stan Horowitz was discussed WG volunteers assigned to various sections of the outline. Damir Novosel and Vahid Madani will lead the preparation of the draft report with help from the volunteers for the sections.

Next Meeting – 30 People, 1 Session, Projector, Power strip

Assignment - Conduct a survey of power systems professionals worldwide to accumulate experience with SIPS. This survey will complement and expand upon the previously published IEEE/CIGRE paper "Industry Experience with Special Protection Schemes" by P.M. Anderson and B.K. LeReverend (IEEE Transaction on Power Systems, Vol. II, No. 3, August 1996). The survey will be conducted via an internet-based questionnaire with the assistance of, and be available to, other interested parties; (e.g. IEEE, CIGRE, PES, EPRI, etc.). The survey should be concluded by September 2008 and will be presented in a report to the "C" Subcommittee and a Summary Transactions paper.

C9: Appl. of Prot. Relays used for Abnormal Freq. Load Shed. & Restoration

Chair: A. Apostolov

Vice-Chair: K. Behrendt

The working group met on Tuesday, September 9th, with 5 members and 6 guests present. Chairman Alex Apostolov reported that he is working on a summary paper draft and should have a copy available for circulation to the working group soon after the Vancouver meeting. Working group comments will be solicited and discussed at the next meeting

The working group expects to meet in single session at the next PSRC meeting, and needs a room for 25 with a projector screen and outlet strip.

C11: Guide for Protection System Testing

Chair: Vahid Madani

Vice Chair: Hyder DoCarmo

Output: Guide

Established: May 2005

Expected Completion Date – Balloting Body: August 2008

PAR Approved through: December 2009

WG C-11 met on September 9 in a single session with total 24 in attendance (10 M, 14 G). After review of the patent slides, the WG members reviewed comments received from the "C" Subcommittee members and discussed edited section (by Hyder and Vahid) based on the reviewer's suggestions.

The WG thanks the C Subcommittee for the overwhelming number of approval votes and the many suggestions which have all been incorporated and discussed at the September meeting. Members of the C subcommittee are part of the balloting body and will have an opportunity to further comment on the draft Guide during the balloting open period.

The WG members believe the Draft Guide is ready to start the process for forming the balloting body and official process for review by the IEEE. We need support from the C subcommittee to participate in the official process.

Next Meeting – 30 People, 1 Session, Projector, Power strip

Scope, Purpose, and Reason:

This guide is intended for power system protection professionals. It will include a reference listing of type tests for protective devices as well as overall protection scheme performance tests for various types of protection schemes. The Guide will describe the methods, extent, and types of protection scheme tests. Interlocking and control functions inherent to the protective schemes are included. This assignment encompasses overall system testing procedures, data collection requirements, as well as the test procedure definitions.

Reason:

This document will aid academic, manufacturing, application engineers and industry protection professionals with the overall benefits for protection scheme performance testing. The document will discuss benefits and challenges associated with verification of overall protection performance and will include information such as: a) Listing of type / production tests, b) Product performance tests from user view, c) Commissioning test - d) Relay settings are properly selected and calibrated e) Verify connections and calibration of settings, f) Trip/no trip and troubleshooting test.

C12: Performance of Relaying During Wide-Area Stressed System Conditions

Chair: Damir Novosel

Vice Chair: George Bartok

Output: Working Group Report and IEEE Summary Paper

Established: 2004

Expected Completion Date: 2008

The working group met in a single session chaired by George Bartok, the Vice Chair, on September 9, 2008 with 7 members and 5 guests present.

Prior to the meeting, the Working Group final report had been approved by the System Protection Subcommittee and by the officers of the PSRC for publication on the PSRC website. Comments received from Charlie Henville and agreed upon by the Working Group members at the last meeting were incorporated into the report. Because of the nature of the corrections made to the report, re-balloting by the Subcommittee was not necessary.

The first draft of an IEEE Summary Paper was prepared by Damir Novosel prior to the meeting. Sections of this draft were subsequently reviewed by a subset of the Working Group and a revised draft (Draft 3) was distributed at the meeting. It was decided that additional review was needed. Demetrios Tziouvaras and Gene Henneberg will conduct this review, concentrating on Section 2. They will also suggest figures that might be incorporated into the summary paper. This will be completed by October 31st.

The Working Group decided that the Summary Paper should be published as an IEEE Transactions paper. It will be formatted to meet the IEEE requirements.

The paper will be submitted for presentation at the Georgia Tech Relay Conference, Texas A&M Relay Conference and Western Protective Relay Conference. Solveig Ward has already prepared an abstract for the Texas A&M Conference.

Pratap Mysore has submitted an abstract to present the Working Group's results at the MIPSYCON conference in Minnesota on November 4th.

The Working Group has completed its assignment and is not planning to meet at the next PSRC meeting.

C13: Undervoltage Load Shedding

Chair: M. Begovic

Vice-Chair: S. Imai

Output: IEEE Report
Established: September 2005
Expected Completion Date: January 2009

The UVLS Working Group met on September 10 with 8 in attendance. After introductions, assignments decided in the last meeting were reviewed and the timeline toward the next meeting were determined as follows;

- September 30 - Clean up the document reflecting remaining contributor's assignments and send to editor group determined in the last meeting (Imai)
- November 20 – The report reflecting editor's comments will be updated to the working group web-site and email will be sent to ask working group members to review

Remaining assignments on the latest draft (4.1) discussed in Kansas City Meeting

- References need to be added to Section 3.1.3 (Charlie Henville)
- References need to be added to Section 5.1.1 (Richard Young)
- Text on centralized schemes for Section 5.2.1 will be solicited (from Steve Conrad, or Jean-Marie Gagnon)
- Text on distributed schemes for Section 5.2.1 will be added (by John Burger)
- Text on Centralized / Wide Area UVLS for Section 5.2.2 will be added (by Shinichi Imai, possibly also by Ken Martin)
- Text on Voltage Slide Scheme for Section 6.1.1 will be added (by Harley, to be sent by Cunico)
- References for Section 7.6.1 will be added (by Vahid Madani)
- Text on Coordination UVLS – UFLS will be added (by John Burger)
- Text on Maintenance / Testing / Reliability will be expanded using CIGRE "Defense Plan" report as a template (by Vahid Madani, Miroslav Begovic)
- References to the names of companies and specific products will be removed from the report (Shinichi Imai, Miroslav Begovic)
- Sections 9 and 10 will be moved into the Appendix of the report
- Text on 1987 voltage collapse in France is needed (Miroslav will try to contact Daniel Karlsson)
- Editors have been assigned to read the text of the entire report (Miroslav Begovic, Shinichi Imai, Damir Novosel, Vahid Madani, Ken Birt, Alex Apostolov, George Nail)

We request a projector and a room for 15 people at the next meeting. At this time, we request a time allotment for a single session.

Assignment: This working group produces a report on the implementation of undervoltage load shedding (UVLS) in electric power systems. It presents background information, guidance in implementing UVLS schemes and a bibliography. Voltage instability, voltage and reactive power management, emergency actions to avoid load shedding, UVLS philosophy and methods, voltage collapse detection, existing practices, settings and coordination between UVLS and UFLS are discussed.

C14: Use of Time Synchronized Measurements in Protective Relaying Applications

Chair: Jim O'Brien

Vice Chair: Alla Deronja

Output: IEEE Report

Established: May 2007

Expected Completion Date: December 2009

Assignment:

Produce a general report to PSRC Subcommittee C outlining practical protection applications using synchrophasors.

Scope:

Develop a report that identifies synchrophasor data and parameters that are useful for improving protection schemes and analyzing protective relay performance. The report will not include deployment of devices to acquire time synchronized measurements.

Working group C14 met on September 09, 2008, in Vancouver, BC, in a single session chaired by Jim O'Brien with 12 members and 33 guests. 3 guests joined the working group as members.

The chair distributed an up-to-date draft of the proposed Outline, which was discussed by the group.

Additional topics were brought up such as addressing local and wide area protection, protection and protection-related applications, and the C37.118 synchrophasor standard as applied to this report.

Line current differential protection was proposed to be moved to the Future Applications section along with other differential protection types such as bus, transformer, etc.

It was proposed to reference the standard C37.118 to limit the scope of the report; however, the existing applications do not use C37.118.

The scope defines only protection applications. The protection-related functions such as power swing detection should also be defined in the scope.

Other potential applications were proposed such as distribution bus differential protection and reclose control.

Gustavo Brunello mentioned the CERTS report Phasor Technology Research Roadmap for the Grid of the Future, which outlines actions on the present and future phasor measurement applications.

Since the topic appears to be quite broad, it was suggested to solicit all applications of synchrophasors, which can be useful or possible to use to determine which are to be addressed in the report.

The WG assignment before the next meeting is as follows:

- Working group members are requested to submit to the chair, Jim O'Brien, via email (jmobrien@duke-energy.com) anything, which is done with synchrophasors in the protection and protection-related areas and the ideas what to do with them by November 1st, 2008.
- Jim will generate the list, and the working group will sort out protection from non-protection synchrophasors on the January 2009 meeting.

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

C15: Design and Testing of selected SIPS

Chair: J. Sykes
Vice-Chair: Y. Hu
Output: Report
Established: September 2008
Expected Completion Date: December 2012

Working group C-15 held its first meeting on Wednesday, September 10, 2008 in single session with a total of 28 people in attendance. The working group opened this meeting with a review of its background and the meeting minutes of the May 2008 task force meeting. The working group focused on its discussion on defining the assignment of the group after Rich Hunt from C-Sub-committee appointed Jonathan Sykes and Yi Hu as the Chair and Vice Chair of the working group.

Based on the recommendations of the last task force meeting, the working group discussed and agreed that the assignment of the working group will be to produce a report in three years on industrial practices in design and testing of selected SIPS. Several candidate SIPS that have shown wide applications in the C-4 survey results were discussed. The working group also agreed to change its title to "Design and testing of selected SIPS" to more accurately reflect its target assignment.

The discussion of what the report should include leads to the following recommendations:

- The report should include a high level general design considerations for SIPS
- The report should have proper reference to C-4 and C-11 results
- The report will not include planning component
- For each of selected SIPS, the report should include the following areas
 - Basic design, design considerations
 - Flexibility and expandability
 - Redundancy, dependability and security
 - Detection methods, required communication support, etc.
 - Maintainability (design for testing), system coordination, regular testing plans

The working group will meet at next PSRC meeting in two-sessions to finalize the assignment of the working group. The group Chairman and Vice Chairman will prepare and circulate a sample assignment statement to members of the working group prior to next meeting.

Next Meeting – 30 People, 2 Consecutive Sessions, Projector, Power strip

C16: Relay Scheme Design for Modern Relays

Chair: K. Birt
Vice-Chair: R. Lascu
Output: IEEE report
Established: May 2008
Expected Completion Date: 2010

C16, Relay Scheme Design for Modern Relays, met for the first time on Tuesday, September 9, 2008. There were 32 people in attendance.

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

- Exclude: AC voltage and current inputs
 - Goose

- Internals of relays
- IRIG and communication issues
- Include: signaling between protective elements such as relays, breakers, etc. primarily as it applies to trip and control circuits

A presentation of the summary paper of the 1999 relay trip design paper was given by Mohamed Ibrahim, IEEE fellow and consultant of Siemens company, which was well received by the working group members and guests. A lively discussion then occurred on topics that should be included in the outline and also on finalizing the scope of the paper (i.e. addendum to original paper versus stand alone report). The preliminary outline will be revised by K. Donahue and J. Sperl by December 1st. Raluca Lascu will circulate the outline before the January meeting.

Requirements for the next meeting: single session, a room for 40 and computer projector.

CTF17: Testing and Design of SIPS

Chair: D. Miller

Vice-Chair: G. Henneberg

Output: Report by the Joint Working Group

Established: September 2008

Expected Completion Date: 2010

Task Force 17 met in a single session on Tuesday, September 9, 2008 in Vancouver, BC; with 25 attendees. Of those attending the meeting 18 elected to become members of the future working group.

After introductions, Charles Henville described what had occurred at the first organizational meeting for the Joint Working Group. This meeting took place on July 23, 2008 at the PES General Meeting. The Joint Working Group will consist of members afflicted with the PSRC, T & D, and the Electric Machinery Committee (EMC).

After a discussion on the possible assignment for a working group and how the PSRC members would be organized to support the activities of the Joint Working Group it was decided to ask the subcommittee for the permission to form a working group of the System Protection Subcommittee for this purpose.

The assignment of the Joint Working Group is: "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." The assignment for the System Protection Subcommittee Working Group will be: To support the activities of the Joint Working Group on Fault Current Contributions from Wind Plants in the production of a report that characterizes and quantifies the short circuit current contributions to faults from wind plants for the purposes of determining protective relay settings and fault interrupting equipment ratings. The report will provide guidelines on the modeling and calculations for that purpose.

The scheduled meetings for the Joint Working Group are planned to be at the following times:

- PES Joint Technical Committee Meeting in January
- PES General Meeting in July
- PSRC meeting in September (or May)

The Working Group will meet with the Joint Working Group in January in a single session. We will need a room for 35 people with a computer projector. A presentation on

fault current contribution will be given by an engineer from a wind turbine generator manufacturer.