

C: SYSTEM PROTECTION SUBCOMMITTEE

Chair: T. Seegers

Vice-Chair: R. Hunt

The C System Protection Subcommittee met on Wednesday, May 16th 2007 in Nashville, TN with 17 members and 35 guests in attendance.

6 Working Groups and 1 Task Force met at this meeting. The members of the Subcommittee approved the minutes of the January 2007.

Working Group C3 Processes, Issues, Trends, and Quality Control of Relay Systems completed its assignment, and the Subcommittee voted to dissolve the Working Group. The Working Group report was presented by Solveig Ward at the Georgia Tech Protective Relay Conference in May 2007.

Working Group C5 Deployment and Use of Disturbance Recorders completed its assignment, and the Subcommittee voted to dissolve the Working Group. The Working Group report was presented by Bill Strang at the Georgia Tech Fault and Disturbance Analysis Conference in May 2007.

Working Group C6 Relay Engineering in Power Engineering Curricula completed its assignment, and the Subcommittee voted to dissolve the Working Group. The final report will be published in an upcoming issue of the IEEE PES Transactions on Power Delivery.

NERC liaison report: June 4th, 2007, all PRC standards are under review. Make sure your utility is involved in the NERC process.

PSCE liaison report: nothing to report.

PSSC liaison report: Nothing to report. The task force on blackouts is still proceeding.

The Subcommittee voted to create a task force, CTF15 Testing and Design of SIPS, to discuss the design and testing of SIPS schemes. CTF15 will be headed by Yi Hu. Must look at most common schemes, define (and especially limit the scope), and must coordinate with C4 and C11 Working Groups.

The Subcommittee voted to create a task force, CTF16 Relay Scheme Design Using Microprocessor relays, chaired by Ken Birt. This task force will consider the ways that protection and control schemes may be changed when using microprocessor relays, and will include documentation, training, and experience. This Task Force may more properly belong in the K or I Subcommittees.

Mukesh Nagpal and Alla Deronja will report back to the Subcommittee at the September meeting on the possibility of forming a Working Group to discuss issues around connecting IPPs to the transmission system. They will consider whether this information is already covered in C37.95, by Working Group K10, or by any other Standard or Guide.

Reports from the WG Chairs

C3: Processes, Issues, Trends and Quality Control of Relay Settings

Chair: S. Kunsman

Vice-Chair: G. Kobet

The Working Group has completed its assignment, and did not meet in Nashville. The WG report was presented at the 2007 Georgia Tech Protective Relay Conference.

C4: Global Industry Experience with System Integrity Protection Schemes

Chair: V. Madani
Vice-Chair: M. Begovic

WG C-11 met on May 15 in session with total 11 in attendance (9 M, 2 G).

After review of the patent slides, the members discussed whether they should consider using a database software tool for automatic extraction of responses or perform the task manually. Based on the nature of survey being related to SIPS, different respondents may interpret the questions differently. Therefore, the decision of the members was to have volunteers to review the surveys and extract the information.

Next item discussed was related to extension of the survey deadline for responses. The WG has received request for extension by different countries (CIGRE) and grid systems in North America. The WG members agreed to a 3-month extension. The WG has received approximately 20 responses with some of the responses covering double digit number of schemes and some in excess of 300 schemes.

The C-11 WG members request extension from the "C" Subcommittee for extension to accommodate survey respondents, compilation of results, and to produce a report. The product from this WG is a report to the C Subcommittee.

Sample of several responses received, to date, were reviewed. The WG members suggested to have a brief document that would assist in uniform interpretation of the survey responses.

The plan is for two members to develop the brief criteria, submit to the volunteers that have agreed to participate in data extraction for comments within a month. In parallel, a sample of responses received will be sent to the WG members.

Five members volunteered to assist in extracting responses from the survey.

Vahid mentioned that of all the responses received, no one has mentioned ambiguity in the questions or that the respondent needed further clarification or information.

Other items discussed was to rebroadcast the survey and methods to get the Regional Councils more involved. The WG members discussed best ways to get respondents to fill out the survey, and best ways to f/u. Several WG members have volunteered to send to their contact colleagues in various parts of the world.

C6: Relay Engineering in Power Engineering Curricula

Chair: S.S. Venkata
Vice-Chair: J. DeLaRee

The WG met with 8 members in attendance. The WG discussed the feasibility of developing actual educational modules, and decided to not undertake this effort. The WG was disbanded by the Subcommittee. The paper will published in an upcoming issue of the IEEE Transactions on Power Delivery.

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, May 15th, with 8 members and 4 guests present. Alex announced that the recirculation ballot was successful; there were no negative ballots. The revised guide, C37.117, has been sent to IEEE RevCom for final approval. In the process, an IEEE editor has reviewed the guide again, suggested several editorial

changes, and asked questions about terminology, references, and other possible editorial changes. The working group reviewed the comments and questions to form a response. Alex and Ken will respond to the IEEE editor.

Alex will prepare an outline for an IEEE Transaction Paper and draft a Summary Paper paper before the next meeting. Members of the working group will be solicited to write sections of the transaction paper.

C11: Guide for Protection System Testing

Chair: V. Madani

Vice-Chair: H. DoCarmo

WG C-11 met on May 15 in single session with total 44 in attendance (12 M, 20 G). After review of the patent slides, the WG members reviewed a list of pending contributions. The following writing assignments were discussed:

- Sec. 4.4.4: - Synchronous closing CB and associated testing
- Sec. 5.1.2 (Functional Testing of IEC 61850-based applications), Test Mode Functionality
- Sec. 5.1.2 (Functional Testing of IEC 61850-based applications), Additional virtual wiring testing
- Section 6 – SIPS Testing

In discussions with the I8 WG (Application of Optical Sensor Systems) and EG C-13 (Undervoltage load shedding scheme), it is also agreed that system testing will address these two from protection scheme and scheme performance perspectives. The C-11 WG members have the knowledgeable people as WG members that can make the contributions.

For the next meeting, the C-11 WG members will start going over comments assigned to review the entire document. A total of 9 WG members have volunteered (2 from Academics, 2 from Consulting / testing, 3 from utilities, plus Chair and vice Chair).

C12: Performance of Relaying During Stressed Conditions

Chair: D. Novosel

Vice-Chair: G. Bartok

The working group met on Tuesday, May 14th with 15 members and 18 guests present, chaired by Damir Novosel.

For the benefit of the guests present, the Working Group scope and the current progress in completing the report were reviewed.

Writing contributions received since the last meeting have been incorporated into Draft 7a of the report. This draft was distributed to Working Group members on May 7th for review at this meeting. The draft is over 95% complete.

The report has been completely reviewed by Demetrious Tziouvaras and Alla Deronja for consistency and to remove duplicate material. The general consensus of Working Group members is that the report is too long (99 pages) and contains detailed information that should be removed and noted as references.

Comments and suggestions received from Demetrious and Alla were reviewed:

- Section 2.1 on Voltage Instability is too broad. Alla will condense this section to remove detailed information that will be referenced.

- Section 2.6 on Voltage Excursions will be moved to follow Section 2.1
- Section 2.7 on High System Unbalance will be reduced to remove duplication with Section 3.2.3
- The last paragraph of Section 2.8 (Dependability-Security Balance) will be clarified and moved to Section 3.
- Section 3.2.5 on Automatic Reclosing and Synchro-check is too detailed. It will be reduced to only the key concepts. The last paragraph that describes how stressed system conditions affect reclosing will be retained.
- Section 3.2.6 on Series-Compensated Lines contains material that is instructive, but not related to the central focus of the report. Fernando Calero will rewrite this section to include only the information pertaining to the impact that series line compensation may have on protection performance during stressed system conditions.
- Section 3.2.8 on Multi-Terminal and Tapped Lines is too long and contains material in subsection 3.2.8.1 that is not related to the central focus of the report. This section will be removed or rewritten.
- All of Section 3.4.2 beyond the first two sentences should be moved to Section 5.3.5.
- Section 3.4.7 (Unknown Causes) and 3.4.8 (Gas Turbine Generator Monitoring) should be swapped.
- The events listed in Section 4 (Field Experience and Examples) should be presented in chronological order.
- Section 4.1 (NERC Analysis of August 14, 2003 Blackout) will be reduced to approximately four pages by Tom Wiedman. The remainder of the detailed material in this section will be referenced.

All assignments to edit and rewrite sections of the draft report will be made relative to the draft copy that Demetrious Tziouvaras has already reviewed and edited. These changes will be submitted to the Chair and Vice Chair by July 15th. George Bartok and Vahid Madani will review the entire report for consistency by September 1st. The new draft will be distributed to the members for review prior to the September meeting in Charlotte. It will also be placed on the Working Group web site.

C13: Undervoltage Load Shedding

Chair: A. Buanno

Vice-Chair: S. Imai

The UVLS Working Group met for the fourth time with 28 in attendance. This included 11 members and 17 guests.

The working group assignment was reviewed with no changes.

Comments & suggestions from Recent Contributions –

1. Clause 2.2.1 on Dynamic Reactive Power Source
 - a. The terms on percentage increase for price and ‘expensive’ are to be removed.
 - b. Lukach will make a summary of the advantages and disadvantages of various dynamic reactive sources..
2. Clause 2.4 - NERC Position on UVLS,
 - a. No comments
3. Clause 5.1 - Manual/SCADA load shedding,
 - a. Group tripping of load via SCADA will be added by Young.
 - b. Load restoration will be mentioned in clause 5.1 Manual/SCADA load shedding by Young.
4. Clause 7 - Scheme Design,
 - a. In clause 7.9, Performance Criteria, operation under extreme cases will be clarified.

- b. UVLS as response-based scheme will be added under clause 7.9, Performance criteria.
- c. Madani will be reviewer for clause 7.9, Performance criteria.
- d. Possible name change for clause 7 to scheme design and engineering section rather than Scheme Design was mentioned and will be considered later.

Open sections & volunteers for assignments

1. Madani will contribute for clause 4.1.3. Safety Net and review all of clause 4.
2. Clause 5.2.1 will be written by Burger.
3. Clause 2.3, Coordination between UVLS and UFLS, will be written by Wiedman.
4. Clause 8, Maintenance and testing, will be covered briefly in this report by Madani; details will be covered in the C11 WG guide.

Presentation

“Understanding Power System Models and Predicting the Next Blackout”, Tony Sleva

Timeline of the activities

- July 15, 2007 – Complete writing assignments
- August 15, 2007 – First review of report
- Sept. 17-20, 2007 – Next working group meeting
- November 15, 2007 – First round of editing
- January 7-10, 2008 – Working group meeting
- February 15, 2008 – Submit for ballot

CTF14: Impact of the Application and Deployment of PMUs on Protective Relaying

Chair: J. O'Brien

Vice-Chair: A. Deronja

TF CTF21 met on May 15, 2007, in Nashville, TN, in a single session chaired by Jim O'Brien with 9 members and 9 guests present to define the need and scope of the future working group.

Is there enough in this topic to justify a Working Group? Yes. Meet as a task force next time, define the scope. Discussion focused on:

- Applications on RAS, SPS, adaptive relays and voting scheme input
- Synchrophasors vs. PMU
- Communications, reliability, redundancy
- Power measurements, frequency, rate of change of frequency, phasor angle
- PMU from transient observation, transient response is suitable for application (synchrophasor standard)
- Trend of integration of synchrophasors and relaying functions, security issues
- Stand alone vs. integrated with relaying
- Post-mortem analysis, line impedances, ratios X/R, positive/zero sequence, hardcore protection applications backup, RATS, frequency load shedding. Away from the system
- Impact on the Recorders DFR
- Impact on communications, should be considered
- Dynamic performance different PMU vendors
- Focus on protection, integration SP with relays, commissioning, communications, relay
- settings, post-mortem, short-circuit analysis, concept of the function, different operation

- of the different vendor devices, reliability, security
- Conventional protective functions receiving info from PMU, putting conventional protection into SP.
- What to use from PMU to improve

Should the output be a Report, Guide, or Standard?

Thoughts on a title and scope:

- Some possible practical applications (PMU inside the relay):
- Check instrument transformer connections
- Check CT polarities, phasing (within station and remote)
- Analyze faults
- Apply system self-checking schemes
- Monitor voltage/current angles across the system
- Perfectly Time-Align

Possible scope

To identify time synchronized measurement data and parameters that are useful for developing relay settings for protective scheme implementation improving protection schemes and analyzing protective relaying performance.