

Working Group on System Design 2004 IEEE/PES General Meeting minutes

Cheri Warren called the meeting to order at 8 am and introductions were made. 53 members and guest were present. The membership list for the Working Groups was passed around and the members were asked to make corrections to the sheet, especially their email addresses.

In a quest to save on paper, the minutes from Orlando reviewed electronically. Greg Welch made the motion to accept the minutes with a second by Val Werner.

Task Force on Reliability Indices

Cheri informed everyone that IEEE Std. 1366-2003 has been approved both by IEEE in December 2003 and by ANSI in April 2004. It will be officially available from IEEE starting in early June. All members of the Working Group whose names appear in the front of the guide should have received copy of guide from IEEE Standards Association. They should have received an email, from IEEE-SA, asking if they wanted electronic or hard copy. If did not receive email notice from IEEE-SA, send an email to Cheri and she will send them a copy of the Guide.

Update on other related meetings

Cheri attended the IEEE-REA conference with Bob Saint where they presented a paper titled, "*IEEE Reliability Indices Standards – Major Event Day Calculations and how it Effects Small Utilities*". The paper was well received and has been submitted to IAS as a transactions paper. She stated that the papers presented at the conference were quite valuable, especially for younger engineers.

Roy Billinton, Chair of the CEA Consultative Committee on Outage Statistics gave an update on the CEA Service Continuity Committee position on the 2.5 β method. The 2.5 β method is still under evaluation and discussion by the CEA Service Continuity Committee. Concerns have been raised as to the process, the appropriateness and the applicability of the method. At his time the Service Continuity Committee has not made a recommendation, one way or another. When a decision is made, they will communicate it through the appropriate channels. Cheri also attended the CEA meeting and found it very informative. She also reminded the WG members that CEA performs a survey each year that is open to all for a nominal fee. Once a year participants get together to review results and share reliability approaches with one another.

Cheri spoke at the AEIC on IEEE Std. 1366-2003. There was great interest in Std. 1366. There were mostly executives at this meeting. The one minute versus five minute questions came up from an FPL executive. FPL has a considerable amount of automation and is being affected by the one minute rule when they are compared with others who use one minute but have less automation. London Hydro, a Canadian utility, has had the same experience. A discussion followed, as the 5 minutes was based on the old auto loop schemes. S&C has about 100 customers with IntelliTeam schemes, which usually operate within one minute although the penetration of the schemes is relatively low at the utilities. The question was asked, is there a difference between one and five minutes. Most members agreed that we should leave the definition at 5 minutes because many of the existing schemes still require that length of time to operate. It was also pointed out that the timing of an interruption is often more important than length of the interruption to most residential customers.

Benchmarking

Cheri then gave an update on benchmarking. The slides from the presentation can be found on the Working Group's website at: <http://grouper.ieee.org/groups/td/dist/sd/>. Many utilities represented by members of the Working Group have given data for use in benchmarking and further development of the Major Event Definition. A Working Group paper will be written based on the benchmark data collected. 79 companies have given data for this study. 35 of those provided greater details about their systems. Of the 35, 94% tracked step restoration. 97% used some form computer tracking system. 91% stated that they had connected model, with 63% to the customer & 94% to transformer.

Classifications of the Utility (Urban/Suburban/Rural (USR) and Small/Medium/Large) was discussed. CEA has also been wrestling with a definition for USR. It is a difficult thing to quantify given the information we all readily have available to us. We seem to be settling on a customers per mile metric.

A total of approximately 52 million customers are represented by the data in this benchmark throughout Canada and the US. There are 3 Urban, 18 Suburban and 27 Rural utilities in the mix. Greater details can be found in the presentation that is on the website.

Some observations from the 2003 data

SAIDI variation grew as size shrank. For all, the data was flat in some spots – CEA sees the same. Some utilities “pre-classified” 8/14/03 blackout while others did not. CEA does not classify U/S/R as some utilities have all three designations and no good way has been determined to fairly represent those cases.

Some companies want their names published in the benchmarking effort while others do not. Cheri Warren will send a formal e-mail asking if you want your name listed in the benchmark. Based on the responses, new graphs will be generated. Cheri will also send the blind data to current WG members.

It was then asked of how the group wants to see the data. It was suggested that a scatter plot of SAIDI vs. SAIFI be made. For the data, need to look at trends to see if SAIDI or SAIFI is increasing. This can be done for an individual utility, but how would it be done on the entire data set. Some were hoping to trends of utilities here. It was pointed out that for trends, it was best to look at the individual utilities. Cheri has charts for each utility, with each utility receiving a copy of their own charts. For the charts, plot the distributions to see if they are shifting left or right, which will give the utility an idea if their performance is improving or declining. CEA plots an all Canada number and it was asked, what does the average customer in Canada see in terms of reliability. The trends are to see if things are getting better or worse. A five-year rolling average is better than year to year.

The question was asked on how interpretable rates interruptions (DSM) were used (they are not include as an interruption). DSM interruptions are not included if it is a system operator decision, but included if it is an actual distribution system problem. This may become an issue in the future. In CEA, transmission level noted as loss of supply.

A list of questions from Devendra Soni of Distribution Control Systems was then presented, a copy of which are attached.

Lee Welch asked how many utility's had bonus goals based upon which quartile their company is in (SAIDI, SAIFI...) according to a specific benchmarking survey. The answer from the WG was not many, but in other forums, this number is growing. Most utilities have specific reliability target, some imposed internally and some imposed externally. It also depends on which survey is used when looking at reliability numbers. And now,

some companies still have their own transmission system and others do not, so the question is: how handled these cases? **C Perry action item on statistical variation.**

Bob Saint then presented the results of a NRECA survey, copies of which will either be sent to the Working Group or placed on the group's web site. There are 860 Co-Ops with 360 responses to the survey. Some of the highlights of the survey are:

- It showed the different regions.
- Showed the breakout of Co-Ops that are regulated by their states.
- What was tracked; momentary and/or sustained outages, type of outage, type of customer...
- How many Co-Ops are using automatic tracking systems and how the data is entered.
- How the data is tracked and the tracking technologies used. These are published reliability reports (of which there are not many).
- Showed for MED – which definition is used. Also, which indices are used.
- Not many of the Co-Ops are tracking momentaries and how defined and captured.
- PQ – looked at and if so how measured.
- Does the co-op have a catastrophic outage plan and mutual assistance plan.
- Most of the Co-Ops do not have any type of automatic monitoring (SCADA).
- Outage prevention – what used (mostly maintenance is used).
- What is primary motivation to improve reliability – mostly customer satisfaction.
- It also showed the types of maintenance programs and visual inspection programs.

The question was then asked, how often to utilities keep their connectivity model up-to-date? Some are dynamic and more may be moving that way. It all depends on how complex the model is. Others update monthly or annually.

There was then an update on Xcel Energy. Xcel had violated the Colorado PUC standards and \$13.4M in fines were levied. An article had appeared in the morning edition of the Denver Post (see <http://www.denverpost.com/Stories/0,1413,36%257E33%257E2200685,00.html> for the entire article).

Cheri Warren will be on NARUC agenda in July. She will be making a presentation on 1366 to the group. This is an opportunity to get the state commissions on board.

Hydro-Quebec: Catastrophic Day Analysis

Majella Lafontaine sent a paper to Cheri Warren that was distributed to the working group, entitled: "Major Event Classification – Adjustment to the 2.5 Beta Method". The main question is: How should days that are so far above the norm be handled? Should there any type of pre-classification? The 1998 Ice Storm that took place in Canada, northern NY and Maine is an example of the type of event that is causing this issue to be explored. Key questions...should these types of days be removed for purpose of calculating MED? Are these days bumping up MED enough to skew data?

Hydro-Quebec is proposing a 4β pre-classification approach. See Power Point slides on the group's web site for possible approaches. The thresholds should be looked at before and after the events to see if there is a big "bump" in the threshold established using the 2.5β . Up to 4β days gets days in other years after catastrophic event: so are the others actually catastrophic events. Some with PBR can get penalized if the catastrophic events are left in. The questions was raised: Instead of looking at it via a statistical process, should it be negotiated with the regulatory body? What if there are multiple events in separate years. Statistics were supposed to handle all of this. Why

should these days be removed? The statistics will do work and so what if threshold jumps. If there are no more catastrophic events, then statistics will come back down to normal after five years. It seems that there is a less of a concern with trend than there is with the effect on metric. It was pointed out, leave the mathematics as pure mathematics. State regulators do not have enough knowledge on how to apply the current 2.5 β method (Do we need of a white paper on how to apply?). We need to move from statistical tool to regulatory tool (but the question is how?). The Working Group needs to get guidelines to Regulators, which would be a valuable tool. Part of the problem is to get common method, the assumption is that the statistics are log-normal. With zero days and catastrophic days, the log-normal no longer fits; so is the calculation of beta still valid? Need to be pure in calculations. There is also an equity issue between the utility and the PUC, which is a penalty issue. If threshold is doubled (MED), then event might be catastrophic (this something to look at). Also, should the time period be lengthen?

Zero days - Status update

Bob Saint has given lot of smaller data sets from Co-Ops. The question on zero days is how does it affect small utilities, regions or districts. The answer is that leaving them in does not have an affect. It appears that MED days are chosen appropriately. From data, MED actual chooses more days than the co-ops would. There is a need for consistency. Several examples were shown with small utilities. With very small number of customers, the SAIDI/SAIFI will be very volatile. Empirically it is giving the right answer, but is it truly the right answer? The best days (0) are being eliminating from calculations. If aggregating, then more days will be MED. It looks better if one slices and dices to smaller areas. May need Monte Carlo simulations. The distributions hyper-exponential, with the more rural area looking more like a Weibull distribution. The data looks more like lognormal in middle. But, we are working with tails, not entire data. Lognormal is a universal fit; not applying it to part of the data is not. No size factor to apply. MED may not apply to utilities below a certain size. This needs more evaluations before going on.

Jim Bouford gave an update on history on method. Started out looking at it empirically. Then looked at lognormal method. Uses a mathematical process to evaluate reliability. Looks at events above the operational limits or design constraints of a utility. Does it look like it gives us a good representation? Only each utility can say for certain. Is it showing the trends? Smaller utility may have more crisis mode days – mostly due to lack of staffing. Method is great when look at system, but as you scroll down, more problems are seen, especially as the number of zero days goes up. The method is trying to smooth out variation to see trends in the reliability. There are two ways, remove tail (MED) or use larger systems (entire US for example). The threshold goes up as the size goes up. Are there enough samples to smooth out the trends? The 2.5 β method is almost to point that it may be to complicated. Need to identify down to what size is the method still valid? Is it just one house vs. all North America. Peaks in outages (Standard Deviation) will disappear, but at 1 house, may only have a few, if any, outages, so there will be great variability.

Need to go back and look at these issues. A sub-group will be formed to look at these issues. Are we accomplishing the goals? Cheri Warren will form the sub group with Jim Bouford, Bob Saint, Charlie Williams, Cheri Warren, Richard Brown & Greg Welch volunteering to look into this more.

Task Force on Reporting

Rodney Robinson began the meeting by discussing the TF progress since the Orlando meeting. Considering the number of questions brought out by those in attendance in the WG Orlando, the TF agreed to delay the guide development and begin by developing a couple position papers on the key issues. Once these papers are complete, the TF will use these (and any other topic papers developed) to compile the first version of the Outage Reporting Guide.

Val Werner made a presentation on the draft paper on: *“Collecting and Categorizing Information Related to Electric Power Distribution Interruption Events: Data Consistency and Categorization”*. A copy of which will be posted to the groups web site. There is a need for some consistencies for benchmarking. There are differences in collection systems, what is collected, step restorations and definitions... (see slides for more details). The sections were: I Introduction, II System Characterizations, III Interruption Cause Categories, Equipment, Power Supply, Other, Planned, Public, Unknown, Vegetation, Weather, Wildlife, IV Responsible System, V. Conditions (Normal, Minor Event & MED), VI Voltage, VII Interrupting Devices, VIII Interrupting Device Initiation, IX Customer Restoration, X Equipment Failure or Deterioration (11 categories).

The following provides the key issues discussed by those present:

System Characterization

The categories used for 'rural, suburban, and urban' were in question by the group as not being consistent with other standard such as the Canadian Reliability Association guides.

It was pointed out that this is minimalist approach and that it was not meant to be all inclusive. The system characteristics that were used were customers per mile. There will be inconsistencies between groups. The way that the population is distributed now, there may be 4 categories. Define by feeder or system. Rural may be 4 customers/mi. Rural area may have suburban pockets within. It was asked, where the numbers came from for the Rural, Suburban, Urban categories

It was agreed that the percent of overhead and underground facilities would also be beneficial for comparison purposes.

Interruption Cause Categories

It was discussed that the intent of the list of causes was to be at a high level for the companies to better benchmark with other utilities.

After much discussion, it was agreed to add 'lightning' as a cause code separate from 'weather'.

It was agreed that 'Other' and 'Unknown' should be included at the bottom of the list.

It was recommended that the TF members group their companies outage statistics under the final list of cause codes to make sure that no one of the categories are greater than 20 %, which would show that the categories are too broad. Look at the spread (should be between 5-15% per group). If category is large, may want to break it out into more than 1 category

After much discussion on the paper, it was agreed that an updated version of the paper would be set out to the full WG for review and comment. Any replies or responses to the white paper will be due back within 2 weeks. A conference call will follow.

Below is the proposed schedule for review and updating this paper:

E-mail to the WG members by June 11th
WG review and comments by June 25th
Compile comments/distribute to WG by July 2nd
Incorporate comments/distribute by July 30th
Conference call for final review/WG vote on submission for publication August 13th

It was further agreed that the first draft of the second paper on 'Data Collection' would be issued to the WG for review by September 30th.

Task Force on Reliable Design

Charles Perry chaired this session.

It was reported that IEEE will no longer publish bibliography papers. Theory is that we should be able to IEEE Explore. If bibliographies cannot publish in Transactions, then they will but on groups website. Group is developing a bibliography of papers on reliability. A draft was presented to group. Members of the group were encouraged to send papers to Charles (cperry@epri-peac.com). Charles will contact Jim Burke to get some of his documents (like Jim's Hard to Find Facts document). It was pointed out that IEEE Explore was not made for the working engineer.

This Task Force is sponsoring panel at 2005 T&D. Some of the panelist have sent summaries to Charles, Charlie Williams and Betty Tobin still need to send their summaries to Charles. The Title of the panel will be: Effects of Distribution System Design on Reliability.

Those who would like to be members of this Task Force should send their names to Charles Perry. The Task Force will write a paper on what is need for a reliable design for a distribution system.

The Distributed Generation Integration WG needs data on any screening processes that re used for install DR on a distribution system. Please send any screening process to Charles Perry. Will send this info to 1547 when they eventually write their interface standard.

General Items of Interest

The Standard is IEEE Std. 1366-2003, not 1366-2004. Cheri will send the latest letter to commissioners to group.

Does group want to look at weather normalization? Charlie Williams would like to propose a Task Force to look at this. This proposed Task Force will look at data and models. Cheri said to wait for the TF until some initial work has been completed. Charlie showed some slides from Florida. Reliability got worst 1 year after big improvements, this was due to increase in lightning activity. A weather normalization factor paper was passed out at the Orlando meeting. How is system responding to improvements based on weather being experienced? Does the Working Group need Weather Normalization interest group? Volunteers for this should send their name to Cheri.

Meeting issues update. T&D Adcom wanted General meeting & Oct conference meeting. Governing Board supportative of a General and Winter Technical meetings. This Working Group is supportive of Winter Technical and General Meetings. The winter meetings should be held at low cost sites. TPC, L&I and ESMOL are supportive of a Vegas meeting for winter of 2005.

Next meeting will be in the Winter of 2005. Information on this meeting to follow. Next General meeting is June 12 – 16, 2005 in San Francisco.

The meeting adjourned at 11:50

Link to updated state regulatory reliability issues: www.nrri.ohio-state.edu

Panel Session on 1366. Regulatory paper as one idea.