NASPI Control Room Solutions Task Team Monthly Meeting

Presenters: Mike Cassiadoro & Jim Kleitsch

February 21, 2018

Agenda

I. Introductions

II. Review meeting minutes from Jan. 2018 Call.

III. Review status of CRSTT Work Products

- Focus Area Documents
- Video Event Files
- Use Case Documents

IV. Review draft survey for *Using Synchrophasor Data to Determine Disturbance Locations* paper.

V. Review CSRTT's mission, objectives and goals and continue discussing potential revisions for 2018.

VI. Adjourn

CRSTT Meeting Minutes – Jan. 2018

Team to review meeting minutes from Jan.2018 call.

Control Room Solutions Task Team (CRSTT) Minutes

Co-leads, Michael Cassiadoro (mcassiadoro@totalreliabilitysolutions.com) and
Jim Kleitsch (jkleitsch@atcllc.com)
Teresa Carlon, NASPI web site and listserv contact (teresa.carlon@pnnl.gov)
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January 17, 2018

Attendees – See below. Call led by Mike Cassiadoro.

Action Items

- Oscillation Detection paper will be submitted to the NASPI Leadership on January 19 for comment.
- Marianna will be working on Using Synchrophasor Data to Monitor Reactive Power Balancing paper. If you would like to join in this effort please let Mike and/or Jim know.
- NDR offered to help with the Determining Disturbance Locations paper. If you would like to join in this effort please let Mike and/or Jim know.
- NDR and Mike will take another look at updating the Phase Angle Monitoring spreadsheet and maybe the paper in an effort to keep the CRSTT documents current. (Download the paper).
- NDR to check with Peak on sharing an event video.
- Teresa to post link to Use Case Document spreadsheet.

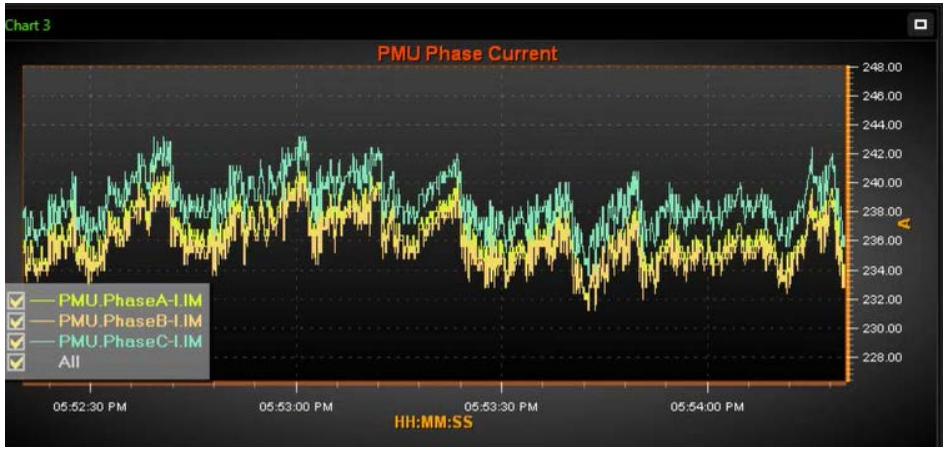
Focus Area Documents

1. **System Islanding Detection and Blackstart Restoration –Posted in June 2015.**
   - (Kleitsch –ATC, Cassiadoro –TRS)
2. **Using Synchrophasor Data for Voltage Stability Assessment –Posted in Nov. 2015.**
   - **(Farantatos** –EPRI, Vaiman –V&R Energy)
3. **Using Synchrophasor Data for Phase Angle Monitoring –Posted in May 2016.**
   - (Cassiadoro –TRS, Nuthalapati -ERCOT)
4. **Enhanced State Estimation Survey –Preliminary responses received, more analysis needed.**
   - (Vaiman –V&R Energy, Kleitsch –ATC)
5. **Using Synchrophasor Data for Oscillation Detection – Posted in February 2018.**
   - (Nuthalapati –Peak, Dyer –EPG, Blevins and Rjagopalan –ERCOT, Patel -EPRI)
6. **Determining Disturbance Locations – Draft survey distributed to CRSTT team members and NASPI Task Team leads for review.**

   (Dyer –EPG, Zweigle –SEL Inc., Cassiadoro –TRS)
7. **Using Synchrophasor Data to Monitor Reactive Power Balancing**
   - (Cassiadoro -TRS, SCE –A.J, Peak RC –Zhang, Vaiman –V&R Energy)

Video Event Files

Objective – Continue building library of events to demonstrate value PMU data provides when analyzing abnormal events and disturbances.



Video
PMU versus SCADA Video Events Summary. Please refer to EPG's template and the Synchrophasor Data File Format .CSV when creating a video event.
Video 1 - Current and voltage oscillations observed on the 138 kV system during testing of new generator controls (65 MW gas turbine). RTDMS PMU vs. SCADA Video 1
Video 2 - Voltage oscillations observed on the 230 kV system when a water pump was taken offline. RTDMS PMU vs. SCADA Video 2
Video 3 - Voltage oscillations observed following the loss of a 345 kV line during a period of high wind generation. RTDMS PMU vs. SCADA Video 3
Video 4 - Real and Reactive Power oscillations observed on the 69 kV system during a period of high wind generation with the plant radially connected (i.e. one of two normal source lines out of service). RTDMS PMU vs. SCADA Video 4
Video 5 - Real and Reactive Power oscillations observed during a period of high wind generation. RTDMS PMU vs. SCADA Video 5
Video 6 - Real Power and voltage oscillations observed following the loss of a large generator. RTDMS PMU vs. SCADA Video 6
Video 7 - Wind farm Oscillation Detection and Mitigation using Synchrophasor Technology Wind Farm Oscillation Detection and Mitigation
Video 8 - A 230kV fault followed by a loss of a large generation plant caused system frequency to drop approximately 72mHz momentarily, while having an impact on nearby system voltages and online generators (Clip 1, Clip 2 , Clip 3)
Video 9 - Please be patient with the download, the video is very large. This video captures the actual synchronization of a large generator to the electric grid. The windows in the visualization tool capture frequency, output power, voltage angle, and voltage magnitude of the generator and at a reference point on the electric grid.

Use Case Documents

Objective – Develop docs that demonstrate ways that grid operators and electric utilities are using synchrophasor data to provide operational value.

Event ID	Event	Event Category	Entities Involved	Event Description	Extended Description in Related NASPI Technical Paper	Safety Impact	Reliability Impact	Budgetary Impact
TE02	Failing potential transformer	Transmission Equipment	ATC	Abnormal voltage signature found while reviewing PMU data led to discovery of a failing potential transformer which was subsequently isolated and replaced.	p.38	The utility avoided safety risk to personnel that might have been in close proximity to the PT during its failure.		Utility avoided costs associated with customer minutes of interruption that would have resulted from the potential transformer's failure had the condition not been identified and a mobile transformer placed in service to facilitate the outages necessary for its replacement.
TE03	Loose connections in potential circuits	Transmission Equipment	OG&E	Fluctuations observed in positive sequence voltage data collected from PMUs led to discovery of a loose fuse connection in a CCVT safety switch. PMU data has been used in a similar fashion to reveal faulty terminations, animal-damaged conductor and contact corrosion.	p.40			Utility avoided costs associated with equipment damage and customer minutes of interruption that might have resulted had the issues not been addressed.

Reference: [Using Synchrophasor Data to Diagnose Equipment Health and Misoperations Event Summary Table]

Disturbance Locations Survey Review

Team to review draft survey for *Using Synchrophasor Data to Determine Disturbance Locations* paper.

NASPI Survey: Using Synchrophasor Data to Determine Disturbance Locations

I. Purpose

The purpose of this survey is to gather information that will be used in a North American SynchroPhasor Initiative (NASPI) Control Room Solutions Task Team (CRSTT) paper exploring how synchrophasor technology can be used in the Real-time Operations Horizon to determine the nature, severity and location of electrical system faults.

Specifically, this paper will consider how synchrophasor data can be used by System Operations staff to analyze Disturbances in near Real-time and identify actions that must be taken to isolate faulted equipment and return the electric system to an acceptable operating state.

This survey will be sent out to different organizations and the responses received will be embedded in a final report.

NASPI Vision and Mission

Vision – Improve power system reliability through wide-area measurement, monitoring and control.

Mission – Create a robust, widely available and secure synchronized data measurement infrastructure for the interconnected North American electric power system with associated analysis and monitoring tools for better planning and operation, and improved reliability.

CRSTT Mission Statement

The CRSTT's mission is to work collectively with other NASPI task teams to advance the use of real-time synchrophasor apps for the purpose of improving control room operations and grid reliability. This team will utilize its experience and regional diversity to provide advice, direction, support and guidance to NASPI stakeholders involved in the development and implementation of real-time synchrophasor apps.

CRSTT Objectives

- Advance synchrophasor applications in the control room environment.
- Provide guidance on best practices.
- Identify issues that impede implementation.
- Ensure synchrophasor-based application training is available to end users.
- Promote operational event analysis to demonstrate the value of synchrophasor technology.

CRSTT Goals

- Develop a series of use case summary docs that define how grid operators and electric utilities are using synchrophasor data to provide operational value.
- Prioritize and complete the remaining focus area documents.
- Create additional video event files for use cases and simulated events.

CRSTT Goals (Cont.)

- Gather operator feedback on synchrophasor applications (best practices).
- Support the development of synchrophasor-related training for operations staff.
- Develop a series of Lessons Learned documents related to the use of synchrophasor technology in the operations environment.

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Next NASPI CRSTT Conference Call: March 21, 2018.
Next NASPI WG Meeting: April 2018 in Albuquerque, NM.