NASPI Control Room Solutions Task Team Monthly Meeting

Presenters: Mike Cassiadoro & Jim Kleitsch

March 20, 2019

Agenda

I. Introductions
II. Provide update on focus area documents
III. Address standing request for video event data and use case documents
IV. Discussion topics to cover during CRSTT portion of upcoming NASPI Work Group Meeting
V. Consider revisions to CRSTT Work Plan
VI. Provide update on Use of Time-Synchronized Measurements in Real-time Ops Horizon training course
VII. Adjourn

Focus Area Documents

Determining Disturbance Locations (Nuthalapati –LCRA)

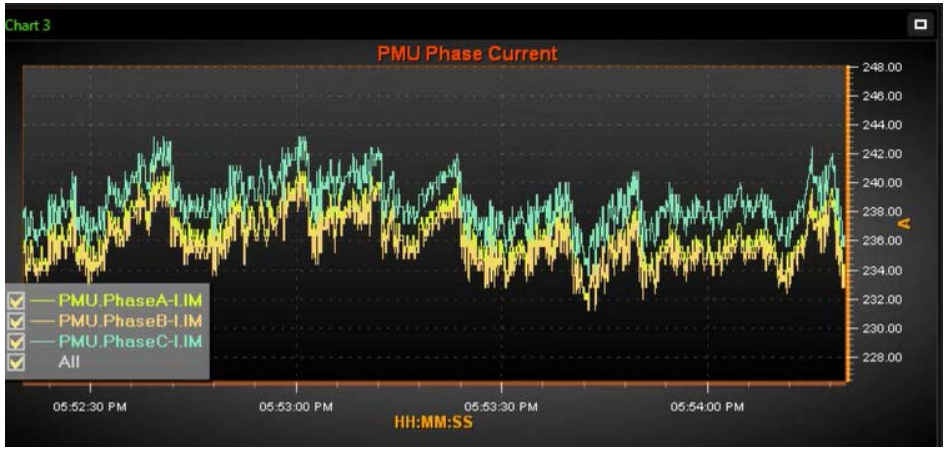
- ❑ Completed and posted on NASPI Website.

Using Synchrophasor Data to Monitor Reactive Power Balancing

- ➢ (Cassiadoro -TRS, Peak RC –Zhang, Vaiman –V&R Energy)
- ❑ No significant progress to date

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**

NASPI WG Mtg. – CRSTT Session

The upcoming NASPI WG Mtg. will allow each team 30 min. to engage the entire working group.

What topics do we wish to discuss during our session?

Wednesday, April 17, 2019	
8:00 - 9:00 am	**Registration and coffee**
9:00 - 9:30 am	Use of Time-Synchronized Measurements in the Real-Time Ops Horizon -- Michael Cassiadoro (Total Reliability Solutions) and Eric Andersen (Pacific Northwest National Laboratory)
9:30 - 10:00 am	Performance, Requirements, Standards & Verification Task Team (PRSVTT)
10:00 - 10:30 am	Data & Network Management Task Team (DNMTT)
10:30 - 10:45 am	**Break**
10:45 - 11:15 am	Engineering Analysis Task Team (EATT)
11:15 - 11:45 am	Distribution Task Team (DisTT)
11:45 - 12:15 pm	Control Room Solutions Task Team (CRSTT)
12:15 – 1:15 pm	**Lunch**

NASPI Work Plan

Open Discussion – Should we consider revising our work plan?

NASPI North American SynchroPhasor Initiative

1 Introduction

This document defines the CRSTT's mission, priorities and goals, and planned activities for 2018.

The CRSTT will review and update this plan annually to ensure a common understanding of the team's purpose and direction.

2 Mission Statement

This task team's mission is to work collectively with other NASPI task teams to advance the use of real-time synchrophasor applications for improving control room operations and grid reliability. This regionally diverse team of subject matter experts will share its experiences and provide advice, direction, support and guidance to NASPI stakeholders involved in the development and implementation of real-time synchrophasor applications.

3 Priorities and Goals

This team's priorities are to:

1. Identify and help to address issues that are impeding the implementation of synchrophasor-based applications in the Operations Horizon.
2. Develop documentation that defines the safety, reliability and economic benefits that synchrophasor technology provides.
3. Recognize and share industry best practices.
4. Support the design, development and delivery of synchrophasor-based application training for end users.
5. Promote operational event analysis to demonstrate the value of synchrophasor technology.

This team's goals are to:

1. Develop a series of use case summary documents that define how grid operators and electric utilities are using synchrophasor data to provide operational value.
2. Prioritize and complete the remaining focus area documents.
3. Create additional video event files for use cases and simulated events.
4. Gather operator feedback on synchrophasor-based applications (best practices).
5. Support the design, development and delivery of synchrophasor-related training for operations staff.
6. Develop a series of Lessons Learned documents related to the use of synchrophasor technology in the operations environment.

Use of Time-Synchronized Measurements in the Operations Horizon

MICHAEL CASSIADORO

Total Reliability Solutions LLC.

Owner, Principal Consultant

ERIC ANDERSEN

Pacific Northwest National Labs

Project Mgr/Mechanical Engineer

Training Course Description

TRS and PNNL are collaborating to develop a *Use of Time-Synchronized Measurements in the Real-time Ops Horizon* training course (8 CEH).

Course Summary: Provide an introduction to synchrophasor technology, describe the value it can provide in the Real-time Ops Horizon, and demonstrate how synchrophasor-based apps can be used by grid operators and electric utilities to improve wide-area situational awareness and grid reliability.

Intended Audience: RC, BA and TOP System Operators and Operations Support staff tasked with monitoring and controlling the Bulk Electric System.

Training Course Description (Cont.)

TOTAL RELIABILITY SOLUTIONS

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Training Location: Train-the-Trainer sessions and operator training classes to be held at PNNL and select offsite locations in Spring 2019.

Training Cost: No registration fee (entities responsible for travel costs only).

Overreaching Training Goals

TOTAL RELIABILITY SOLUTIONS

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- Increase knowledge and advance use of synchrophasor technology by creating training materials that grid operators and electric utilities can integrate into their respective training programs.
- Provide train-the-trainer workshops to help electric industry trainers meet the underlying knowledge requirements before delivering company-specific training on the topic.

Additional Information

Are PNNL and TRS in search of industry partners to assist with the design and development of training materials?

Yes, all grid operators and electric utilities that wish to participate in the design and development of course materials are invited to do so. A generic version of the training materials will be made available to industry upon completion of the project.

Who has agreed to participate so far?

ATC, ERCOT, ISO-NE, LCRA, Peak Reliability, SCE, Southern Company and WAPA have agreed to support this effort so far.

Contact Information

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Next NASPI WG Meeting: April 2019 in San Diego, CA
Next NASPI CRSTT Conference Call: May 15, 2019