NASPI Control Room Solutions Task Team Monthly Meeting

Presenters: Mike Cassiadoro & Jim Kleitsch

April 19, 2017

Agenda

I. Introductions

II. Review Status of CRSTT Work Products
   - Focus Area Documents
   - Video Event Files
   - Use Case Documents

III. Provide Update on CRSTT Industry Outreach Efforts

IV. March NASPI Meeting Recap

V. NASPI CRSTT Breakout Session Highlights

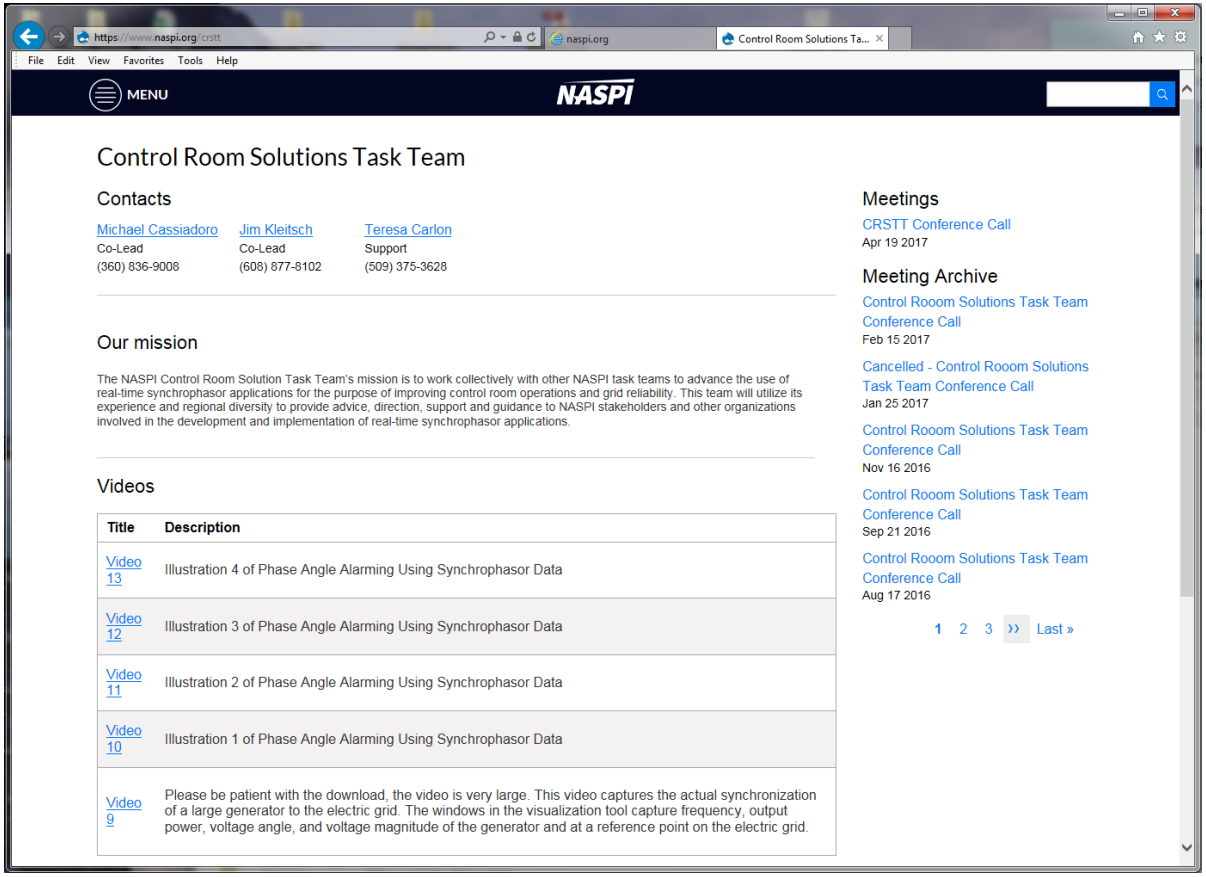
VI. Adjourn

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. **Oscillation Detection**
   - (Nuthalapati –Peak, Dyer –EPG, Blevins and Rjagopalan –ERCOT, Patel -EPRI)
6. **Determining Disturbance Locations**
   - (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 to expand video library of events to demonstrate the value of synchrophasor data when analyzing disturbances



Use Case Documents

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.
TE04	Failing voltage transformer	Transmission Equipment	Dominion	Sporadic voltage dips and fluctuations observed on a 500 kV line led to discovery of a failing CCVT which was subsequently isolated prior to its imminent failure.	p.42	The utility avoided safety risk to personnel that might have been in close proximity to the CCVT during its imminent failure.		Utility avoided costs associated with equipment damage that might have resulted from the CCVT's failure.
TE05	Identifying 69 kV arrester failure	Transmission Equipment	ATC	The details of a 69kV customer impact event were identified within two minutes by control room engineers reviewing PMU data. The fault could not be observed with SCADA data.	p.44		Utility able to identify and isolate the failed lightning arrestor shortly after relay operation occurred.	

Microsoft Word Document

Microsoft Word Document

- **Develop 1-2 page summary documents to help educate end users (see Mike's examples above)**
- **Expand effort to other use cases once format has been "approved". Synch with DisTT format for consistency**

Industry Outreach – IEEE ISGT

Dan, Marianna, and Mike will be participating in an IEEE ISGT panel next week. There will be a panel session **"Industry Best Practices in Using Synchrophasor Technology"** during **IEEE ISGT 2017, Washington, D.C.**, April 23-26, 2017.

Conference website is http://sites.ieee.org/isgt-2017/

This session is organized jointly by IEEE PES Cascading Failure Working Group (CFWG) and NASPI CRSTT in collaboration with other Task Teams.

It is scheduled for **Monday, April 24, 2017 from 3:00PM to 5:00PM**.

Adobe Acrobat Document

Agenda:

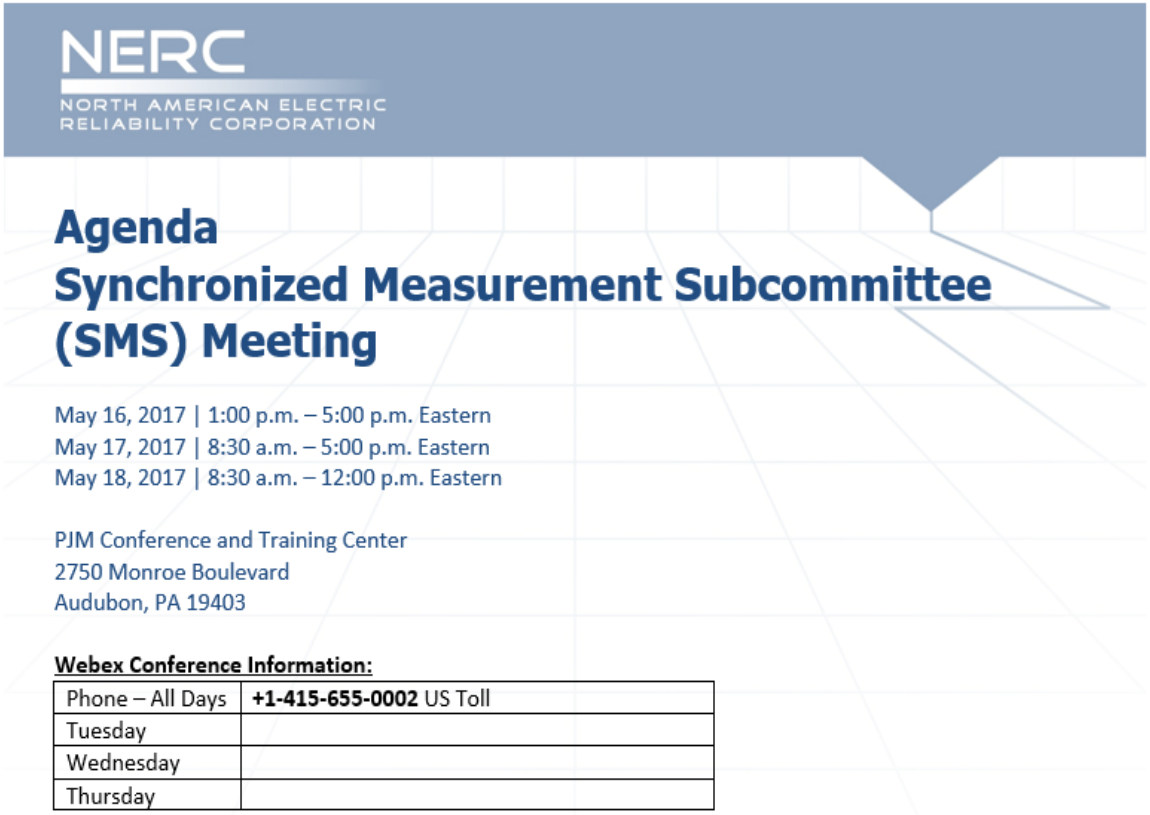
Using Synchrophasors for Detection and Prevention of Major System Blackouts: Framework and Recommendations of **IEEE PES CFWG**

1. **NASPI Task Teams** – Advancing the Use of Synchrophasor Data in the Operations Horizon
2. Synchrophasor Deployment and Synchrophasor Based Applications at **SDG&E**
3. Integrating Synchrophasors in the Control Room at **PJM**
4. **ERCOT** Post Smart Grid Regional Demonstration Project Roadmap
5. **BPA** Experience with Synchrophasors: From Wide-Area Measurements to Wide-Area Control
6. Q&A session and discussion

Details on the panel session are available from http://sites.ieee.org/isgt-2017/panels/

Industry Outreach – NERC SMS

Next meeting of the NERC Synchronized Measurement Subcommittee [SMS] being held at PJM in May. Details follow:



NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Agenda
Synchronized Measurement Subcommittee (SMS) Meeting

May 16, 2017 | 1:00 p.m. – 5:00 p.m. Eastern
May 17, 2017 | 8:30 a.m. – 5:00 p.m. Eastern
May 18, 2017 | 8:30 a.m. – 12:00 p.m. Eastern

PJM Conference and Training Center
2750 Monroe Boulevard
Audubon, PA 19403

Webex Conference Information:

Phone – All Days	**+1-415-655-0002** US Toll
Tuesday	
Wednesday	
Thursday	

Some key topics where we're looking for participation / presentations from the group include:

- **Cybersecurity issues**
- **Recent forced oscillation examples**
- **Linear state estimation**
- **System model validation**
- **Recent PPMV examples**

NASPI Work Group Meeting Recap

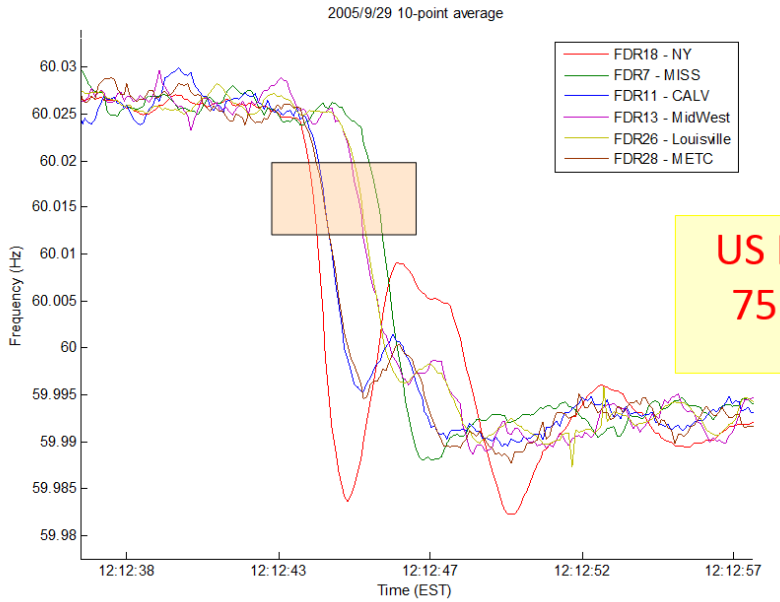
- The March 2017 work group meeting was held at NIST offices in Gaithersburg Maryland
- 160+ attendees
- Presentations have been posted to the new and improved NASPI web site

  https://www.naspi.org/node/530
- Highlighted time distribution techniques and control room solutions
- Long term planning considerations
  - Two meetings versus one long term
  - Task Team versus Task Force long term

NASPI CRSTT Breakout Highlights

- Shih-Min Hsu from Southern Company reviewed the work they've down with UT Knoxville on event location for generator trips.
- Compared location results on known events using frequency versus phase angle data for the analysis
- Next steps include line trip detection and location based on phase angles and potential move from FDRs to PMUs

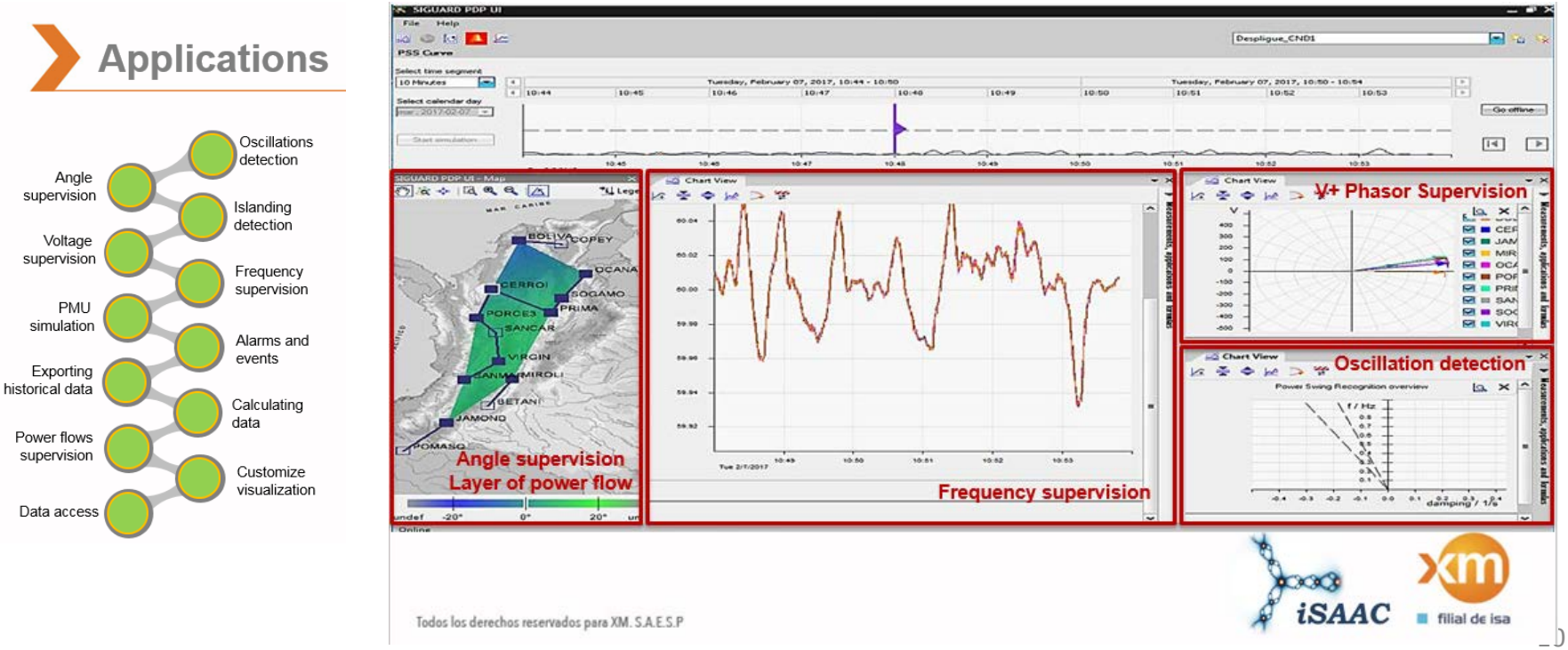
On-line Event Location



US Patent:
7519454,7765034

Breakout Highlights (cont'd)

- William Eduardo Amador Araujo from XM / the Colombian Power System Operator discussed the implementation of Synchrophasor Technology at their new Control Center
- Started working with synchrophasor technology in the 2007 time frame.
- New control center in 2017 and synchrophasor applications will be part of their implementation

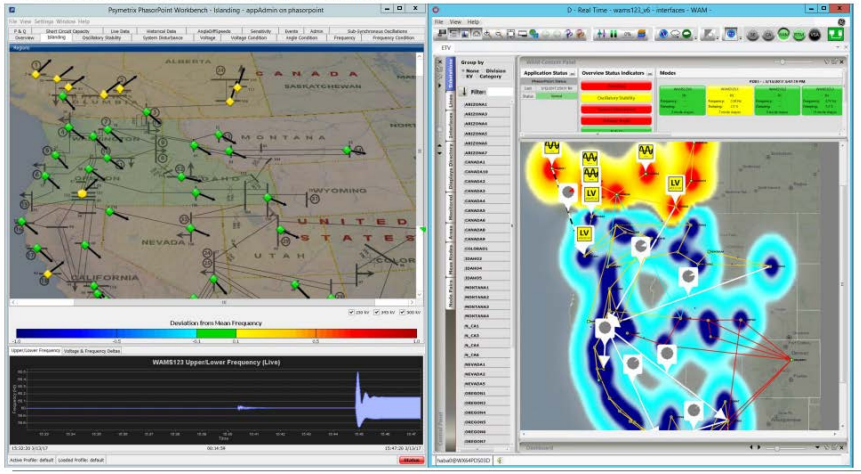


Breakout Highlights (cont'd)

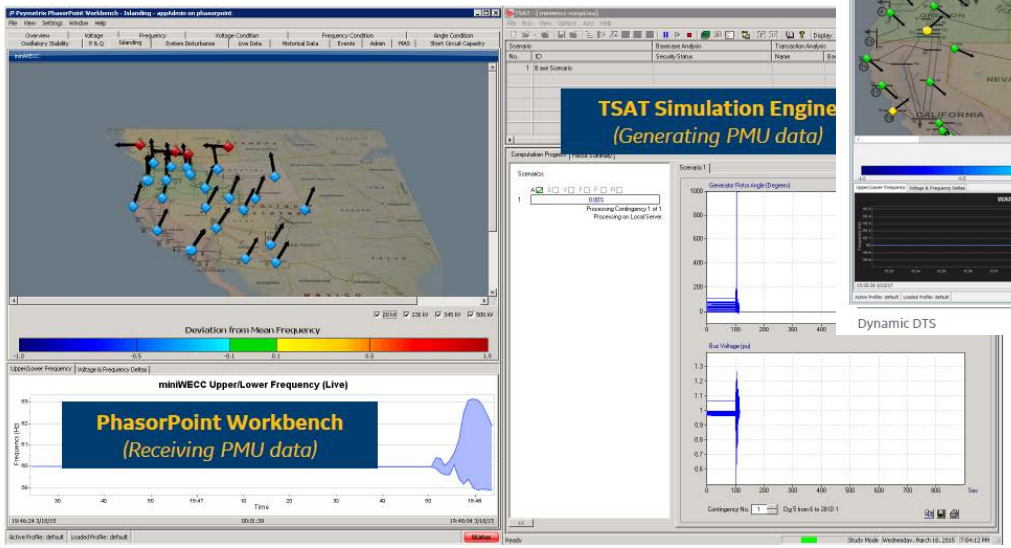
- Krish Srinivasan from GE reviewed their Hybrid WAMS and EMS Operator Training Simulator
- He also demonstrated the operation of their integrated training simulator which allowed PMU playback as well as interactive system response using TSAT playback.

WAMS Applications

Oscillation Monitoring & Island/Resync Management



Sample Screenshot



Breakout Highlights - CRSTT Business

- NDR went over the document he's been working on related to oscillation detection using synchrophasor data.
  - He surveyed the industry and received 17 responses with requirements for the tools they are using as well as screen captures of the different implementations where applicable.
  - He's also requesting videos showing the use of the applications.
  - We plan to gather team feedback, update as needed, and post it to the NASPI web site prior to the September meeting
- We discussed the value of Use Case documents and agreed to continue down that path. Recommendation to start with easy things like data plotting to help gain confidence in the technology and gain ops support. This could become a task force project but for now there was no strong push to do away with the task force structure. We will continue to evaluate as we move forward on our work plan.
- We discussed the potential change from two meetings to one meeting in 2018 or 2019. Several members of the group were on board with moving to 1 meeting. There was also concern expressed about one longer meeting as three days of high tech is tough to absorb (my words – forgive me) Other options could be to keep two meetings but be open to web hosted meetings instead of face to face to minimize travel costs, allow more flexibility in scheduling. Some concerns about not being able to go back to two if one isn't enough.

Fall 2017 NASPI Meeting

- The Fall NASPI meeting will be held in Springfield, Massachusetts
- Full day 9/26 and half day 9/27
- Vendor show and user success story focus along with a poster session
- Forced Oscillation workshop the afternoon of 9/27 co-sponsored by NASPI and SMS
- NERC SMS meeting being held 9/28 at ISO New England

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