NASPI Control Room Solutions Task Team (CRSTT)

Update on Using Synchrophasor Data to Determine Disturbance Locations Focus Area Document

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Update for the CRSTT Monthly Conference call, 18th July 2018

Disturbance Locations

Determining disturbance location is one of the most important use cases of synchrophasor technology

This focus area document will explore the use of synchrophasor-based apps to:

- Detect disturbances
- Characterize the nature and severity of disturbances
- Identify mitigating actions

A survey was distributed to over 30+ organizations to gather information on this topic. Responses will be embedded into the final document.

Survey Template

NASPI Survey: Using Synchrophasor Data to Determine Disturbance (e.g. Fault) Locations

Submitted by: (Name of organization)

1. **Is your company using, planning to use, or have an interest in a synchrophasor-based application(s) to provide System Operations staff with data, information, or guidance about an electrical system disturbance (e.g. fault or failed equipment)? If yes, please provide the info requested below.**

   If your company is not using or planning to use such applications at this time but is interested in doing so in the future, please provide any feedback or insights you can offer as to what needs to happen before you can move forward. In other words, are there specific issues that need to be resolved or actions that must be taken before you can introduce such applications to the control room environment."

2. **Application name:**

3. **Type of fault information that the application provides:**

   Note: Examples of info provided include: Impacted Equipment (transmission line, station equipment, generation facility), fault type (phase-to-phase, phase-to-ground, failed equipment), fault severity (duration, percentage of voltage dip, MVA or MW interrupted), fault location (at a station, miles from station, at a tower, tower number), etc.

4. **Objective of the application:**

5. **Application requirements (coverage of the network, hardware, software, visualization, telecommunications, etc.):**

6. **The value addition from using the application in the Real-time operating environment:**

   Note: The CRSTT is most interested in any operational enhancements, safety, reliability or cost benefits that your company has gained or expects to gain through use of the application.

7. **Current state of the application (in development, testing, in operation, provided by vendor, etc.):**

8. **If in operation, where (e.g. in use in the control room, in use by engineers, etc.)?**

9. **If it is not yet in operation, what is the timeline for being ready?**

10. **Application provider or developer:**

11. **Application software (in-house development, open source, proprietary):**

12. **Application's ability to integrate with other Real-time monitoring systems (e.g. EMS, SCADA):**

13. **If the application is not in use for operations yet, can it be operationalized and how can that be achieved (i.e. used in Real-time Operation Horizon):**

14. **Type of application GUI:**

15. **Operating entities (e.g. operators, engineers, etc.) that will be or are using the application:**

16. **Any other relevant information that can be provided:**

    - **Example: Can you provide any sample video clips demonstrating the capabilities of the tool**
    - **Any references/papers/reports published by your organization which explain more details**

NASPI North American SynchroPhasor Initiative

Organizations Surveyed

Vendors/developers:

- Electric Power Group
- Electric Power Research Institute
- GE
- Grid Protection Alliance
- Montana Tech
- Pacific Northwest National Laboratory
- Quanta Technology
- Rensselaer Polytechnic Institute
- Schweitzer Engineering Laboratories
- Texas A&M University
- University of Tennessee
- V&R Energy
- Washington State University

Response: 8/13

Other entities interested to participate are welcome to do so. Please send email to Sarma (NDR) Nuthalapati at ndrsarma@ieee.org

Users:

- American Transmission Company
- BPA
- CAISO
- Com Edison
- Dominion Virginia Power
- Duke Energy
- Entergy
- ERCOT
- Idaho Power
- ISO New England
- LCRA Transmission Services Corporation
- MISO
- NY ISO
- ONS, Brazil
- Pacific Corp
- PEAK Reliability
- PG&E
- PJM Interconnection
- Power System Operation Corporation, India
- Public Service Company of New Mexico (PNM)
- Salt River Project (SRP)
- San Diego Gas & Electric
- Southern California Edison
- Southwest Power Pool (SPP)
- Swissgrid
- SyncroGrid
- Tucson Electric Power
- Western Area Power Administration (WAPA)
- XM, Columbia

Response: 16/29

Summary

Type of faults:

- Large Generation Trips (from rate of change or bus voltage angle (freq))
- Source of Forced Oscillations
- Fault Location (by detecting voltage magnitude or PMU Location)
- Transmission line switching (by location and detection of angle)
- Load shedding (by frequency)
- Pumped storage tripping
- Estimated interrupted MW
- Proximity of voltage collapse
- Relay/circuit breaker mal-operation

Status of application

- A few in operation (Oscillation location)
- A good number in Testing
- Mostly in use by operation engineers
- A few in control room
- Some users do not use synchrophasor technology for disturbance location.
- Some use Synchrophasor technology as a complementary tool besides digital relay recordings

Schedule for Completion

- July 2018 – Complete analysis of survey responses.
- Sept. 2018 – Generate draft of document for team review.
- Oct. 2018 – Release final document and present findings at NASPI Work Group Meeting in Philadelphia, PA.

Thank U !!