MISO Wide-Area Visualization

NASPI Work Group Meeting
October 22-24, 2014

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What We Thought We Knew

- Resource Integration
- Voltage Stability Analysis
- Frequency Stability
- Event Detection & Alarming
- Baseline / Alarm Analysis
- Event Analysis
- Oscillation Monitoring
- Wide Area Situational Awareness

2011 Project Scope

Function Enabled by Synchrophasor Data:

- Development Challenge:
  - Low
  - Medium
  - High

Year:

- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

- Wide Area Control & Protection
- Special Protection - Islanding
- Fault Location
- Dynamic Line Rating
- Resource Integration
- State Estimation Integration
- Voltage Stability Analysis
- Baseline / Alarm Analysis
- Event Detection & Alarming
- Event Analysis
- Oscillation Monitoring
- Wide Area Situational Awareness
Visualization Approach

Present information, not data

Different information into single view

Expand possible visualizations EL wide

Enhanced presentation capabilities

Situational Awareness
Expanded Angle Pair Monitoring?
Enhanced Real-Time Displays (eRTD)

- Internally developed geospatial visualization
  - Present Information and not data
  - More information displayed in less space
  - Extended MISO visualization capabilities
Voltage Gradient; Angle Pairs; PMU Stations; IROL / Key interfaces; BA Information
BA/RC Overview; IROL-Key Interfaces; Anc. Service MW and $; Ext Sched Interchange
eRTD

- Aggregates alerts into a single display
  - Correlates phasor data with EMS and stability monitoring alerts
Operational Processes

• Operators have processes for Oscillation Monitoring and Phase Angle Monitoring alarms

Oscillation Monitoring Process
– Review alarms to determine if transmission or generation equipment was lost in the local area of the oscillation
– Look for power swings on transmission or generation equipment in the local area of the oscillation
– Review State Estimator solution for any equipment outages in the local area
– Contact local Utilities in the area of the oscillations to see if they have noticed any operational issues on their equipment

Phase Angle Monitoring
– Review Pre/Post contingency Voltage
– Check for unsolved contingencies
– Check for low voltage in the area of the interface
– Check that the State Estimator is solving with no voltage violations
Questions?

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