Eastern Interconnection Situational Awareness Monitoring System (ESAMS)

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DOE Eastern Interconnection Situational Awareness Monitoring System (ESAMS) Prototype Demonstration

Overall Project Objective:

*To introduce a common, high-level interconnection-wide view based on synchrophasor information in order to foster discussion within and among Eastern Interconnection operating entities**

Key Elements of the initial high-level view will include:

1. Detect and identify forced and natural oscillations
2. Monitor phase angle pairs and identify when values are outside of normal operating ranges
3. Detect atypical behavior from an ensemble of measurements and identify which ones are contributing to the atypicality

Information Delivery Methods (by subscription):

1. Near real-time text message
2. Emailed reports (daily, weekly, monthly)

**The prototype will not duplicate functionalities currently provided by FNet*

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Eastern Interconnection Situational Awareness Monitoring System (ESAMS)

Continuation of CERTS baselining project with:

- LBNL and PNNL
- PJM, NYISO, ISONE and MISO
- EPG

Goal: Create a prototype oscillation detection and baselining tool for a large portion of the Eastern Interconnection

Focus on information sharing

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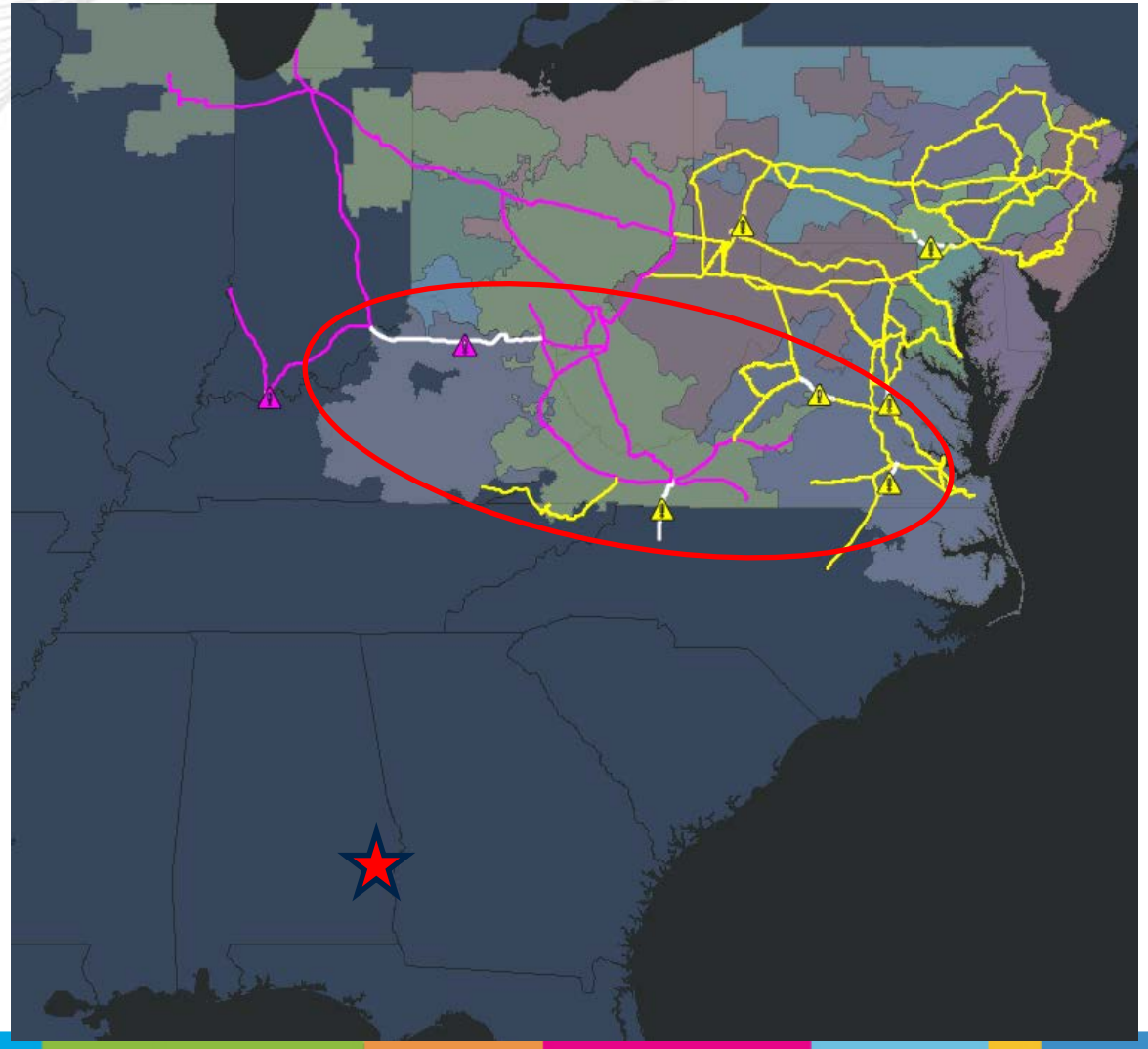
Eastern Interconnection Situational Awareness Monitoring System (ESAMS)

- Oscillations occur in the system and can be observed across the interconnection.
- 2016 forced oscillation event at Farley Nuclear Station in Southern Company
  - 100 MW oscillations in Alabama
  - 20 MW oscillations in AEP



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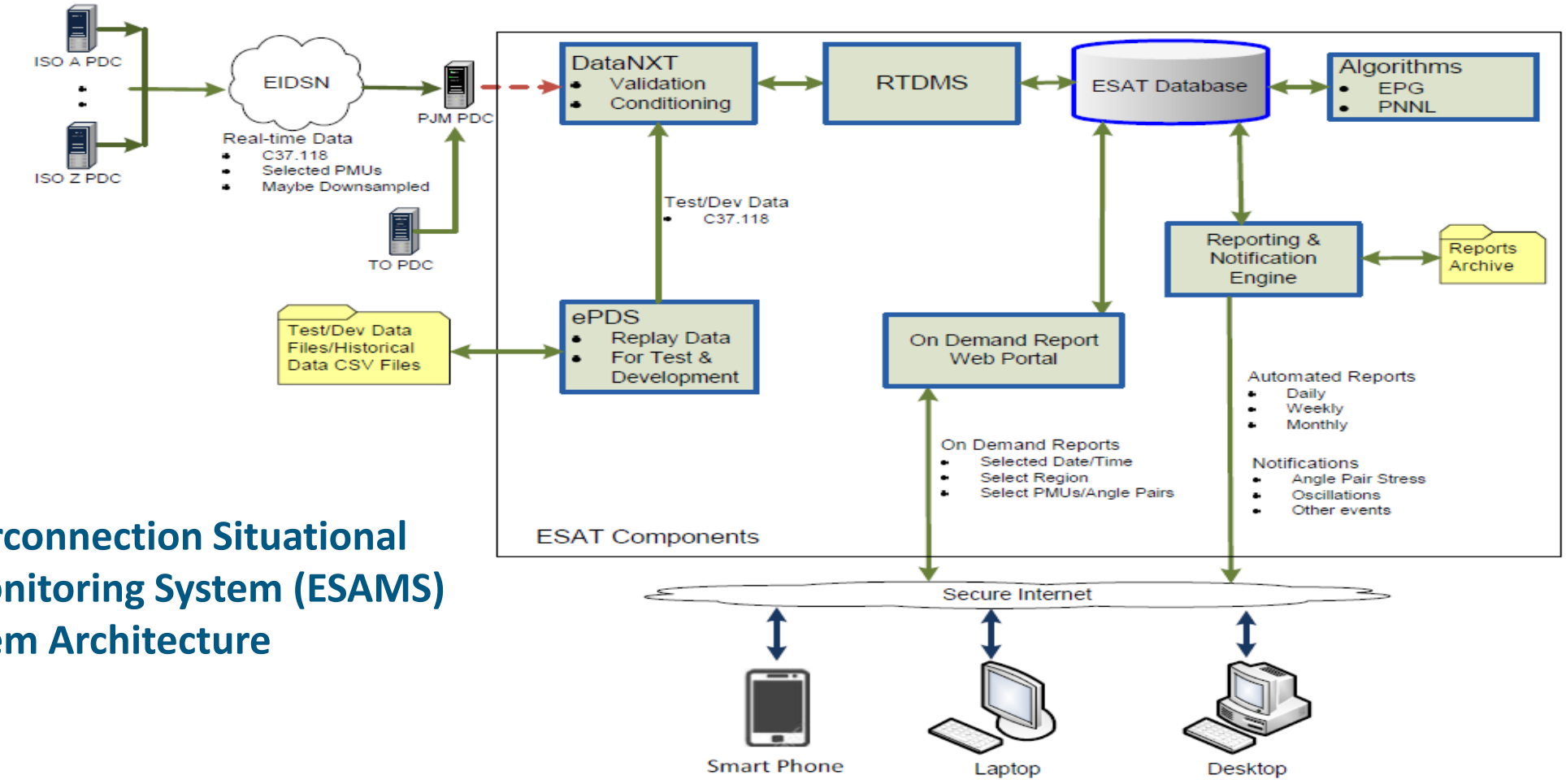
System Architecture for the Prototype System



Eastern Interconnection Situational Awareness Monitoring System (ESAMS) System Architecture

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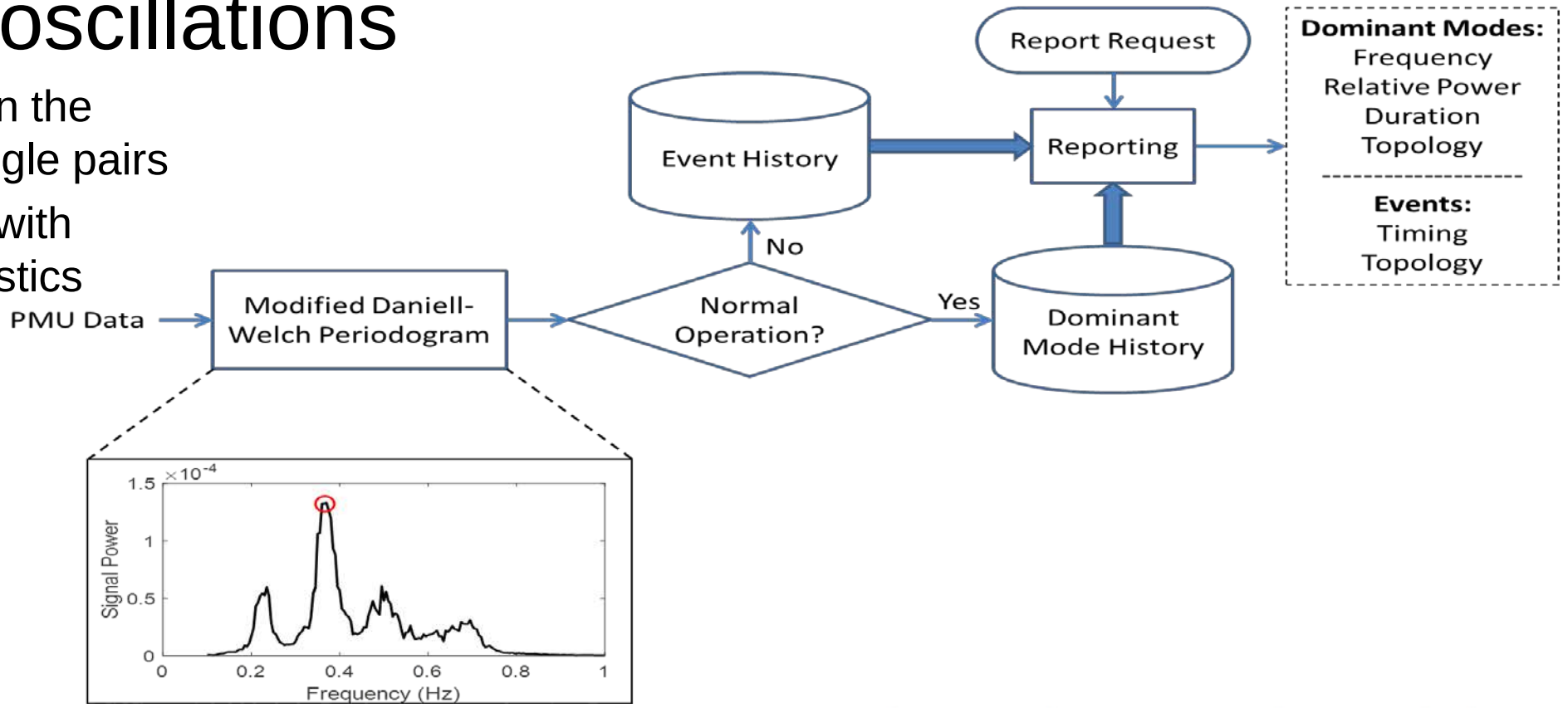
Key Element #1: Oscillatory Event Detection

Event: Changes in low-level natural oscillations

- Oscillations between the areas defined by angle pairs
- Increase familiarity with EI modal characteristics



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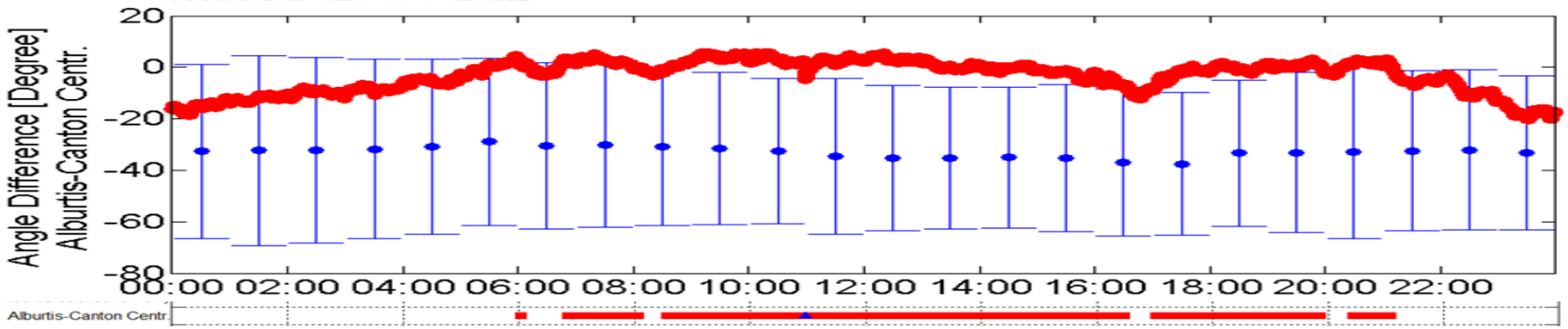
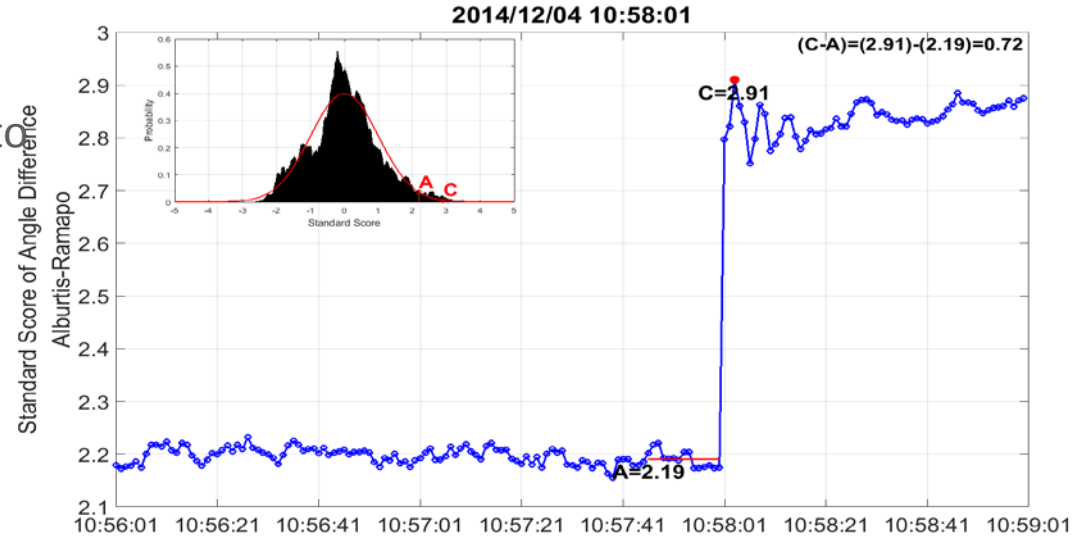
Key Element #2: Monitor Phase Angle Pairs

- Identify when phase angle pair differences are outside of historically observed normal operating ranges



- Apply control chart methodology to detect significant changes in angle pairs



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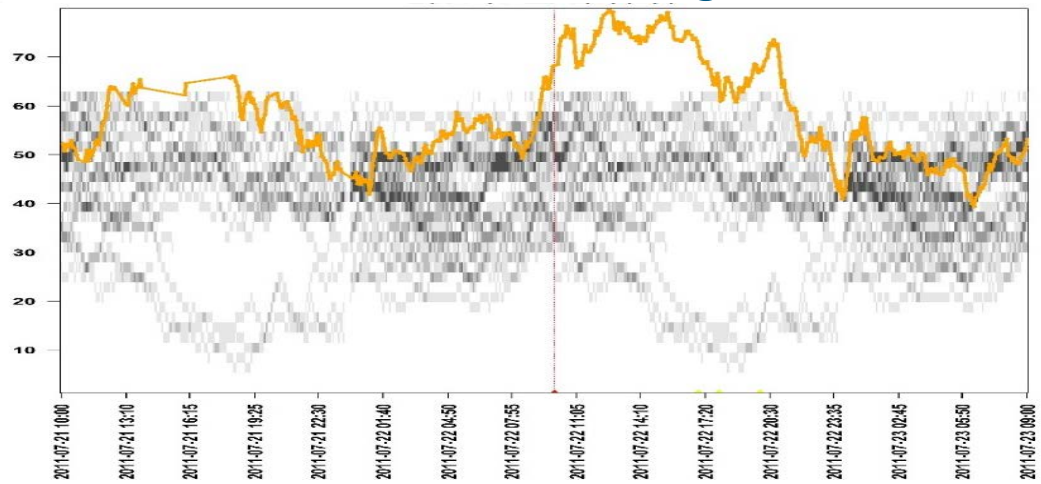
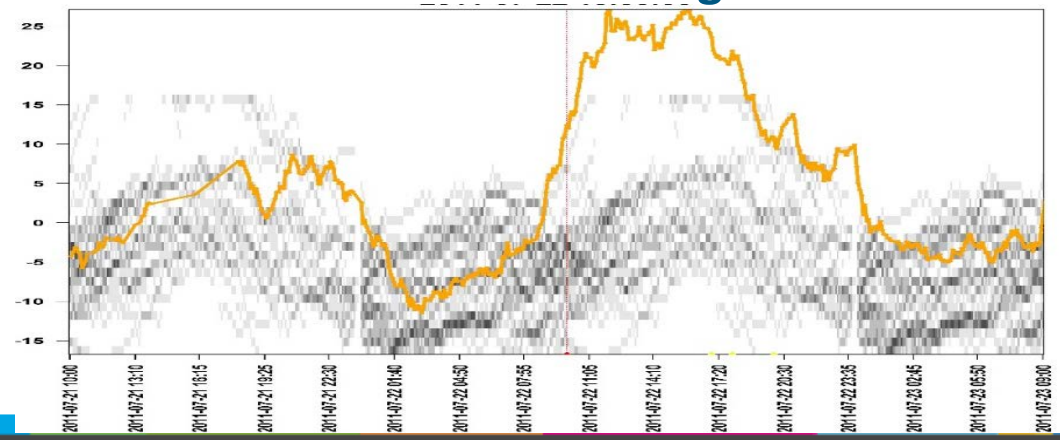
Key Element #3: Detect Atypical Behavior

- Use multivariate statistical algorithms and past data to define a baseline of normal, observed behavior
- Compare current data to the baseline to determine when and where atypical behavior is observed

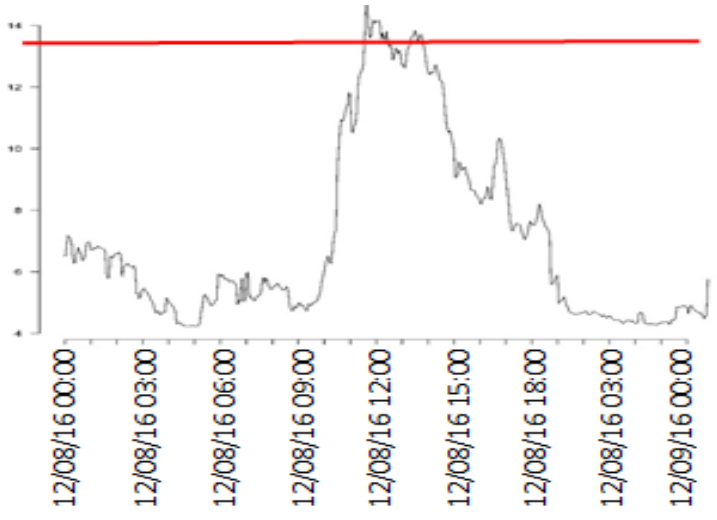
Jackson – Alburtis Angle Pair



Monroe – Hanna Angle Pair



Atypical Score



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Project Milestones and Schedule

Feedback and direction on initial prototype notifications/summaries w/ISONE, MISO, NYISO, PJM	Completed
Preparation of requirements document	Completed
Establish partnership with ISO/RTO host - scope and place project in queue for 2018 funding for IT support	Completed PJM will host demonstration
Update briefings with partners (ISONE, MISO, NYISO), and outreach (CERTS ILC, EIDSN)	Completed
Finalize initial "look" and factory test prototype with historical data – transfer/test at PJM Synchrophasor Lab	Completed
Initiate field installation at PJM	In progress
Complete field acceptance tests with PJM	Fall 2018
Roll-out to include other 3 original ISO/RTO partners	Late 2018/ early 2019

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Questions?

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