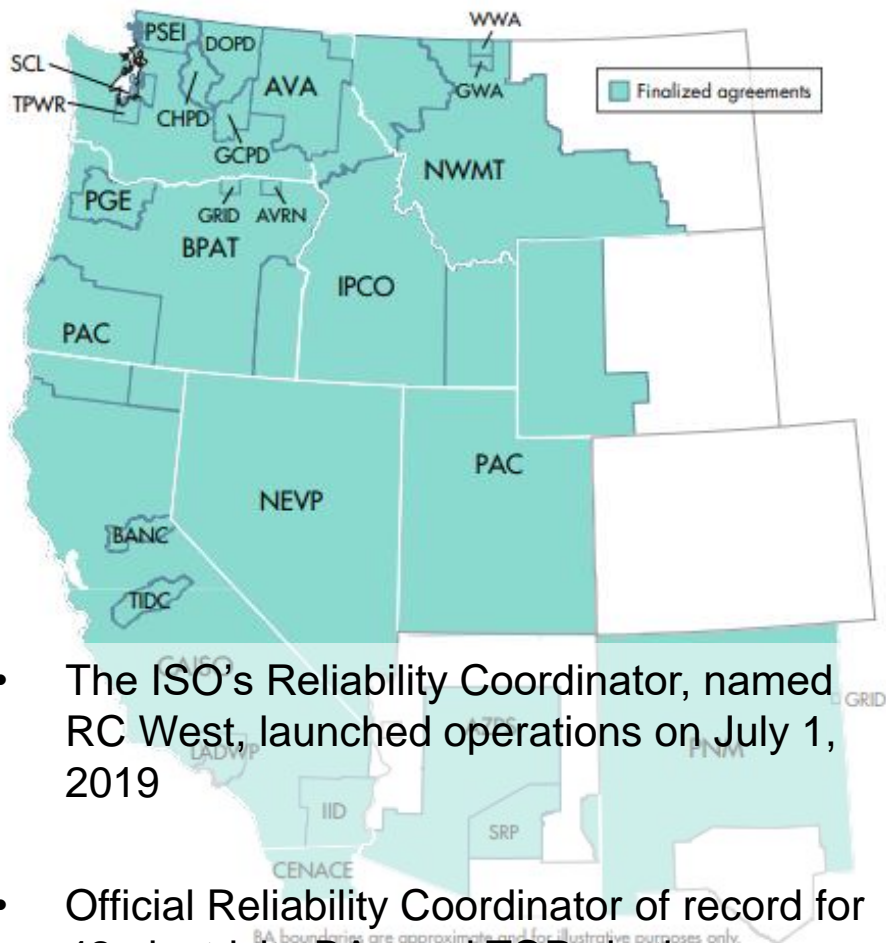# Panel: Real-Time Oscillation Analysis: Technology Readiness, and a Vision for Future Needs and Applications
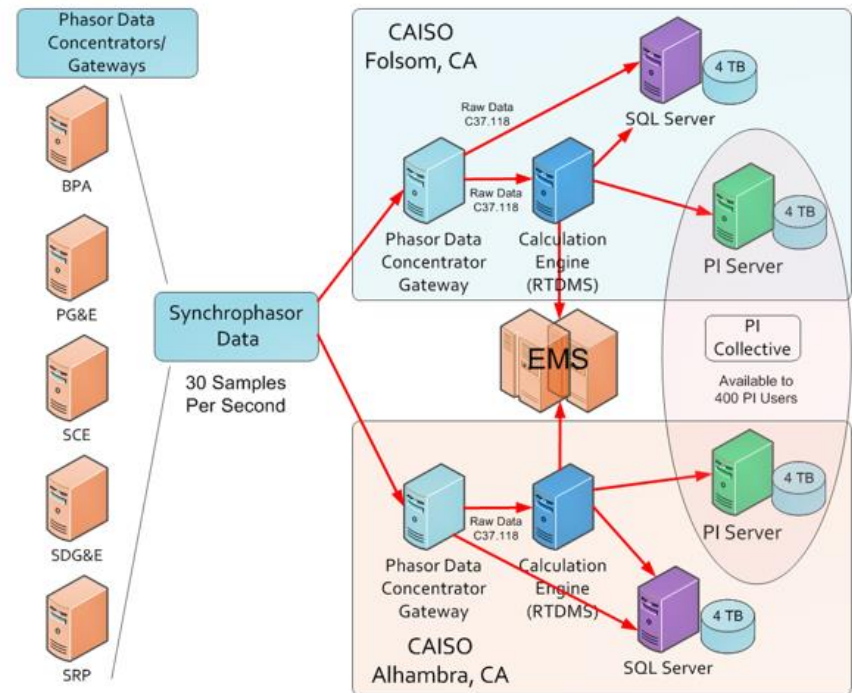
Aftab Alam, CAISO

NASPI Webinar, 24 June 2020

Reliability Coordinator Services

- The ISO's Reliability Coordinator, named RC West, launched operations on July 1, 2019

- Official Reliability Coordinator of record for 42 electricity BAs and TOPs in the Western Interconnection.

- Incoming PMU data being utilized in RTDMS for monitoring of inter-area modes and detection of forced oscillations.

RC West Monitoring of Oscillations

- Operating Procedure developed to supplement monitoring of oscillations for three primary scenarios:
  - Inter-area (electromechanical modes)
  - Forced (Local)
  - Forced causing Inter-area oscillations

- Training and reinforcement

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Monitoring of Oscillations

- Since Sept 2019, 50+ events have been observed in RTDMS and investigated by operators and engineers

- Different kind of events
  - Ramping of Units
    - Conventional
    - Renewable
  - Malfunctioning of controls
  - Some still under investigation
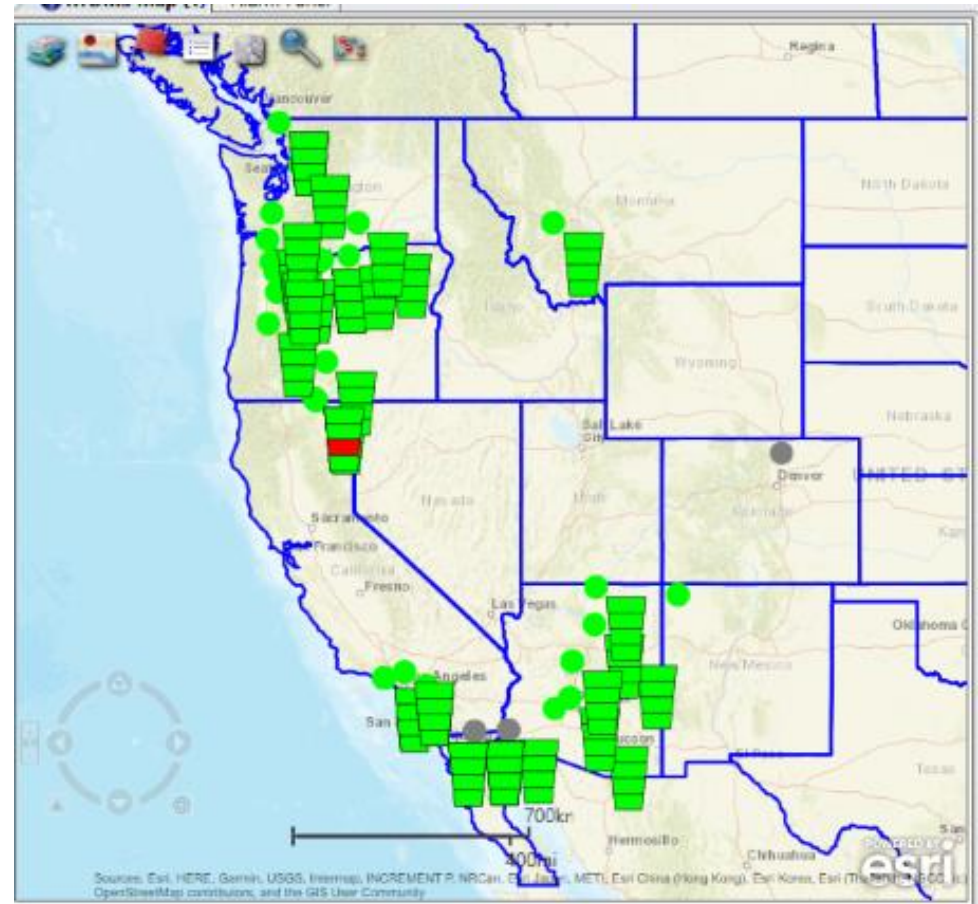
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Oscillation Event Example

- Oscillations of 161 MW observed in Band 3 oscillations (1.2Hz) observed in RTDMS in the Pacific Northwest.

- Duration was about 10 minutes

- Primary cause of oscillation was the lowering of voltage set point to the low excitation limit. Oscillation began upon hitting the low excitation limit

- RC West coordinated with TOPs to identify source

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Oscillation Event Example

- Oscillations of 1.5 MW observed in Band 3

- Longer Duration

- RC West coordinated with TOPs to identify source

- Cause under investigation

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Oscillation Event Example

- Oscillations of 15 MW observed in Band 2

- Short Duration

- Cause and source under investigation

Current and Emerging Challenges – Natural / Inter-area oscillations

- Monitoring of Inter-Area Modes – **Consistency on how do you monitor?**

- **Developing guidelines for operators**
  - Offline studies required to determine what dispatch changes, changes in transfer flows, topology changes are needed to increase damping
    - Small Signal Stability Studies
    - Dynamic Simulations + Data Analysis

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Current and Emerging Challenges – Natural / Inter-area oscillations

- **What about real-time determination and validation of mitigation actions?**

    – Developing guidelines for engineers to run real-time studies to validate actions that help to increase damping

- **Impact of contingencies on damping?**

    – Opportunity for Real-Time Small-Signal stability analysis. Evaluation of need is required.

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Current and Emerging Challenges – Natural / Inter-area oscillations

- Monitoring of Inter-Area Modes – **Consistency on how do you monitor?**

- Developing guidelines for operators
  - Offline studies required to determine what dispatch changes, changes in transfer flows, topology changes are needed to increase damping
    - Small Signal Stability Studies
    - Dynamic Simulations + Data Analysis
  - What about real-time?
    - Developing guidelines for engineers to run real-time studies to validate actions that help to increase damping

Current and Emerging Challenges – Forced Oscillations

- Source Identification
  - Continues to be a challenge when there is lack of PMU data

  - Need to develop hybrid approaches to make tools smarter to determine
    - Do we have units ramping?
    - Do we have a unit showing abnormal behavior?
    - Integrate with SCADA and other data sources

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Questions

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