



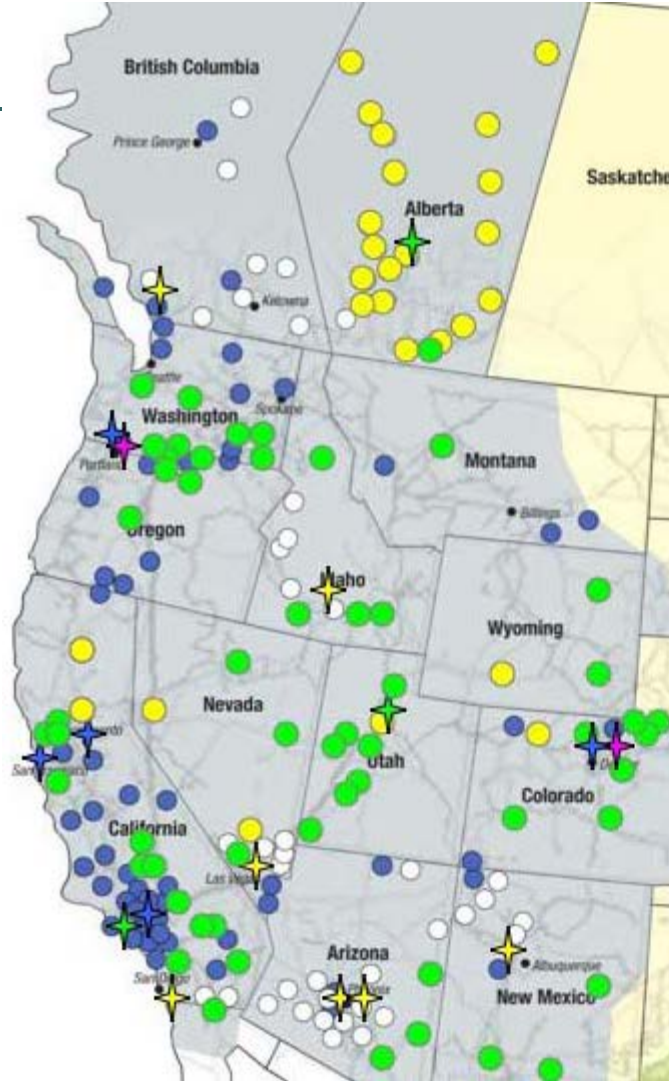
**Western Interconnection Synchrophasor
Project (WISP)**
Training Technical Session

Mike Cassiadoro
mcassiadoro@wecc.biz
Brett Wangen
bwangen@wecc.biz

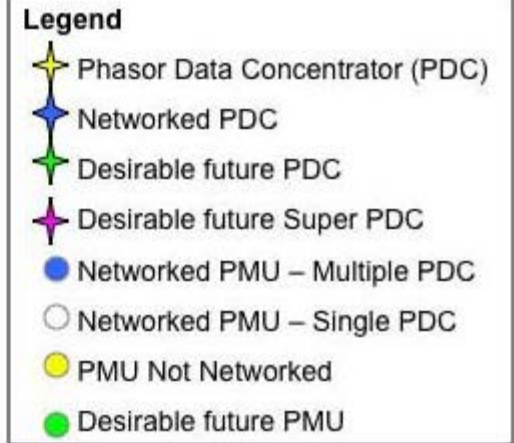
NASPI *North American
SynchroPhasor Initiative*

WISP Scope

- 300 PMUs
- 19 Utilities
- \$107 Million
- Monitoring and applications
- Not a research project



Phasor Measurement Units (PMU) in the Western Interconnection



Applications

	Wide Area Frequency Monitoring	Wide Area Angle Monitoring	Wide Area Voltage Monitoring	Oscillation Monitoring	State Estimation Phase Angle Integration	Model Validation	Reporting
Implementing?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Part of Wide Area View?	Yes	Yes	Yes	Yes	Yes	No	No
Studies Required?	No	Yes	No	Yes	No	No	No
New Procedures Required?	No	Yes	No	Yes	No	No	No

Training Audience

- Internal RC Staff Training
 - RCs and engineering staff
- WISP Participant Training
 - Operations staff training
- Interconnection-wide Training
 - Provide awareness of how WECC RC will use the information provided through synchrophasor data and tools

Types of Training

- Basic – provide periodic presentations and/or newsletters to start discussions
- Advanced – more detailed review of key topics.
 - Phase angle monitoring, system dynamics, mode damping, voltage stability, etc.
- Application – hands on training using WISP developed tools
 - WASA, WAV, voltage stability
 - Both internal and external

RC Training

- WECC Reliability Coordinators (RCs) will need to understand what the data is and how it helps them recognize problems on the power system.
- What action should I take when I get this alarm?
 - Phase angle
 - Oscillations or mode damping
 - Voltage instability

RC Engineer Training

- Operations support staff need training to understand:
 - How do the tools work?
 - What types of false positives are typical for these tools?
 - What type of coordination/validation needs to take place?
 - What procedures are in place that tell us how to mitigate problems?

BA and TOP Training

- WAV training
 - Common view, alarms; but what does it all mean?
- Common use of procedures developed to help mitigate issues related to mode damping, oscillations, or phase angle separation.
- Montana Tech modal analysis tool training.

Application Training

- Wide Area Situational Awareness (Alstom e-terravision and the WECC developed Wide Area View tool)
- Oscillation detection and mode meter tools
- Real-time voltage stability
- Alarming
 - New tools bring new alarms. What action do we expect from RCs/Operators?

Tools to Support Training

- Dispatcher Training Simulator
 - WASA training, phase angle monitoring, and voltage stability
- Currently WECC does not have ability to simulate PMU data.
 - Primary method - replay of historical cases
- Table top training will be utilized where simulation does not effectively convey the training objectives.

Relationship Between New and Existing Tools

- WASA – wide area monitoring tool that will integrate SCADA, network application, and synchrophasor data in one place.
- 1 second data from PDC will be propagated to EMS for displays and application usage.
- Integration to state estimation, voltage stability applications
- Node pair phase angle monitoring in real-time contingency analysis.

Questions

