Use of Phasor Data for Real-Time Operations

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Agenda

• Disturbance Examples
• Operational Perspective
• Barriers
• SCE approach
• The Future
SOUTHERN CALIFORNIA EDISON (SCE)

One of the Largest Electrical Utilities in the U.S.

- 50,000 Square Mile Territory
- Serving 430 Cities and Communities
- 4.7+ Million Customers
- 70,000 New Customers Per Year
- 850 Substations
- 23,303 MW Average Load
- 5400 Transmission & Distribution Circuits
- 3281 Transformers:
  - 59 AA Banks
  - 188 A Banks
  - 3034 B Banks

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Disturbances

- November 1998 Breaker Failure SCE Sustained Low Voltage
  - System stressed
  - Normal load
  - Market generation dispatch
  - High path flows
  - Event results in path overload
  - Sustained load voltage
  - Action necessary to prevent voltage collapse
  - Potential cascading event

- January 2008 System Oscillations
  - Loss of transformer 500 kV transformer initiating event
  - System swings lasted over an hour
  - Pacific DC ramped down and subsequently to zero to resolve problem
  - Unfortunately phasor provided data was not the diagnostic used to determine there was a problem

- What problem are we trying to solve?
  - Lets recognize we may not be able to solve all problems
  - We can’t boil the ocean
One Operators Opinion

• Since 1996 we have known in WECC that planning studies do not reflect real time conditions

• What do I do with phasor information?
  – Pre-contingency?
  – Post-contingency?
  – Who has agreed to these actions?
  – Are we all looking at the same information?
  – Can we all agree what the solution is?
  – Who ultimately directs the corrective action?
  – Who is responsible for the economic consequences of these actions?
Operational Perspective

• Lets walk before we run
  – We need to know what problem we are trying to solve
  – All disturbances are not created equal

• SCADA versus PMU data
  – Integration or separation
  – How can the operators determine solutions
  – When is SCADA latency good enough
  – Intelligent alarming possibilities

• When should we take action?

• When should we wait?
Barriers

• Engineers and Operators
  – Communication
  – Who carries the torch

• Industry
  – Expectations
  – Buy in on solutions
  – Economic impact of path reductions
    and generation re-dispatch

• Funding
  – The time is right
  – What are the right projects to work on

• Markets
  – Consideration to market implications
  – What is the price for operating more
    reliably
SCE Approach

- Control Center Changes
  - Introduction of applications
  - Visual presentation
  - EMS State Estimation enhanced with phasor data

- Engineering Engagement
  - Workshops
  - Training

- Collaborative Solutions
  - Situational awareness
  - New tools
  - SCE Smart Grid initiative
The Future

• Lets work together to deliver a solution
  – Improve the accuracy of existing tools
  – Provide a compelling interconnection wide case to affected entities that proactive response is warranted
  – Give engineers information they need to determine how to improve reliability
  – That will give operators what they need to maintain reliability
QUESTIONS?

THANK YOU FOR YOUR ATTENTION