The information in this presentation is based on the results of a DOE funded project under:

American Recovery and Reinvestment Act of 2009

- Smart Grid Investment Grant Program
- Smart Grid Demonstration Program

For further information go to www.smargrid.gov.
The Deployment of the PJM SynchroPhasor Project and Lessons Learned

IEEE Innovative Smart Grid Technologies (ISGT) Conference
February 20, 2014
Washington, DC

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Outline

• Project summary
• Current state of SynchroPhasor at PJM
• Challenges/Lessons Learned in the project
• Transition
• Next steps
PJM SynchroPhasor Deployment Project

The project provides a highly reliable data collection network.

SynchroPhasor Measurement Devices at 82 Substations

Production Grade Data System to Support 300+ Monitored Substations
SynchroPhasor Visualization

Current State

- RTDMS application has been in Dispatch since July 18, 2013
  - Burn-in testing (Stability, Firewall, Patches, etc. in a 24x7 Environment.)
  - Available to Reliability Engineers
Additional Updates

• Data quality remains main focus
  – Significant progress being made
  – Automation of reporting
  – Refinement of processes

• Operations and maintenance processes

• Collecting PJM and DOE Implementation Exit Criteria from TOs

• Finalizing remaining funds for TO’s with period 4 work

• Discussion of whether PMU sources become CIP assets
THE OLD CHICKEN AND EGG PROBLEM ...
Challenges and Lessons Learned

- Project Management
- PJM vs TOs
- IT vs Engineering
- Data Quality
- Transition to Operations
Challenges and Lessons Learned

• TO Installation Schedule Changes
• Multiple vendors h/w and s/w in use
• Data Quality and Availability
• Coordination of all project stakeholders
  – TOs, Vendors, ISO/RTOs, DOE
• Ensuring the architecture is scalable
• Storage, Storage, Storage
• R&D approach vs. “touch it once” approach
• Data Exchange with other RTO/ISO’s
Setting priorities

• Important for project planning and budgeting
  – Will need to take resource and funding constraints into consideration

• Priorities of the addressed topic areas are evaluated considering
  – Importance
  – Estimated efforts in terms of number of years it may take to get there

• A preliminary view on priority for each focus area – will adjust after received feedbacks
  – Data quality
  – Offline applications
  – Real-time applications
Project In Summary

• Completion of SGIG Synchrophasor project is just a starting point
  – A lot still need to be done to fully integrate Synchrophasor system into PJM operations to benefit from it

• Roadmap provides a general direction and the basis for planning and budgeting for areas to be addressed
  – Identify areas to be addressed
  – Prioritize these identified areas

• Next steps
  – Getting feedback on the current document
  – Refine it to consider other factors to proper prioritize identified areas
  – Add any other areas if needed
Data Quality

PMU Error Rate Trend, All TOs

* Target of .2%.
Data Quality and Availability

• Overall 91% of data is acceptable
• 50% - “Good” (or better) rating [< .2% avg. error]
• 58% - delivering “Timely” data [latency < 500ms]
• Poor Quality – Root Causes
  – PMU Calibration - Loss of telecom connection
  – GPS Clock issues - Server overload
  – Data Name limitations - Aliasing at PDC
  – Loose cables - PDC configurations

• Lessons Learned
  – Establish test criteria to use at installation
  – Ensure data quality at TO PDC before sending data
Phasor Data Quality Task Force

• The DOE Grant Project was focused heavily on implementation of Phasor metering systems and typically used personnel with other primary job responsibilities (typically with their EMS). As such these systems are just now entering the “operations” phase. Impacted areas are:
  – Quality Measurement –
  – Personnel
  – Data Quality Goals
  – PMU maintenance outages to improve data quality are sometimes difficult to achieve in a timely manner
  – Nature of Data Quality Problems
Additional Requirements for Improved Utilization

Challenges & Benefits:

- No Generator Buses with PMUs
- For generator model development and verifications, we need high resolution data (SynchroPhasor data) at generator buses
  - Potential On-line model testing instead of traditional off-line testing
  - Improve the accuracy of the generator model; especially with regard to wind farm modeling
  - Forthcoming NERC standards
- Generation Primary Frequency (Governing) and AGC Response Performance Monitoring
- Oscillation Monitoring and Detection
Priorities From Here

• Key Tasks:
  – Complete connections and configurations
  – Improve Data Quality and Availability

• Phasor Application Use:
  – Phase Angle display in Control Room
  – Feed Intelligent Event Processor (IEP)

• Measure of Success:
  – Data Validation and Event Analysis
  – Operations Integration
  – Data Exchange with neighboring RC’s
Thank You!

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