Impediments to Leveraging Phasor Measurement Unit Data and Synchrophasors

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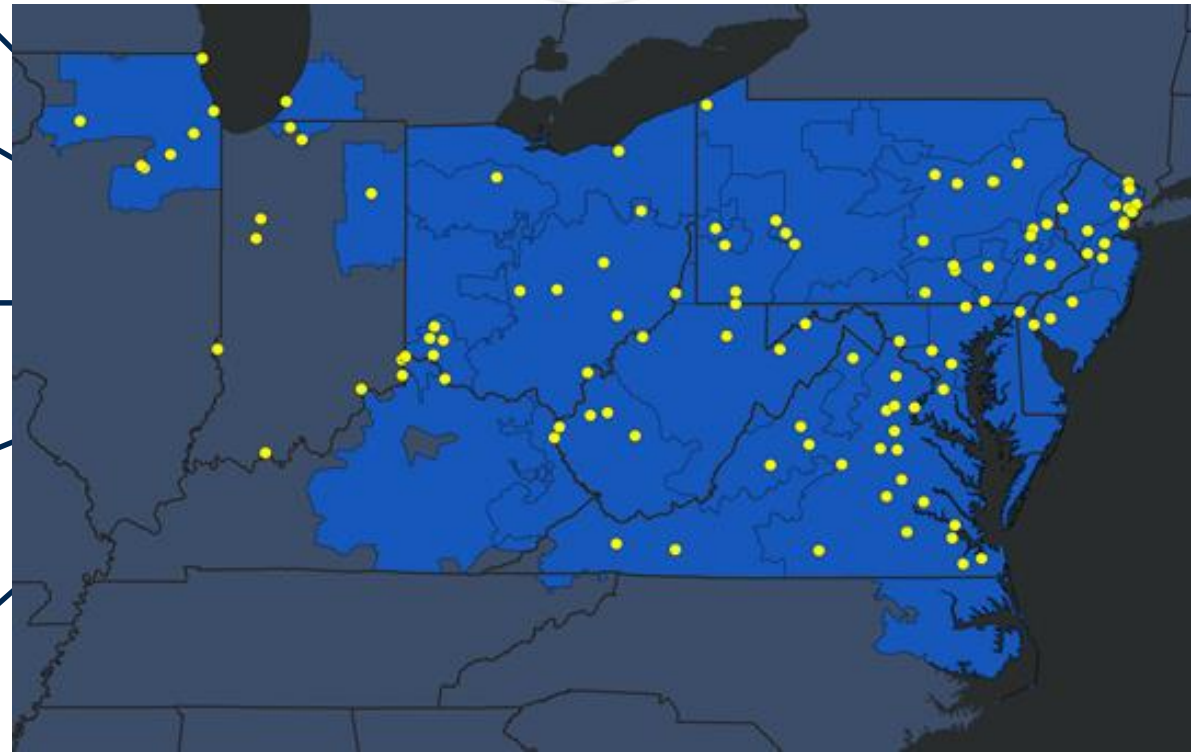
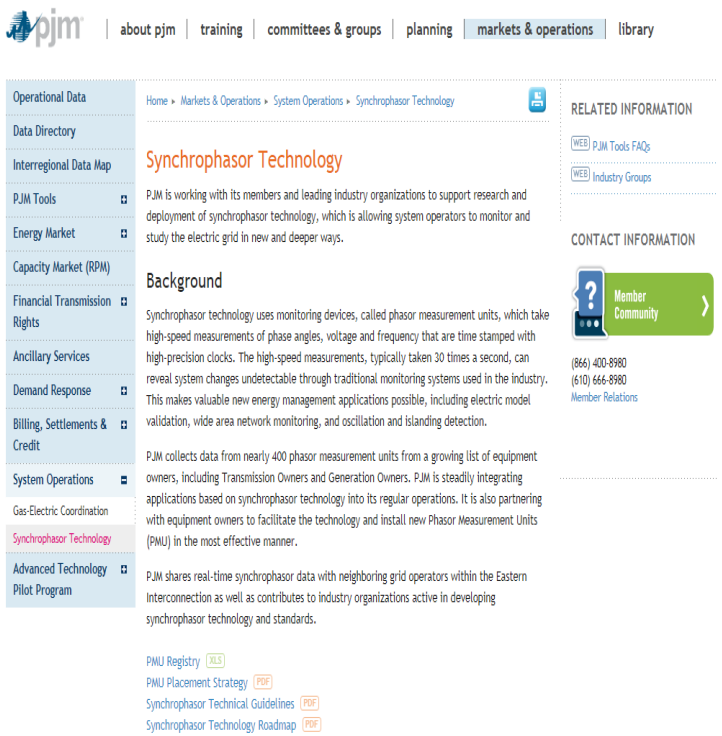
PMU Deployment

- 4 PDCs (both sites)
- 12 TOs ← Collect 4 ISO/RTO ← Share
- 400+ PMUs
- 120+ Substations installed with PMUs
- 42 GB data/day for entire PJM Territory





PJM's PMU Placement Strategy

PJM has a PMU placement strategy across the RTO to address gaps and provide redundancy with respect to:

- Model validation
- Linear state estimator (LSE) measurement and observability
- Areas of known stability concern
- Enhance overall situation awareness
- Restoration efforts and/or event analysis around Eastern Interconnection events

PJM has an ongoing outreach effort to reach out to transmission and generation owners to address these gaps

Impediments & Lesson's Learned

Challenges	Solutions
Use cases of Synchrophasors target the wide-area ISO/RTO territory size, but the devices must be installed and maintained by the local utility.	PJM has identified its own benefits of using PMU data, but has also identified benefits to the transmission owner: • Asset health monitoring • Generator model validation
PMUs have clear value in real-time control room applications, however any operational decision making will raise CIP compliance concerns.	NERC SMS has written an implementation guidance document that differentiates RTO CIP classification of PMU assets vs TO classification.
Existing PMU deployments are mostly limited to existing PMUs installed during the DOE project.	PJM Tariff requirement for new generators larger than 100 MVA must install a PMU and stream data to PJM.

Continuing Challenges

- PMUs have a low upfront capital cost, but high O&M costs to maintain equipment updates, outages, network connectivity, etc. PJM has also experienced these administrative costs: metadata and outage tracking, server and network maintenance.

- Synchrophasor technologies are less mature than existing RTU / SCADA devices. Troubleshooting data quality issues often requires more time to address.
  - New STTP streaming protocol will improve network data drops between data centers.