



Impediments to Leveraging Phasor Measurement Unit Data and Synchrophasors

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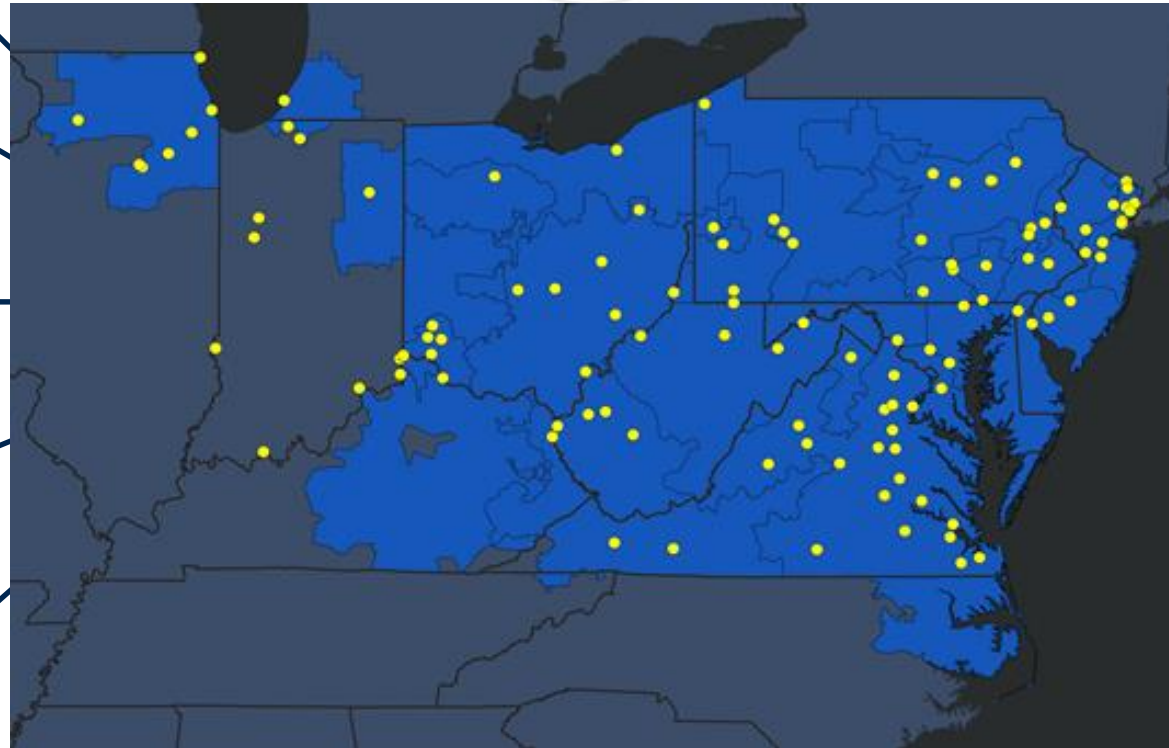
4 PDCs (both sites)

12 TOs ← Collect
4 ISO/RTO ← Share

400+ PMUs

120+ Substations installed with PMUs

42 GB data/day for entire PJM Territory



Operational Data | Home > Markets & Operations > System Operations > Synchronphasor Technology

Data Directory

Interregional Data Map

PJM Tools

Energy Market

Capacity Market (RPM)

Financial Transmission Rights

Ancillary Services

Demand Response

Billing, Settlements & Credit

System Operations

Gas-Electric Coordination

Advanced Technology Pilot Program

Synchronphasor Technology

PJM is working with its members and leading industry organizations to support research and deployment of synchronphasor technology, which is allowing system operators to monitor and study the electric grid in new and deeper ways.

Background

Synchronphasor technology uses monitoring devices, called phasor measurement units, which take high-speed measurements of phase angles, voltage and frequency that are time stamped with high-precision clocks. The high-speed measurements, typically taken 30 times a second, can reveal system changes undetectable through traditional monitoring systems used in the industry. This makes valuable new energy management applications possible, including electric model validation, wide area network monitoring, and oscillation and islanding detection.

PJM collects data from nearly 400 phasor measurement units from a growing list of equipment owners, including Transmission Owners and Generation Owners. PJM is steadily integrating applications based on synchronphasor technology into its regular operations. It is also partnering with equipment owners to facilitate the technology and install new Phasor Measurement Units (PMU) in the most effective manner.

PJM shares real-time synchronphasor data with neighboring grid operators within the Eastern Interconnection as well as contributes to industry organizations active in developing synchronphasor technology and standards.

PMU Registry [XLS](#)
 PMU Placement Strategy [PDF](#)
 Synchronphasor Technical Guidelines [PDF](#)
 Synchronphasor Technology Roadmap [PDF](#)

RELATED INFORMATION

[WEB](#) PJM Tools FAQs
[WEB](#) Industry Groups

CONTACT INFORMATION

[Member Community](#)

(866) 400-8980
 (610) 666-8980
[Member Relations](#)

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



- Use cases of Synchrophasors target the wide-area ISO/RTO territory size, but the devices must be installed and maintained by the local utility.
- PMUs have clear value in real-time control room applications, however any operational decision making will raise CIP compliance concerns.
- Existing PMU deployments are mostly limited to existing PMUs installed during the DOE project.



- 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
- NERC SMS has written an implementation guidance document that differentiates RTO CIP classification of PMU assets vs TO classification.
- PJM Tariff requirement for new generators larger than 100 MVA must install a PMU and stream data to PJM.

- 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.