NASPI Reliability Coordinator Data Quality Survey Summary

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Overview

Improving data quality is essential to assure that synchrophasor technology can deliver trustworthy information and insights for real-time and off-line uses.

- This survey collected information from 5 Reliability Coordinators on some of their definitions, practices and processes for synchrophasor data delivery and management.
- The Survey results show different data quality results, definitions and practices across the various RCs.
- Different doesn't mean some are doing it wrong, just that they're not all the same. We can learn from these differences.
- Looking forward, we may need collectively to aim higher and adopt greater consistency of in order to achieve high-quality, mission-critical-worthy, interconnection-wide data exchange.

Definitions

- PMU – the device, not the signal
- Signal – the collection of data that describes the specific measurement being monitored, e.g. positive sequence voltage and current by phase
- Latency – time period from data time stamp to arrival at PDC. Statistics calculated at PDC by the PDC application -- or not at all
- Good data – not always defined
  - Determined by data quality flags
  - Assessed in comparison to state estimator

Managing data

- Screening and handling bad data (e.g., flat-lined or unreasonable data)
  - Identify it with threshold checks (e.g., for range of frequency or voltage) and status flags
  - Archive it with other data
  - Block bad data from getting to sensitive applications
- Mostly no special attention to potential time-stamp errors
- Data wait time – max allowable ranges from 3 to 20 seconds before PDC moves the data on
  - Late data may be archived (or not)

Network performance

- PMU device performance – 4 RCs monitor individual PMU performance to some degree. Reports on data quality by PMU shared with TOs in 3 RCs
  - Device performance monitoring – most PMUs (85-95% or better) are performing with acceptable quality
  - ERCOT and ISO-NE have specific PMU performance metrics
- Data drop-outs – varies daily. Not measured everywhere. Can vary from 0.8 to 15% of signals delivered
- Data accuracy – most aren't measuring this yet, or have just started.
- Network performance – several RCs track network availability, data losses, jitter, latency

Policies and processes

- Data quality problem reporting process to TOs? Varies by RC
- Data validation by the TOs? Mostly no
- PMU outage planning process? Mostly no
- Data cleaning or reasonableness tests? Mostly done at the application level, not generically across all data
- Standard PMU data quality report? Yes for 3 RCs, no for 2

Network flows

- Maximum wait time for PMU data from TO? Between 3-4 up to 20 seconds
- Minimum TO to RC latency? 18 ms up to 4 seconds
- Maximum hops for a data packet – 2 to 7 hops (e.g., PMU to station PDC to TO PDC to RC PDC)
- Network protocol for PMU data flow? C37.118 TCP or UDP Unicast or unspecified
  - 1.5% data loss associated with UDP; no data impacts from TCP use
- Network component performance tracking? Standard network monitoring; SLAs for network provider; real network issues happen between the TO substation and control center, not TO to RC
- Mostly no QoS requirements for synchrophasor network

Documented processes?

- Individual(s) responsible for data quality monitoring? Yes, and support teams
- Formal RC business metric for PMU data quality? No
- Documented processes or agreements between TO and RC for PMU data management? No, none beyond the tariff agreement and formal handbook or manual. (see links in survey report and presentations)

Conclusions

- Data quality is much better today than it was five years ago – but it will need to get better before synchrophasor technology can be fully trustworthy for mission-critical uses.
- Let's learn from each others' good practices and efforts.

- Thanks to our friends at PJM, Peak, ISO-NE, MISO and ERCOT for sharing their information.

Questions?

NASPI North American SynchroPhasor Initiative