Design Goals for Data & Systems at PJM

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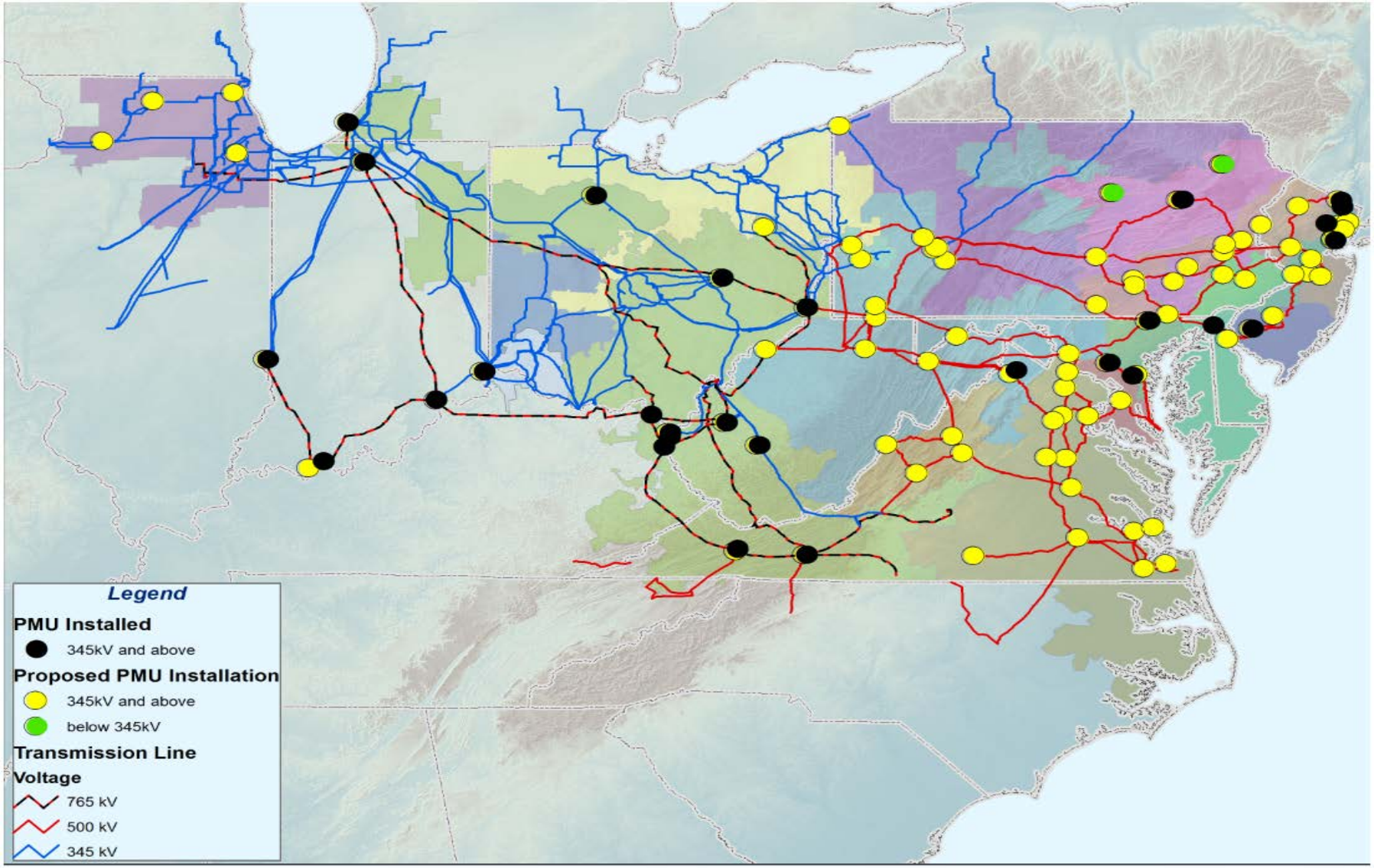
NASPI North American SynchroPhasor Initiative

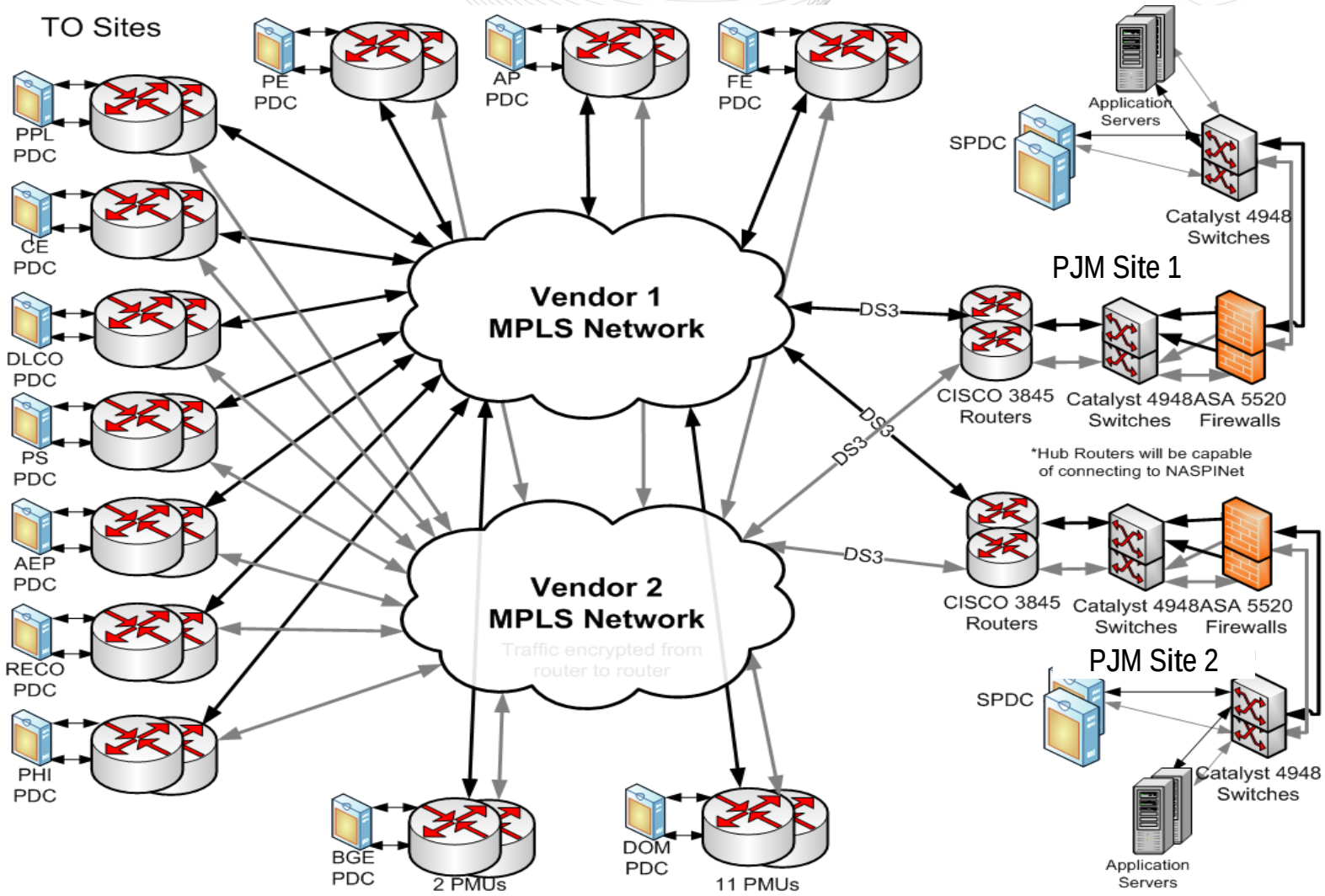
Outline

- High-Availability
- Performance Monitoring
- Operational Support
- Design Goals for Data & Systems

PJM SynchroPhasor Deployment Project



High-Availability



- IT Operation Center
  -24x7

- Tivoli
  - Windows logs and Application logs

- Applications' own performance report

- IT Operation Center
  -Alert – Response – Follow-up action
  -Develop Standard Operating Procedures

- Intelligent Event Processor (IEP)
  -Alarms from applications

Design Goals for Data & Systems

- Data:

  -99.99% data available, 99% with STAT = 0, & 90% with End-to-End Latency<100 ms (all per Hr.)

- Systems

  -Each PDC available > 99.99%, Each major application individually (without resorting to back up) available > 99.99% (per day)

Data Quality

- 71% of PMUs with “Good” (or better) rating
- 45% of PMUs delivering Timely data
  - With latency under .5 seconds
- 35% of PMUS are both “Good” and “Timely”

- Poor Quality – Root Cause
  - PMU Calibration - Loss of telecom connection
  - GPS Clock issues - Server overload
  - Data Name limitations - Aliasing at PDC
  - Loose cables - PDC configurations

- **Application Security**
  - PJM and TO technical implementation comply with their Security Standards including CIP.
  - EPG software (ePDC, RTDMS, PGDA) to ensure:
    - proper programming standards are implemented.
    - software complies with PJM Security Standards including CIP
- **Independent Testing**
  - PMUs and PDCs in use by the Project.
  - Virginia Tech provides testing (to C37.118 standards) as information to the TOs and PJM.

Scope of the PMU System at PJM and TOs (Beginning of 2013)

12 Transmission Owners

90 Substations

360 PMUs

720 Measurements

4096 bytes per PMU Message

30 Messages per second sent to PJM

Each PMU generates 108,000 database rows per hour

Estimated1 TB of Storage / mo for 100 Substations

1,302,528* bytes of data, per second, streaming from all PJM PMUs into the PJM PDC and Applications

*Additional, almost same amount of data will be coming from other interconnections