Smart Grid Investment Grant Update

NASPI Working Group Meeting

October 17-18, 2012

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PRINCIPAL ENGINEER

Acknowledgement & Disclaimer

- Acknowledgment
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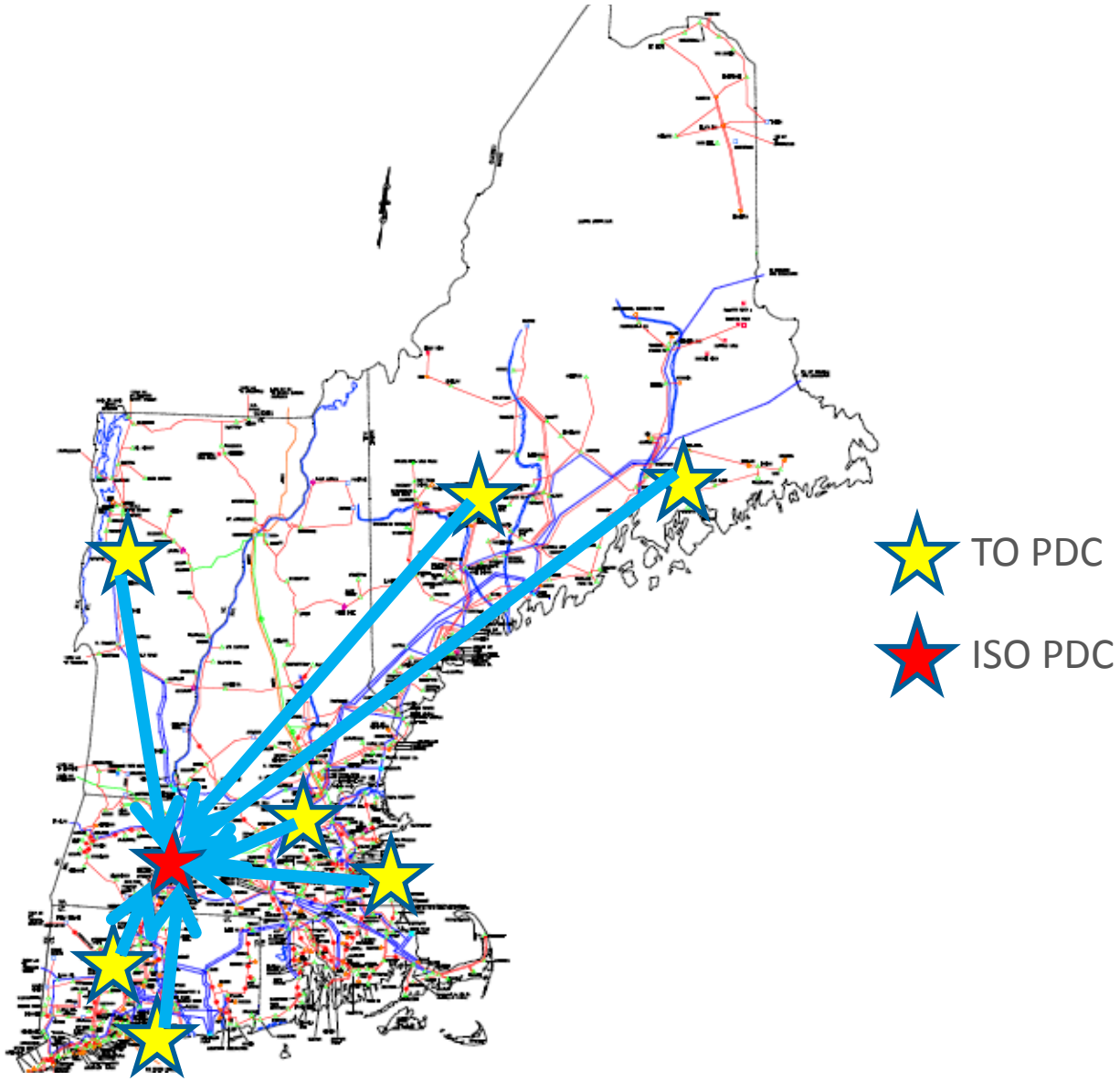
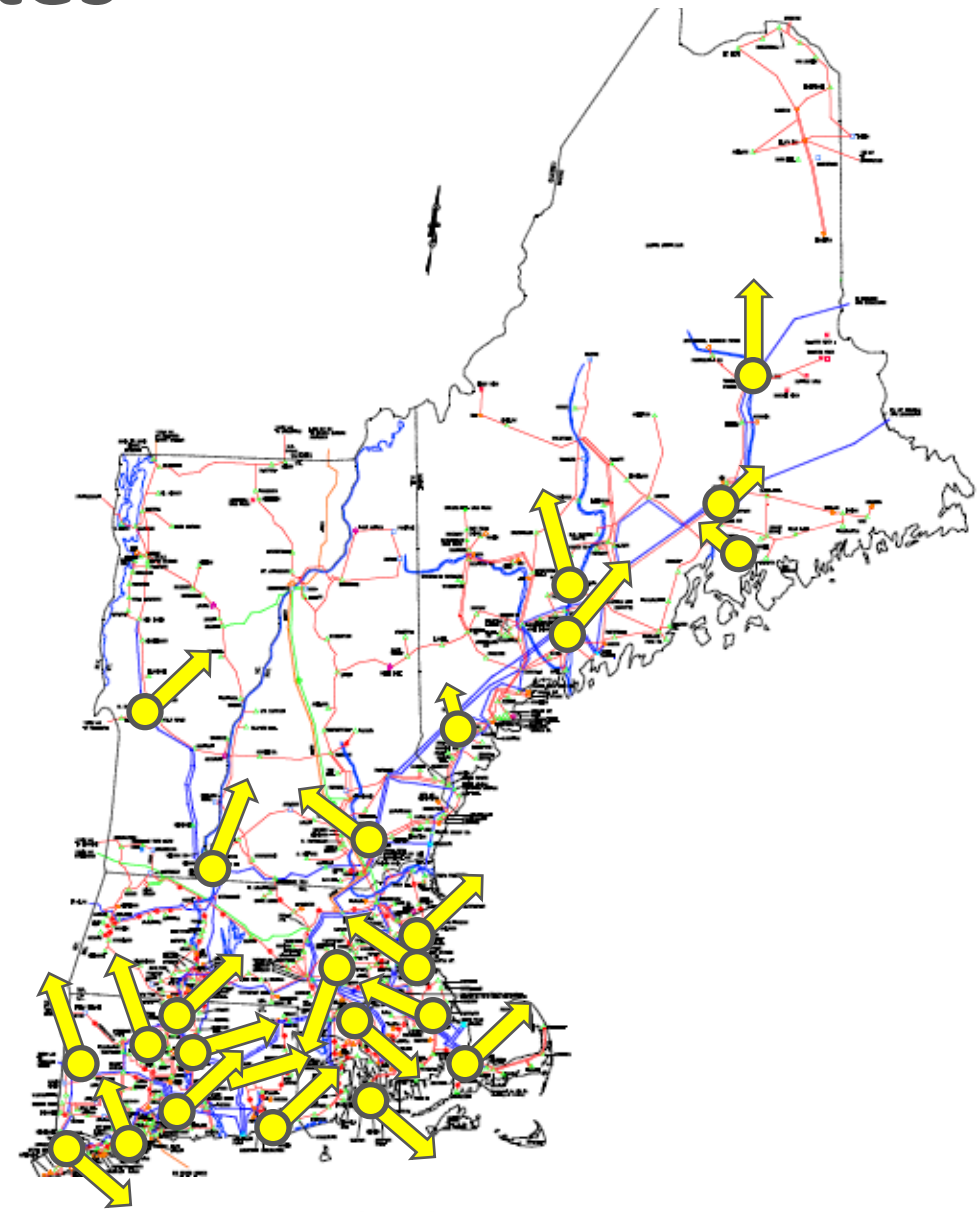
Project participants

- ISO New England (RC for the region)
- Project Transmission Owners (# PMU-substations)
  - Bangor Hydro (2)
  - Central Maine Power (5)
  - National Grid (7)
  - Northeast Utilities (16)
  - NSTAR (4)
  - United Illuminating (4)
  - Vermont Electric (2)
- Project Manager
  - Jim Graham, ISO-NE
- Other Partners
  - Mehta Tech Inc.
  - Alstom Grid
  - V&R Energy Systems Research

PDC Sites



PMU Sites



Project Schedule

- PDC Installations:
  - openPDC developed by GPA, installed & supported by Alstom Grid
    - SEL PDC used by one TO: renames signals according to naming convention then forwards to ISO-NE openPDC
  - 8 openPDC sites: one at ISO, one each at 7 TOs
    - All in-service by Q1 2012
- PMU Installations (substations, not devices)
  - 36 of 40 substations streaming as of 10/1/12

Project Schedule (continued)

- Applications (none will be used by operators)
  - Alstom PhasorPoint - Q3 2012 installed version 6.1
  - V&R ROSE – Q3 2012 installed beta version
  - Mehta Tech – Q2 2012 installed Master Station beta version
  - EPRI WASAT - Q3 2012 installed beta version
    - Not part of SGIG project

➢ **Applications hosted at ISO – TOs do not have access**

PMU Data

- PMU Coverage (substations, not devices)
  - 345 kV substations – 44% (35 of 79)
  - 115 kV substations – less than 1% (4 of 688)
- Communications (PDCs)
  - Point to point circuits from ISO to each TO from teleco
  - Routers at both ends managed by ISO-NE
  - Firewalls at each end (TOs manage their own Firewalls)
- Communications (PMUs)
  - Corporate WAN to PDC – mostly fiber, some teleco
  - ➢ **Performance during lightning activity is a concern**

PMU Data (continued)

- Data flows and speeds – all at 30 per second
  - Up to 1 Mbps from the TO with 16 PMUs
  - All data flowing to the ISO archive in real time
    - No batch data
  - ISO only receives one phase or positive sequence
    - Multiple phases not allowed
    - Some TOs create all phases but only forward one
- Data storage
  - Data access query process is mature and workable
  - Preparing for 3 years of data readily accessible
    - Approximately 13 Tera-bytes
  - PMUs that are also DDRs – data storage in substation
    - ***New England requirement***

PMU Data (continued)

- Data quality and availability
  - 34 of 35 PMUs delivering good quality data
  - All PMUs delivering data within latency limits – 3 sec.
  - Occasional telco failures interrupt data for 1-2 min.
  - ➢ **Common setup errors addressed before PMU allowed to stream**
- Data requests from researchers:
  - No real-time data sharing outside of New England
  - Several universities interested: UTK, NEU, RPI, WSU, UMASS…

Challenges, lessons learned, next steps

- Next steps
  - Will complete implementation phase in 2013, observation till 2015
  - Utilize data to evaluate system performance, pre & post disturbance, assist in tuning system models
  - Introduce concepts into Operating training
  - Monitor the development of Operator Tools
- Biggest technical challenges to date
  - PMU algorithmic issue
- Research needs
  - Data analysis: Identify interconnection phenomenon & data features

Questions