NASPI WG Panel Session

PG&E Experience and Lessons Learned

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Initial Synchrophasor Deployment at PG&E

• Installed for WISP with DOE Cost Share (2009)
• PMUs in existing RAS relays
• 202 PMUs, 101 redundant measurement locations (line voltages and currents)
• 24 Substation PDCs, 12 redundant locations
• 4 control center PDCs, 2 redundant locations
• Architecture is NERC CIP compliant (Operational Data Network, PCAs vs BCAs)
• 61850 communications protocol between PMUs and substation PDCs, and between substation PDCs and control center PDCs (Field Gateways)
• 2 WISP Gateways delivering data to PeakRC
Enhancements

• Installed 3 PMUs on generator terminals at 2x1 combined cycle power plant (MOD-26 & MOD-27)
• Established Transmission Operations Synchrophasor Test Lab (TOSTL)
• Initial deployment had low availability and high latency, changed communications protocol from substation PDCs to control center PDCs to 37.118 resulting in greatly enhanced data availability
• Replaced all substation GPS clocks
• Added 6 PMUs monitoring 500 kV bus voltages and line currents
• Standardized on general purpose PMU/PDC appliance for future PMU/PDC installations monitoring bus voltages and line currents
• Established PMU/PDC lifecycle program
• 2 WISP Gateways sending data to CAISO RC West via managed ethernet 10Mbps
Future Enhancements

- All lifecycle PMU/PDCs will stream 37.118 to control center Field Gateways and measure bus voltages and line currents
- PMUs will be independent of substation relays
- Improve system-wide availability
- Improve access to archived data
- Establish OSISoft PI archive on corporate network
- Install PMUs on 500 kV tie-lines to two STATCOMs (Gates and Round Mountain)
- Install PMUs on 500 kV tie-lines to the 300 MW/1200 MWh Dallas Battery Energy Storage System at Moss Landing (world’s largest battery energy storage project)
- Install PMUs on all tie-lines with other utilities (BAL-003)
Neighboring Electric Utilities and Balancing Authorities

- BPA
- PacifiCorp
- BANC
- NV Energy
- TID
- PG&E
- SCE
Archives

- Original archives openHistorian and PhasorPoint distributed among multiple servers
- Future archives moving to a combination of openHistorian and OSIsoft PI (150 TB, 3 years)
- OSIsoft PI will be deployed on corporate network to make data available enterprise wide (PRC-002-2, MOD-033)
Lessons Learned

• Utilize 37.118 until there is a new standard

• Install on NERC CIP-compliant network even if applications will not be used by grid operators initially

• Install reliable GPS clocks

• Utilize PMU/PDCs independent of substation relays

• Establish support network including IT system administrators, network operations, communications technicians, protection engineers, automation engineers, and substation electrical technicians
Data Availability Dashboards