TCIPG

PMU Data Quality

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Goals

- Gain a fundamental understanding of phasor measurement challenges.
- Characterize synchro-phasor data quality (error, availability, reliability).
- Investigate PMU data utility for Smart Grid applications.
- Investigate state estimator sensitivity to measurement errors.
- Identify methods for detecting faulty synchro-phasor data.
- Investigate implications and remedies for faulty synchro-phasor data.

Fundamental Questions/Challenges

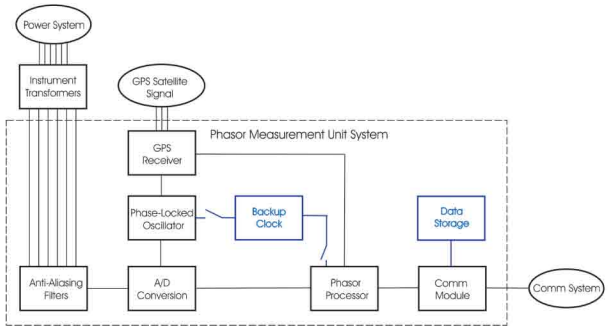
- Many PMU applications are envisioned; few applications implemented with an established track record.
- PMU data quality is questionable; not trusted.
- PMU standards established in IEEE Standard C37.118-2005: do they meet application requirements?

Research Plan

- Build and test an open-box synchro-phasor measurement device; understand the challenges of measuring, processing, synchronizing, and integrating synchro-phasor data. Collaboration with National Instruments.
- Research the application of synchro-phasor data to power system Thevenin equivalent circuit representations.
- Characterize the error, availability, and reliability of field measurements and phasor measurement devices.

Research Results

- New Project Start: September 2011.
- Preliminary work analyzing PMU reliability and PMU data availability.
- Assembling a student team and resources to build a working PMU in Fall 2011.



Broader Impact

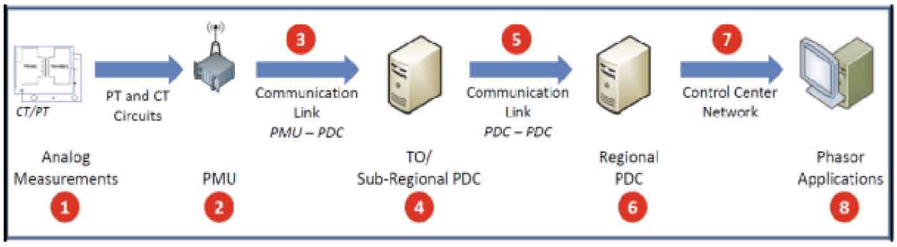
- PMU algorithms
- PMU data application
- Reliability and availability measures… and implications
- PMU employment
  - feeding the state estimator,
  - independent verification of state estimator solutions,
  - or combinations.

Interaction with Other Projects

- NASPI Working Group.
- Vulnerability of PMUs to jamming/spoofing: Professor Domínguez-García.
- Hosting University of Tennessee, Knoxville FNET data recorder: frequency data measurement project.

Future Efforts

- Seeking industry partners who have fielded PMUs.



"Phasor Data Quality and Availability," February 2011, North American Synchro-Phasor Initiative (NASPI) Working Group Meeting, Fort Worth, TX, 24 Feb 2011. https://www.naspi.org/site/Module/Meeting/Reports/SubReports/workgroup.aspx