North American SynchroPhasor Initiative

DOE Update and Projects Intro

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Huntington Beach, CA
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SGIG Electric Transmission Systems Projects

- American Transmission Company, LLC (PMU) $2.7*
- American Transmission Company, LLC (SCADA) 22.9
- Duke Energy Carolinas, LLC 7.8
- Entergy Services, Inc. 9.2
- Midwest Energy, Inc 1.4
- Midwest ISO, Inc – 15 trans owner partners 34.5
- ISO New England, Inc – 7 18.1
- New York ISO, Inc - 8 75.7
- PJM Interconnection, LLC – 12 27.8
- Western Electricity Coordinating Council – 18 107.8

* Total Project Cost
Recovery Act Grants Have Accelerated Synchrophasor Deployment

April 2007
Networked Phasor Measurement Units in North American Power Grid

November 2012
Phasor Measurement Units in North American Power Grid

Legend
- Existing PMU locations
- PMU installations in progress

*Does not include stand-alone units
Advanced SynchroPhasor Research Projects

$4.3 million awarded to four, 3-year projects

• Regents of University of California
  • Security-Dependability Adaptive Protection System
  • Alarms for Power Swing Encroachment on Relay Characteristics
  • Visualization

• Virginia Polytechnic Institute and State University
  • Develop and Implement Synchrophasor-Based State Estimator
  • Develop Transducer Calibration Techniques
  • Characterize and Analyze Unbalanced Conditions
  • Develop Tools to Determine Optimum Islanding Strategies During Catastrophic System Events
  • Develop Visualization Tools for the 3-phase Tracking State Estimator
Advanced SynchroPhasor Research Projects (con’t)

- **Georgia Tech Research Corporation**
  - Real-Time Implementation of the Distributed Dynamic State Estimation and Wide-Area Transient Stability Analysis
  - Apply to On-Line Generator Parameter Identification to Generators in the NYPA System
  - Implement Transient Stability Monitoring at other Plants/Substations

- **Electric Power Research Institute**
  - Wide-area, Real-time Visualization of Frequency, Voltage and Current Contours for Security Monitoring
  - On-Line Identification of Major Events
  - On-Line Event “Instant” Replay
Advanced SynchroPhasor Research Projects (con’t)

• Washington State University
Power Grid Reliability and Security – Analysis and Simulation for a Secure Communication Network from PMU to Synchrophasor Applications
NSF/DOE University of Tennessee/Knoxville Engineering Research Center (ERC)

- University of Tennessee Knoxville - ERC
  Center for Ultra-wide-area Resilient Electric Energy Transmission Network (CURENT)

- Monitoring and Sensing
- Communications and Cyber Security
- Computation and Modeling
- Control and Actuation
- Economic Analysis
Contact Information

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