

## ▼ Introduction to the Electric Power System Monitoring and Control Minitrack

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This minitrack focuses on topics related to the monitoring and control of complex systems such as power systems to ensure that disturbances have a minimal impact on performance. Specific topics include: Steady-State and Dynamic Security Assessment; Available Transfer Capability (ATC); State Estimation; Security-Constrained Optimal Power Flow; Sensor Applications; Large-Scale Real-Time Control; and related technologies. The sessions in this minitrack are typically organized around three current research areas in electric power systems monitoring and control. This year's themes include sensor networks and data integration, advanced real-time measurements, and EMS applications.

Sensor networks are an emerging technology that relies on a set of monitoring and communication devices distributed over the region of interest (in our case, power system). Devices (such as phasor measurement units, or distribution network monitors) are tied to a backbone command network, which can be wireless or wired (when speed is of importance). In order to maximize the network performance (which can be tied to a multitude of objectives), various forms of data fusion can be exploited at the cost of somewhat higher communication and computational burden. This sensor data has traditionally been localized in substation recorders. New efforts are underway to communicate this substation monitoring data back to the primary energy management system for use by operators in decision making.

The North American Synchro-Phasor Initiative (NASPI) is a collaboration among utilities, ISOs/RTOs, NERC transmission companies, researchers and vendors to implement a wide-area synchro-phasor network in all four North American

interconnections. The mission statement of the NASPI, "to create a robust widely available and secure synchronized data measurement infrastructure over the eastern interconnection with associated analysis monitoring tools for better planning and operation, and improved reliability." New directions in power system research are emerging as the employment of this synchro-phasor technology is becoming more widely installed. This includes the collection, analysis, and application of these measurements, data protocols, communication, and integration, topology processing, state estimation, security margin assessment, alarming, and visualization.

Restructuring in the electric power industry has led to the creation of large-scale Reliability Coordinators (RCs) with the purpose of having better coordination of the security and reliability of the high voltage transmission grid. Furthermore, partially as a result of the August 14th, 2003 blackout, there has recently been an increased desire for better inter-RC coordination in order to provide better situational awareness of the state of the a large portion of the interconnected transmission system. Advances in energy management system (EMS) technologies are needed to ensure the reliable operation of the interconnected grid through increased wide-area situational awareness. Example topics include state estimation, contingency analysis, security constrained optimal power full, and wide-area visualization.

This year's focus on these three areas was organized by Miroslav Begovic of Georgia Tech, Joe Eto from Lawrence Berkeley National Laboratory, and Tom Overbye of the University of Illinois.