



TRANSFORMING GRID OPERATION AND PLANNING

Future Power Grid Initiative Newsletter

February 2012

As the new year is getting going, FPGI is introducing GridOPTICS™ powerNET, a new testbed focused on enabling cutting edge power system and Smart Grid research. The Initiative also had a successful mid-year review that encouraged the team in its efforts.

HIGHLIGHTS & ACHIEVEMENTS

powerNET

The GridOPTICS™ powerNET testbed promises to be one of the early success stories of the Future Power Grid Initiative. The powerNET is an experimental testbed for designing, testing, and evaluating the data networks for the power grid. Already, FPGI projects and external users have greatly appreciated some of powerNET's benefits, starting with its ease of access and configuration, its ability to host multiple users at once, and its capability of federation and simulation of nodes throughout the power grid. Principal Investigators Thomas Edgar and David Manz are excited about the prospects of powerNET, which is currently expanding its hardware to better simulate real life grid operation and planning. With 24 smart meters on their way and a series of Phasor Management Units (PMU) already in place, Edgar and Manz are looking to boost its facility by adding Supervisory Control and Data Acquisition and Real Time Digital Simulation capabilities. PowerNET also promises to advance planning and research on cyber security and the grid. Several federal agencies are supporting the powerNET's team to make the testbed federatable and allow lessons to be shared with other research projects across the nation.



PMUs in powerNET testbed

Upcoming Papers

- Selim Ciraci, Oreste Villa, " Ser++: An Automatic Framework for Object Serialization Code Generation", submitted to Compsac 2012
- Ning Lu, Pengwei Du, Xinxin Guo, Greitzer, FL. "Smart Meter Data Analysis," submitted to the IEEE Transmission and Distribution Conference and Exposition 2012, Orlando, FL, USA, 2012.
- Ning Lu, Pengwei Du, Frank Greitzer, Xinxin Guo, Ryan Hohimer, Yekaterina Pomiak, "A Multi-layer, Data-driven Advanced Reasoning Tool for Intelligent Data Mining and Analysis for Smart Grids," submitted to the 2012 IEEE PES General Meeting, San Diego, CA, USA, 2012.
- Yan Liu, Wei Jiang, Shuangshuang Jin, Mark Rice, Yousu Chen. "Distributing Power Grid State Estimation on HPC Clusters : a system architecture prototype," Submitted to IPDPS 2012, PNNL-SA-83180.
- Shuangshuang Jin, Yousu Chen, Mark Rice, Yan Liu, Ian Gorton, "A Testbed for Deploying Distributed State Estimation in Power Grid," Submitted to IEEE PES General meeting 2012, PNNL-SA-84535.
- Tom Ferryman, David Haglin, Maria Vlachopoulou, Jian Yin, Chao Shen, Frank Tuffner, Guang Lin, Ning Zhou, and Jianzhong Tong, "Net Interchange Schedule Forecasting of Electric Power Exchange for RTO/ISOs," Submitted to IEEE PES General meeting 2012. PNNL-SA-84231.

Mid-Year Review

FPGI had its 2012 Mid-Year Review on January 25-26. During these two days, the FPGI Leadership Team presented recent highlights of the ongoing research to the Initiative's advisory committee. The advisory committee, which consists of eight advisors from universities and utilities across the nation and PNNL, was very satisfied with the review. Specific comments include:

- » “Very impressive blending of advanced long term research and critical industry problems”
- » “The initiative has the right direction and made tremendous progress”
- » “Brings important insights to the power industry and leads the way”

FPGI FOCUS AREAS

Focus Area One addresses data networking and management issues, and enables the digital infrastructure for the future grid. This focus area will address the gaps in networking and real-time data management by developing advanced algorithms and software tools and techniques. **Focus Area Leads:** Bora Akyol (bora@pnnl.gov) and Phil Craig (philip.craig@pnnl.gov)

Focus Area Two targets research in the areas of advanced mathematical models, next-generation simulation and analytics capabilities for the power grid. Projects in Focus Area Two will use high-throughput data streams produced by projects in Focus Area One and integrate them with sophisticated mathematical models to conduct large-scale power grid simulation and analysis. Focus Area Two strives to advance the state-of-the-art in modeling

and simulation in order to achieve much higher fidelity situational awareness and global comprehension for power grid stability, efficiency and flexibility. **Focus Area Leads:** Daniel Chavarria (daniel.chavarria@pnnl.gov), Tom Ferryman (tom.ferryman@pnnl.gov), and Ning Zhou (ning.zhou@pnnl.gov)

Focus Area Three aims to convert large amounts of model and sensor data into information and knowledge to support decisions in grid operation, planning, and policymaking. This area concentrates on the development of coordinated visualization interfaces and decision support capabilities in a modular, extensible software environment that can be used for both real-time grid operations as well as long-term planning. **Focus Area Leads:** Bill Pike (william.pike@pnnl.gov) and Paul Whitney (paul.whitney@pnnl.gov)

ABOUT FPGI

The Future Power Grid Initiative (FPGI) will deliver next-generation concepts and tools for grid operation and planning and ensure a more secure, efficient and reliable future grid. Building on the Electricity Infrastructure Operations Center (EIOC), the Pacific Northwest National Laboratory's (PNNL) national electric grid research facility, the FPGI will advance the science and develop the technologies necessary for meeting the nation's expectations for a highly reliable and efficient electric grid, reducing carbon emissions and our dependence on foreign oil.

Contact

For more information, please visit the FPGI website gridoptics.pnnl.gov.

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