THE GRID A PUBLICATION OF FINLEY ENGINEERING | 2016

WELCOME TO THE GRID

In a recent industry event I heard a keynote speaker state, "I do not know of a time where we have faced so much uncertainty." While it was stated somewhat tongue-in-cheek, and elicited a humorous response from the crowd, as caretakers of one of the world's most complex electric energy delivery systems you are indeed facing a time of great challenge and uncertainty. Clean Energy, Distributed Energy Resources, Regulatory Compliance, and Changing Demographic, just to name a few.

Certainly the Industry has seen a lot of changes over the past twenty-five years. From FERC Orders 888 and 889 to the present FERC Order 1000. The playing field is most assuredly changing. Ever since Edison first powered up the Pearl Street Station the industry has been evolving with an increasing rate of change.

At Finley, we are dedicated to training people and offering opportunity to be at the forefront of change in the industry and technological trends. Whether it is assisting you through times of resource constraint or coming alongside in helping you map out and plan for the future we are thrilled to be a part of this exciting and challenging time in the history of energy delivery.

I encourage you to check out our web site for a collection of timely and relevant white papers and articles addressing trends and challenges. Best regards and enjoy this edition of the GRID.

Phil Carroll
Vice President

The Enernet: the Convergence of the Energy Grid & the Intenet

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(FIRST IN A SERIES)

As utilities are facing exponentially-increasing fuel costs, the importance of, and demand for, conservation and efficiency are growing rapidly. And, of course, demands for reliability continue to increase, not only from customers, but from the North American Electric Reliability Corporation (NERC) and the Federal Energy Regulatory Commission (FERC).

The Smart Grid

One of the most effective tools that utilities have begun to introduce to improve conservation, efficiency, and reliability is the smart grid. With the growing use of the smart grid, the electric power industry is beginning to deploy a lot of intelligence gathering, analysis, and control through the power grid. Many of these tools are being integrated with existing tools. Many of the tools are new. A summary of the most commonly used and effective tools and technologies includes load management, demand side management, control of distributed generation, SCADA systems, smart meters, automated distribution management devices, customer information and billing systems, advanced metering systems, automated outage management systems, and geographic information systems (GIS).

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Before the introduction of these tools and technologies and the advent of the smart grid, utilities only had to deal with a few million monitoring and control points on the entire nationwide transmission and distribution system. Now, in addition to the installation of many millions of smart meters, there are many times that number (billions) of monitoring and control points, both inside the customers' premises and on utilities' transmission and distribution systems, must be managed. In many cases, information needs to flow to these points, and, in most cases, information needs to flow back from those points.

Distributed Generation/Storage

Adding to the challenge for utilities is the explosive proliferation and the recently-growing popularity of distributed generation, such as on-site renewables, storage batteries, and combinations of multiple energy generation/storage equipment, most commonly known as microgrids. The growing use of these renewables, storage systems, and microgrids is creating a new, complex network of small, local generation, replacing the 20th Century electric utility model of large, centralized baseload generation plants and networks of transmission and distribution lines. The result is a newer, stronger power network composed of a number of smaller entities, but which are tied together, and operating in real time, as opposed to large centralized generation that needs to be full-power-moved over many miles and then stepped down.

The Need for Communication

As a result of the introduction of all of the new tools and technologies that are required to manage the smart grid and the new distributed generation/storage networks, the power grid as a whole is gaining an increasing dependence on communication systems for everything in the system.

This demand is a two-way street. That is, getting the most from the tools and technologies, and making sure they coordinate effectively with each other, require real-time, two-way digital communications.

In an interview for "IEEE Smart Grid," Steve Collier, director, smart grid strategies, for Milsoft Utility Solutions, noted: "In addition to the intelligent devices and the telecommunications network that we have been talking about, utilities require enterprise applications to turn the data into actionable information in order to be able to manage a smart grid in real time. These applications will reside at utilities, at consumers' homes and businesses, and at other businesses that will be participating in the smart grid."

One way to manage this communication is for utilities to each create their own proprietary communication networks. However, an effective smart grid cannot be achieved via this type of patchwork of independent, utility-owned telecommunications networks with proprietary data and communications protocols. The reason is that such independent communication systems are likely to severely limit, even prohibit, interoperability between and among each utility's hardware and software systems, and, even worse, across the entire grid.

Enter the Internet (and "Enernet")

In order to effectively manage the massive and complex communication needs of the modern electric grid and all of its components, according to Collier, "We will need a robust, reliable, interoperable, broadband, nationwide digital telecommunications network that can handle literally tens of billions points of monitoring and control in real time."

That is, the information network capable of handling this digital information blizzard must be ubiquitous, self-healing, and have sufficient speed and capacity to monitor and manage billions of intelligent electronic devices within the grid and inside consumers' homes and businesses.

Will the electric utility industry be up to the task of creating this massive, complex, expansive, and expensive communications network? The bad news: No, it won't. The good news: It won't need to, because such a network already exists. It is called the Internet. "No other network can, in the long run, provide the speed, reliability, and interoperability of the Internet," said Collier. "Nor will any other network be as ubiquitous, self-healing, and of sufficient capacity to handle the enormous amount of data that will be moving across the smart grid."

According to Collier, the Internet, both wired and wireless, is already nearly ubiquitous and has proven to be able to handle millions of times more data than anyone originally expected. "It's the only telecom network that can support a smart, self-healing power grid that will involve monitoring and managing billions of intelligent electronic devices distributed throughout the grid from generation through transmission and distribution systems into consumers' homes and businesses," he said.

The fact that the Internet is so robust is critical to its integration with the electric grid. That is, the Internet is incredibly robust in terms of its bandwidth and data management. And, in order to achieve the operations and efficiencies that are required for the electric grid, the automation that is required will be able to rely heavily on the Internet to create the robust communications network that will work hand in hand with the robust power systems.

The resulting interaction is being referred to as the "Enernet."

In fact, while some utilities are already integrating the Internet into their operations, the full synthesis of electric power and the Internet has already been in place on a small scale in data centers around the country, where communications and power are so important that they are intertwined in a small version of the integration of the power system and the Internet. And, in actuality, this model can be rolled out on a larger scale – systemwide.

READ MORE!

Read the entire article on
FinleyUSA.com/enernet

This is the first of a 3-part series on the Enernet. Part 2 & 3 are also available on our website **www.FinleyUSA.com**

Client Spotlight: City of Nixa, Missouri

Nixa, Missouri has a population of just over 19,000 according to the 2010 census, and is located near Springfield and Branson in the southwest part of the state. The City has invested in infrastructure and boasts a progressive approach to planning in advance of expansion in this rapidly growing area.

Recently, Finley worked with the City of Nixa to prepare for a successful third-party solar farm project.

"The City of Nixa was approached by a third party developing a solar farm, with the intent of selling power back to us. We approached Finley Engineering to provide a review of the interconnection, review the engineering plans and evaluate the reliability. Finley conducted the research, review and modeling and compiled a complete report for us. We've been working with Finley Engineering since 2006 and have been very pleased with their work—they are always good to work with," said Doug Colvin, City of Nixa.

Significant projects include the final connection of a seven mile transmission line establishing a looped transmission system, upgrading and changes made to ESPY, Downtown, NE substations allowing increased relay protection schemes, more distribution feeder ties and increased substation capacity. In addition Finley is working on a SCADA project to be operational by the end of 2015.

"Our team at Finley Engineering greatly appreciates the knowledgeable and skilled team we get to work with at Nixa," said Mike Socha, Director of Business Development for Finley. "The changes and upgrades Nixa has put in place create a win-win for the City and the electric customers who, no doubt, have

experienced improved electric reliability. We thank City Administrator Brian Bringle and the City Council for the privilege of working on these important projects."

Introducing: Jeremy Mather

Utility Rates and Records Coordinator, Jeremy Mather, is an integral part of our project management and client satisfaction team. Jeremy assists clients with Continuing Property Records, cost of service rate analysis, and financing package compilation; including coordinating with outside consultants, lending institutions and governmental agencies. His goal is to control costs as part of the management of each project, ensuring that costs are kept in line with the original budget for our clients.

Jeremy brings added value to all Finley clients as he works behind the scenes to establish project objectives, policies, procedures and performance standards and works as a Finley liaison between clients and fellow Finley associates.

Jeremy began his career in the financial sector over 15 years ago and has amassed great expertise in all aspects of accounting, financial management and business administration. His prior experience melds into Finley's broadband and energy disciplines to present clients with greater resources from one company.

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