Wireless Monitoring Advances

NETWORK ENABLES REMOTE MANAGEMENT

BY SALVATORE SALAMONE

TYPICALLY, UTILITIES USE A MIX OF COMMUNICATIONS technologies to send real-time information about the status of equipment such as transformers in substations and other devices throughout a transmission and distribution system back to a central command center.

Utilities commonly use a combination of a normal phone line, a cell phone, and industrial radio technology.

Unfortunately, many of these communications methods often fail. Utilities must constantly monitor and manage more and more devices all the time. Adding a new communications link for each device can become expensive. Additionally, using some devices, such as cell phones, isn't practical in some rural areas where wireless carriers might not have the necessary coverage to reach new substations.

About two years ago, Great River Energy started to look at alternatives to overcome such common utility industry problems with communications.

One of the nation's largest generation and transmission cooperatives, Great River Energy provides wholesale electric service to 28 distribution cooperatives. The company boasts 2,500 megawatt generation capabilities, more than 4,500 miles of transmission lines, 102 transmission substations, and 498 distribution substations, and it serves 627,000 commercial and residential customers.

To better support its operations and its cooperative members, GRE chose a two-way, real-time communications system that could handle the variety of data and traffic required to manage and monitor its systems.

In talking to equipment vendors, the company discovered a wireless communications technology that used the 700 megahertz spectrum to carry data. Using standard wireless communication components operating at this frequency, GRE could transmit the data between substations and radio towers and carry this traffic on a backbone network back to a command or operations center.

To use the 700 megahertz frequency band requires a license from the Federal Communications Commission. A company can apply for its own license. But this can be time consuming, complicated, and costly. "We were not comfortable with the risks of managing the equipment and managing the FCC," said Jim Jones, vice president and CIO at Great River Energy.

Additionally, for GRE to obtain the geographical coverage it needed would require a national license, which would be prohibitively expensive.

An alternative would be to work with a radio system operator with an FCC license for the spectrum and obtain spectrum access through that entity. Several companies with local area licensees offered access, but for national coverage, GRE would have had to work with five local license holders. This led the company to search for an operator with a national license. "It is easier to deal with one company, rather than five," said Jones.

A radio node supports two-way wireless communications with substation equipment. PHOTO COURTESY OF ARCADIAN NETWORKS

Great River Energy selected Arcadian Networks and the two have been working together for about two years in the planning and deployment of a network to connect substations, meters, and transformers. The two companies kicked off a two-year deployment project in April 2006.

The network relies on radio towers placed throughout the region. Substations and devices in the field transmit data to these towers, which connect to a backbone network that then carries the traffic to a central command center. Additionally, commands can be sent to the equipment over the same network. To ensure security, the traffic is encrypted.

Basically, Arcadian Networks offers a private digital network that allows electric utilities to collect and monitor data from distant locations in real-time. Arcadian believes its network will enable new smart grid applications such as two-way communications to support distributed generation and remote equipment monitoring. Other applications that can be and are supported include supervisory control and data acquisition, security monitoring and surveillance, voice over Internet protocol, transmission operations, automatic meter reading and workforce management.

System designers had to resolve how to handle special data before making the move to this new network. Specifically, throughout Great River's system many pieces of equipment used proprietary point-to-point communications technologies. This data could not simply be sent over the network. It had to be encapsulated – the equivalent of inserting a letter into an envelope – to send it over the network.

By mid-December 2007, about 60 Arcadian base stations were online with another half dozen or so to be added in the next six months.

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JAPAN GOES TO HUNGARY

Japan plans to buy carbon credits from Hungary, the *Associated Press* reported.

Japan is making the deal to comply with its obligations to reduce greenhouse gas emissions under the Kyoto Protocol. Hungary has about 10 million tons of carbon credits to sell. According to Japanese newspaper reports, Japan is planning to spend about $180 million for that amount of credits.