

Oncor Leads Energy Delivery Business with Cutting-Edge Technology

Oncor, the regulated energy delivery business within Dallas-based TXU Corporation, is the first company in the United States to rely on high speed Ethernet to transmit energy production data from merchant power plants to the Independent System Operator (ISO). The information is used for transaction settlement and billing, and Ethernet provides a more cost effective, reliable, and secure solution than intermittent modem links.

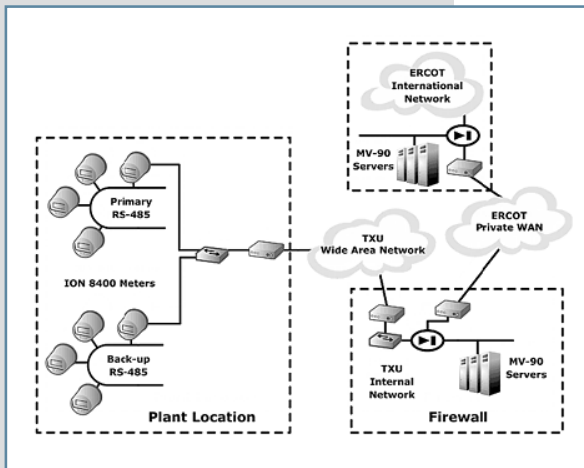


Diagram of the ERCOT-polled settlement meter communication scheme.

Application:

Utility

System:

ION[®] 8400 meters

Benefits:

- ◆ Regulatory compliance
- ◆ More accurate data collection
- ◆ Easily shared data
- ◆ Automated system
- ◆ Scalability

Fully ERCOT Compliant

This important innovation was initiated when the Texas Electric Restructuring Act, signed into law in 1999 to introduce a competitive state energy market on January 1, 2002, obligated all transmission utilities to provide power plant settlement meter data to the Electric Reliability Council of Texas (ERCOT) ISO.

Under the Act, ERCOT operates a Meter Data Acquisition System (MDAS), which collects generation and consumption energy data on a 15-minute interval basis from all transmission utility companies in the state.

Significant Challenges

For Oncor, the Act presented a significant challenge: there are over 100 generating units, scattered over a third of Texas, connected to the Oncor transmission grid. Fifty-nine of these generating units are owned by TXU and the remaining units are merchant/IPP/Cogen facilities.

Oncor had to install and maintain over 260 new revenue-accurate meters as part of their existing data-collection system, and add the necessary communications links to make the data available to ERCOT daily without adding additional effort for Oncor's staff.

Another challenge was that many of the power plants required high-accuracy wide dynamic current metering, especially the Independent Power Producers (IPP), whose peaking plants would consume very little energy when dormant but deliver huge amounts of current when producing. The huge range in measurements - from 5 kW to 500 MW - require special metering capabilities.

According to Mike Greene, Oncor Transmission and Pipeline president, "the new market rules challenged us to ensure that the meters would be compatible and deliver the necessary information to both Oncor and ERCOT in a timely manner."

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Case Study: Utility

Envisioning a Solution

Oncor needed a system that would allow both Oncor and ERCOT to gather data from the meters independently and quickly. The solution is an innovative combination of advanced metering devices and Ethernet, serial and dial-up communications links.

The conversion to ERCOT-Polled Settlement (EPS) meters over a 12-month period was a daunting task for Oncor because of its large number of geographically dispersed generating units. Oncor owns and maintains the EPS meters for all 102 generating units, and is responsible for installing, controlling and maintaining the meters, recorders, instrument transformers, wiring, communications, and other associated equipment needed to measure energy generation and internal plant consumption.

It is also responsible for installing and maintaining back-up metering at each EPS meter location for resources, auxiliary netting, and bi-directional meter points. The final meter point count at all the plants for plant output metering, plant load consumption metering and backup metering is 262 meters.

A Fitting Solution

Oncor decided to use a hierarchical meter structure, linking a number of meters through RS-485 serial communication links to a central meter that acts as an Ethernet gateway - a definite advantage because RS-485 has a much longer range than Ethernet and is generally less expensive. About 40 gateway meters are connected to the existing Ethernet local area network (LAN) and wide area network (WAN).

Through these networks, both Oncor and ERCOT can communicate with all 262 meters in the system individually. For a small number of meters (less than 20 in the overall system) located outside the range of a direct Ethernet connection, a modem connection to the gateway meter suffices. The meters are generally located between the power plants and transmission switchyard to maintain the most beneficial separation between generation and transmission.

ION® 8400 meters, supplied by ABB and manufactured by Power Measurement, were chosen as both the serial and gateway metering devices because of their direct Ethernet links, wide dynamic range, and support for multiple simultaneous communications channels.

"This equipment represents a whole new generation of meters," notes Greene. At the time of the installation, the ION® meters were the only meters on the market with built-in Ethernet that supported MV-90, a common billing collection package used in the utility environment, including by both ERCOT and Oncor.

Shared Information

The meters are read daily over Oncor's WAN by three independent MV-90 systems, two located in Dallas and one located at ERCOT's facility near Austin, providing billing and status information instantly to both Oncor and ERCOT.

When either organization's MV-90 billing package initiates the process to collect meter data, the request is channeled through the Ethernet router to a gateway meter, and then passed through the RS-485 connections to the individual meters. The meters have rolling logs - with the oldest information dropping out of the log when new information is added - so that the latest relevant data is always available regardless of when the meters are polled. And because of the reliability and speed of the Ethernet connections, the data collection process takes only a fraction of the time that would be required for dial-up connections, as well as being more cost effective, more reliable and more secure.

Flexible Monitoring Functions

The ION® 8400 meters also provided the wide dynamic current metering required to accurately monitor Independent Power Producers (IPPs) connected to Oncor's system. When an IPP facility is generating power, up to 500 MW can be flowing onto the grid. When the facility is not generating power, it can draw about 5 kW from the grid. These locations pose a particular challenge for the metering system, because of the wide voltage range that must be accurately measured. ION 8400 meters are specially designed to monitor these ranges, offering revenue certification accuracy, another reason they were chosen for all metering points within the system.

Other communications channels were used to pass information to the Resource's Energy Management group. The group can access the meters directly using DNP protocol through secondary RS-485 connections, polling the meters frequently (typically every two to four seconds), then using the real-time data for dispatching and predictive planning.



David Welch, Oncor Transmission Metering Specialist, demonstrates the installation of the new EPS Meters.

Challenging Environment

Besides the technical complexities, the project also faced significant administrative challenges. The technical specifications of the project changed as the project progressed, with the ERCOT protocols revised nine times and the ERCOT operating guides revised as recently as October 2001. These changes impacted the design phase of the project, making design changes necessary to ensure that all phases of the project were compatible and met ERCOT's standards outlined in the Texas restructuring law. Oncor worked with MSE Power Systems as the consulting engineering firm and prime contractor, Ernest P. Breaux Electrical, Inc. as the construction contractor, and ABB/Power Measurement as the meter supplier to ensure that no details were overlooked.

Future Assurance

The metering elements of the ERCOT deregulation model are crucial for the settlement process in an open market. A well-calibrated and maintained meter system is essential for the market to function efficiently. For Oncor, knowing that they have a dynamic, efficient system in place means they can face the future successfully in a deregulated market, secure in the knowledge that they can meet their obligations to ERCOT and the public.



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