

TRANSMISSION & DISTRIBUTION WORLD

Oncor Focuses on End-to-End Information Flows



Integrated distribution management system aims to boost electric reliability.

By **Charles Jenkins, Keith Hull** and **Phillip McCrory**, *Oncor*

CUSTOMERS HAVE COME TO CONSIDER ELECTRICITY AS AN ALMOST INALIENABLE RIGHT. They expect to have it and to have it all the time. In households and businesses alike, power outages quickly escalate from inconvenient to unacceptable.

Oncor Electric Delivery Co.'s (Dallas, Texas, U.S.) highest priority is providing reliable electric power, continuously and safely, to the 7 million people taking power from its lines. Oncor is taking its already high-level distribution management and customer service skills to a new plane by deploying the industry's first fully integrated distribution operations environment for the power grid.

MANAGING A HIGH-GROWTH WIRES OPERATION

Oncor operates the largest distribution and transmission system in Texas and the sixth-largest electric grid in the United States. It provides electricity to 3.1 million homes and businesses in more than 400 communities, including Dallas-Fort Worth, over approximately 117,000 miles (188,000 km) of lines that span close to 60,000 sq miles (171,000 sq km). The region is vibrant and growing, even in the current economic downturn.

As a regulated wires utility, Oncor's primary performance measurement is the number of outage minutes per year. Minimizing outages is an ongoing challenge in an environment subject to severe lightning storms, tornados, freezing temperatures and extreme heat. Oncor constantly strives to improve its customer service, electric reliability and cost productivity through advanced technologies and processes. When the Smart Grid concept originated, Oncor took a leading role. Its first Smart Grid applications were installed nearly 10 years ago, and it continues to expand and enhance the infrastructure with new and innovative technologies.

INTELLIGENCE THROUGH INTEGRATION

In 2006, as part of Oncor's Smart Grid initiative, the company was in the midst of a dramatic technology transformation, including:

- Distribution automation — involving installing smart switches to restore homes and businesses

quicker in the event of a power loss

- Smart meters — installing sophisticated devices to open up a whole new innovative world of customer control of their energy use

- Mobile workforce management (MWF) — planning to replace an existing system that was at or near the end of its useful life

- Distribution supervisory control and data acquisition (SCADA) system and legacy outage management system (OMS) — dealing with systems that are unsuitable for Smart Grid data influx.

What was lacking, and therefore preventing Oncor from realizing the Smart Grid's true potential, was end-to-end information flows — from distribution to the meter — that were automatic, interactive and culminated in actionable items.

Operational challenges were also limiting Oncor's capabilities. Correlating, sorting and scheduling the high volume of work was a cumbersome task. Each control room dispatcher juggled multiple systems from his or her control station. They ran as many as 10 applications at a time from five to seven different computer systems, each with its own user interface. Operators had to toggle between keyboards, windows and applications to access necessary data, consolidate the disparate information manually and decide what actions to take. Although the various applications were functional and valuable, the environment was complicated, and the process needed improvement to cope with the existing and anticipated operations requirements.

It became clear to Oncor that in order to gain the efficiencies they required, the operators' tasks would need to be automated end-to-end. By consolidating the user interfaces of the many applications necessary into a single operator environment, they could achieve this goal. Adding this framework to the infrastructure would simplify the operator's job by improving analysis and decision-making capabilities, allowing Oncor to better prevent outages and other network interruptions, respond more quickly and efficiently when they occur, and reduce the average outage minutes.

With this in mind, Oncor's management team embarked on an ambitious initiative to improve



On the left, Oncor employees Robert Fuller and John Donovan at Oncor's Distribution Operations Center work to switch power and issue work order tickets after a major storm. On the right, Oncor's Distribution Operations Center stays open 24/7, 365-days-a-year with employees, like Mark Terry and Roberto Mancha, handling different areas of Oncor's distribution grid.

the utility's Smart Grid infrastructure through a centralized, integrated distribution command and control environment with integrated MWFM, OMS, distribution network applications and distribution SCADA.

CHOOSING THE RIGHT SOLUTION

No single vendor delivered a consolidated suite of solutions, so two current Oncor vendors, Siemens Energy and Intergraph, partnered to offer a comprehensive distribution management system (DMS).

Siemens' Spectrum Power SCADA energy management system had been used as Oncor's transmission management system (TMS) since 1999. Siemens proposed driving grid management down to the distribution level by deploying its Spectrum Power D-SCADA and Spectrum Power Distribution Network Applications (DNA).

Intergraph likewise had a long history at Oncor as its geographic information system (GIS) vendor. Intergraph presented its InService MWFM and OMS as a means to improve coordination between the back office and the field, and to empower the operators to better handle complex scheduling and dispatch operations.

Together, the partners crafted and proposed a commercial off-the-shelf, fully integrated DMS solution consisting of MWFM, OMS, D-SCADA and DNA, with a model-based solution design and consolidated user interface, running on a common operating platform.

Both vendors were viewed by Oncor as viable, committed partners who were respected for their commitment to Oncor's success and understood the utility's culture. They were also receptive to adding and enhancing functionality to better meet broad T&D industry needs and putting the changes into

the baseline applications in order to keep system maintenance and upgrade costs under control. The contract was signed in March 2007, and when the phased rollout is completed in 2010, approximately 2000 linemen and measurement personnel and upwards of 50 dispatch operators will use the DMS.

OPTIMIZING DISTRIBUTION FOR A SMARTER GRID

The four components of the integrated DMS, with its centralized operations command and control center, are being rolled out in three phases: the MWFM solution, OMS and D-SCADA, and DNA.

1. Intergraph's InService MWFM was put into service system-wide during the four months ending December 2008. Oncor currently dispatches approximately 15,000 service tickets per day to more than 1300 crews in the field through their mobile devices. In addition to MWFM's advanced device hardware and software capabilities, the field force has maps and visuals that were not available in the previous system. The devices are optimized with routing information, work schedules and other information necessary to complete the jobs efficiently. GPS tracking capabilities allow crew productivity and safety to be monitored.

2. Intergraph's InService OMS and Siemens' Spectrum Power D-SCADA solutions are being integrated for rollout in the fourth quarter of 2009. A November pilot will include Paris, Texas, in the east and Midland, Texas, in the west. Intergraph OMS, which provides outage analysis and management capabilities, will replace a portion of Oncor's home-grown CATS system. The OMS compiles and correlates complex grid and outage data and visualizes it for the operator in a single environment, allowing better, timelier decisions. D-SCADA will replace an obsolete distribution SCADA system. D-SCADA



On the left, Oncor lineman Tim Lewis installs the IntelliRupter switch in the Dallas-Fort Worth area. On the right, the IntelliRupter PulseCloser switch is more groundbreaking technology that Oncor has installed in the development of its Smart Grid.

provides real-time data acquisition and control services. It keeps the operator informed of changing network conditions, generates alarms when needed and simplifies control request processing.

3. Siemens' Spectrum Power DNA is scheduled for rollout in June 2010. DNA will deliver real-time analytic capabilities not available to Oncor previously. It is an automation engine that works in the background to provide distribution grid load and voltage calculations to verify network conditions, detect overloads, support restoration activities and optimize voltage conditions. It turns voluminous data from many Smart Grid technologies into specific actionable intelligence.

Numerous other systems are being integrated with DMS, including TMS, GIS, CIS, capacitor control, DA switches, MDMS, IVR, MMS, reporting and notification. For instance, DMS analysis tools will enable Oncor's feeder automation scheme,

and the system will use meter data collected from Oncor's advanced meter infrastructure (AMI) to build accurate load models. In addition, the DMS rollout will be the first time TMS and D-SCADA are integrated together as part of OMS to manage the grid in real time.

SATISFY THE CUSTOMERS

More than 3 million homes and businesses rely on Oncor for reliable electric power, and electric



Oncor's advanced meters revolutionize energy management and reliability by providing a two-way flow of data between meters and utilities.



As of September 2009, Oncor has installed more than 300,000 advanced meters.

reliability is indelibly tied to the efficiency of the dispatchers and field crew.

Oncor will continue to actively pursue and invest in innovations that improve reliability and deliver cost efficiencies. Partnering with visionaries in Smart Grid technology, research and development will remain a key strategy in Oncor's ongoing efforts to minimize the frequency and duration of customer outages. **TDW**



Oncor's Gary Moody and Chris Parker work at Oncor's Transmission Grid Management center, a facility that never sleeps, constantly monitoring flow of electricity through more than 15,000 miles of transmission lines.

Charles Jenkins (C.W.Jenkins@Oncor.com), Oncor senior vice president, is responsible for engineering, construction, field operation, grid operations and distribution dispatch. A 37-year veteran of Oncor and its predecessor companies, he is a registered professional engineer. Jenkins serves on the board of the Electric Reliability Council of Texas and is a member of a North American Electric Reliability Corporation standard drafting team. Previously, he has been active on NERC, Electric Power Research Institute and Edison Electric Institute committees.

Keith Hull (Leslie.Hull@Oncor.com) has 27 years of experience in the electrical utility industry managing various engineering, distribution construction, maintenance and operations organizations. As senior director of distribution system operations at Oncor, he is responsible for operating the distri-

bution and substation system to ensure the safe, timely and quality delivery of electrical service. Hull's organization is accountable for the SCADA system and the development and implementation of the new MWFM, OMS and DNA systems.

Phillip McCrory (Phillip.McCrory@Oncor.com) is T&D services director for Oncor Electric Delivery's operations IT systems. His 35-year career includes responsibility for transmission planning and the installation of Oncor's EMS. He has spoken internationally at various conferences on security and Smart Grid. McCrory holds a BSEE degree from the University of Arkansas and an MSEE degree from the University of Texas at Arlington. He is a senior member of IEEE and a licensed engineer in Texas.



Oncor has installed the world's largest concentration of Smart Grid voltage compensation equipment, static VAR compensators, in Dallas.

DMS Benefits to the Business and Consumers

There are several benefits associated with the distribution management system (DMS):

- *Actionable Information.* DMS processes a tremendous volume of information from multiple systems at a high rate of speed, consolidates and filters the data automatically, and puts it in an actionable framework so the operators can make rapid decisions and get service back on-line faster.
- *Simplified Workstations.* DMS control stations consist of three or four monitors presenting a consolidated user interface for all applications (including common navigation, keystrokes and appearances), and a single keyboard from which to manage dispatch operations.
- *Open Systems Platform.* DMS is designed based on a common information model that improves interoperability between applications. It has a single platform and model from which to pull information, track events, and generate reports. As a result, Oncor can continue to evolve the system with new and upgraded Smart Grid components, rather than replacing the system as business needs change.
- *COTS Solution.* As a standard off-the-shelf solution, Oncor is able to better manage its costs to maintain and evolve its systems.
- *Scalability.* The system is sized for the future, allowing Oncor to employ new Smart Grid technologies as they become available and to accommodate a growing customer base.
- *Safety.* With the advanced detection abilities, the field operators are given the exact information they need to properly respond to an outage. If the job is not completed within a certain amount of time, an alarm is generated to determine whether the operator is ill or in jeopardy.
- *Regulatory.* The majority of Texas' power grid is contained in the Electric Reliability Council of Texas. The Public Utility Commission of Texas regulates the rates and operations of the investor-owned utilities in Texas. Oncor is better equipped to meet the metrics required by the regulators with DMS.
- *Training.* Operator training is simplified, and the learning curve is shortened because the systems are consolidated with a single user interface.
- *Customer Service.* The bottom-line benefit for Oncor is the ability to reduce the customer minutes of interruption and add overall efficiencies to distribution and grid operations.