

Industrial Communication

Siemens brings reliable network solution to Central Oregon

RUGGEDCOM Multi-Service Platform and serial device server enable substation RTU and IED integration into SCADA fiber optic network

Central Oregon is an arid plateau at 4,000 feet elevation, bounded by the snowy Cascade Range on the west. The terrain once daunted explorers and settlers, but today it draws outdoor recreationalists to the region's small communities.

La Pine, Oregon – home to Midstate Electric Cooperative – lacked a source of reliable power for farming, ranching and timber operations until the mid-20th century. In 1952 Midstate Electric energized its first seven miles of lines, with 153 member/owners and six employees. Today, Midstate Electric has more than 18,000 member/owners, nearly 2,400 miles (39,000 kilometers) of energized line and 56 employees. Midstate Electric's provision of reliable, affordable power – and its forward-looking investments in proven technology to serve its membership – has clearly played a major role in the region's economic growth and prosperity.

Midstate Electric's service territory covers 5,600 square miles (14,500 square kilometers) in the state of Oregon, – including portions of Deschutes, Klamath state, Lake and Lane counties – from the snowy Cascades on the west to Lava Butte on the north, Klamath Marsh on south and Christmas Valley to the east.



RUGGEDCOM RS416 server with serial, Ethernet, and fiber ports

The challenge

For reliable, resilient, efficient operations, and to upgrade substation monitoring and control, Midstate Electric needed a rugged network switch that could accommodate a variety of communication sources and operate reliably in the widest temperature range. The terrain presents part of Midstate Electric's challenge. The snowy mountains and arid, high plateau of Central Oregon produce cold winters and hot summers, which impose harsh conditions on substation communications equipment. Historically, outages in winter required a technician to travel by snow machine to remote substations at any time of day or night.

An antiquated SCADA system collected data from RTUs (remote terminal units) in substations and sent them over a copper-wire serial communications network to microwave towers for transmission to headquarters in La Pine. The serial communications network could not provide the speed and bandwidth for substation monitoring data to reliably reach grid operators in a timely manner.

"We had an older SCADA system," says Gary Logsdon, meter technician for Midstate Electric. "We didn't even have Ethernet radios, just old microwave radios going to our substations via serial communications. We had so much [substation] data we were trying to bring back that the older network was 'bottlenecking,' Logsdon says. "When we started switching to fiber optic cable-based Ethernet networks [about a decade ago], that eliminated the bottlenecks."

Midstate Electric extended a fiber connection from its operations center to its most accessible substations, but that left the difficult-to-reach substations in need of a reliable communications network with sufficient speed and bandwidth.

As Midstate Electric upgraded to Ethernet-based networks for improved SCADA functionality in its substations and on distribution feeders for greater visibility into and control of field assets, it also added new, fiber optic-based IEDs (intelligent electronic devices). This upgrade posed a new challenge: integrating legacy, serial-based RTUs and new, fiber optic-based IEDs into a fiber-based Ethernet network.



RUGGEDCOM RX1501 platform and RUGGEDCOM RS416 serial servers from Siemens enabled Midstate Electric to integrate legacy RTUs with modern IEDs for an Ethernetbased network for monitoring and control of field assets.

RUGGEDCOM RX1501 Multi-Service Platform and RUGGEDCOM RS416 serial device server provide robust network gear for reliability, efficiency and global standards. With its service territory sprawling across Central Oregon's

"At one point our IT folks wanted to install an ordinary modem inside the substation," Logsdon says.

"It died within a couple of days. It wasn't rugged. The RUGGEDCOM RX1501, however, is well suited for harsh substation environments. We haven't had any problems with RUGGEDCOM devices. They've lasted and lasted. It's hard to beat the [RUGGEDCOM] RX1501 when it comes to mission critical infrastructure."

high-altitude plateau, Midstate Electric had to invest in equipment that could withstand the punishing conditions affecting remote substations, which includes extreme temperatures, wind-blown dust and electromagnetic interference (EMI).

Midstate Electric seeks to comply with global standards for the reliability of critical infrastructure:

- IEEE 1613 addresses error-free communication in substations, which requires fiber optic cable-based Ethernet networks unaffected by EMI.
- IEC 61850-3 focuses on EMI, industrial temperature range and resistance to shock and vibration.

RUGGEDCOM RX1501 switch/router and RUGGEDCOM RS416 serial server provide high-level immunity to EMI as well as the electrical surges typical in electric utility substations. Both devices operate in temperatures that range from -40° to +185° F. (-40° to +85° C.). The RUGGEDCOM RX1501 and RUGGEDCOM RS416 also meet IEC 61850-3's specifications for withstanding high levels of vibration and shock.



Mowich Substation



Part of the Midstate Electric network

RUGGEDCOM RX1501 Multi-Service Platform and RUGGEDCOM RS416 serial server enable the integration of legacy and new monitoring and control gear without factory reconfiguration. As Midstate Electric evolved from legacy, copper-based serial communications to integrate new, fiberbased IEDs, it needed to mix and-match legacy and new substation gear. Unlike other products, the RUGGEDCOM RX1501 selected by Midstate Electric has communication modules that enable hot-swappable, "plug-and-play" installation of both serial and Ethernet gear.

"The [RUGGEDCOM] RX1501 gives us multiple ways to speak to 'things' because of the communication line modules that plug into the switch," Logsdon explains. "We can have Ethernet, fiber and serial ports all going into the [RUGGEDCOM] RX1501, so we can talk to any device we need to. Having the option to replace a module with Ethernet, serial or fiber connections is a great feature."

"Now, our RTUs are used just for alarm schemes on transformer and substation health," Logsdon adds. "Our system sends text or email alerts if an alarm goes off. So if it's a weekend and no one's in the dispatch office looking at SCADA data and something happens, we know in real time. Before we started upgrading our SCADA technology, including implementing the RUGGEDCOM RX1501, that scenario was not an option."

RUGGEDCOM RX1501 Multi-Service Platform and RUGGEDCOM RS416 serial server enable remote monitoring and control of substation and distribution IEDs for reliability, resiliency and operational efficiencies. Midstate Electric's remote substations, scattered across challenging terrain, and its limited staff resources, underscore the value of the remote monitoring and control reliably enabled by the RUGGEDCOM RX1501 and RUGGEDCOM RS416.

"Now if SCADA shows that a breaker has opened, someone at the central office can address it," Logsdon says. "That saves an awful lot of time and money. Crews don't need to travel back and forth. Operators can just send a command from the office. It has definitely made our operations more reliable and efficient."

Despite its growth, Midstate Electric maintains a lean and efficient staff. One criterion for its selection of network equipment is the ease of implementation.

"They are simple," Logsdon says of the RUGGEDCOM RX1501 and RUGGEDCOM RS416. "You place them into a substation in the field, program them and they just work. This saves our field crew considerable time."

The results

A fast, high-bandwidth Ethernet network solution enabled by RUGGEDCOM RX1501 and RUGGEDCOM RS416, improved system reliability, resiliency and operational efficiencies, saving Midstate Electric money, man-hours and truck rolls and enabling future functionalities.

Siemens reputation as a mainstay of the power industry also played a role in Midstate Electric's decision to use RUGGEDCOM RX1501 and RUGGEDCOM RS416. Midstate Electric invested in equipment it knew would be supported over the long haul. And as new substations are built to accommodate growth in Midstate Electric's service territory, the new facilities are equipped with fiber-based Ethernet networks running through RUGGEDCOM RX1501 for all the right reasons. "Anything new that we do, RUGGEDCOM is the gear we're going with." Logsdon remarks. According to Logsdon, the selection of RUGGEDCOM products reflects the forward-looking position of Midstate Electric's management.

"Our management, in the 20 years I've been here, has always tried to be on the leading edge of technology," Logsdon concludes. "If it's available and it can benefit us, management is all for it."



View from Table Rock of multiple irrigation pivots

Case study at-a-glance

Customer: Midstate Electric serves more than 18,000 member/owners across a 5,600-square mile (14,5000 square kilometers), four-county area of Central Oregon with nearly 2,400 miles (4,000 km) of energized lines.

Challenge: for reliable, resilient, efficient operations, and to upgrade substation monitoring and control, Midstate Electric needed a robust network solution that could accommodate a variety of communication sources.

Solution: RUGGEDCOM RX1501 Multi-Service Platform and RUGGEDCOM RS416 serial server from Siemens allowed Midstate Electric to integrate legacy RTUs with new IEDs for an Ethernet-based network for monitoring and control of field assets.

Results: a fast, high-bandwidth Ethernet network supported by the Siemens solution improved system reliability, resiliency and operational efficiencies. This saved Midstate Electric man-hours, truck rolls and enabled future functionalities.

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