SIEMENS

Reference

Staying cool and controlled in the desert sun

Rugged Ethernet switches from Siemens enable faster, more reliable data communications for SCADA monitoring and control within distribution substations in the Sultanate of Oman.

Power Economy Middle East, based in Abu Dhabi, United Arab Emirates, is a systems integrator and Siemens partner with a decade-long reputation for quality power solutions. The company serves clients in power, oil and gas and diverse industry verticals primarily in the Middle East and North Africa, including Oman, Saudi Arabia, United Arab Emirates, Egypt and Qatar.

Oman-based Mazoon Electricity Company SAOC is a power distribution utility serving residential, commercial and industrial customers. Mazoon selected Power Economy to build new, fully automated distribution substations to replace its aging fleet of substations that lacked reliable SCADA connectivity for monitoring and control. A number of legacy substations also needed upgrading from copper-based to fiber optic-based Ethernet networks.

Reliable monitoring, control and protection of substation functions would enable Mazoon to deliver reliable, quality power to its customers. Thus Mazoon's requirements for this ongoing project specified that all new substations comply with the IEC 61850 standard for high-speed data communications. The Ethernet switches needed to meet that standard had to comply with the IEC 61850-3 standard for reliable operation in punishing temperatures and environments with high levels of electromagnetic interference.

The Mazoon project also required a substation local area network (LAN) for on-site monitoring and control, as well as connectivity to the distribution utility's control room at its headquarters in Muscat, the capital of Oman.

The challenge for Power Economy was to source and integrate an array of high-bandwidth Ethernet switches to reliably connect each substation's SCADA server, remote terminal units (RTUs), intelligent electronic devices (IEDs) and protection relays. The selected switches would have to offer fast convergence time if any link in the network failed, to ensure the continuity of monitoring, control and protection functions.

The challenge

Power Economy Middle East, a systems integrator, needed to source Ethernet switches to enable reliable SCADA monitoring and control for new distribution substations in harsh desert environments.

"Mazoon wanted current data on the substation's relays and other RTUs," said Shailabh Tekchandani, automation engineer at Power Economy Middle East. "Are there any faults or any relays tripping in the substation? This information is very critical to our customer, signifying that they must have a reliable data communication network within every substation."

In the past, Power Economy had sourced switches from various vendors, but it had long depended on the RUGGEDCOM portfolio from Siemens, based on the products' high data speeds and ability to perform in harsh environments.

"Previously, the use of serial communications had limitations – signal monitoring was limited by data transmission rates," stated Tekchandani. "And we had deployed other brands of switches that overheated. This is why the client prefers, and we recommended, RUGGEDCOM for Mazoon's projects."

The solution

Siemens diverse product suite and service support allowed Power Economy Middle East to build new, fully automated distribution substations and upgrade existing substations with reliable, high-bandwidth connectivity for monitoring and control.

Tekchandani explained that in the Middle East, a brand's reputation for excellence, a track record of market success and a diverse portfolio of solutions and support services is critical to be successful in the market.

"It's very important that a vendor has Middle East references because of our difficult environmental factors, which are different from other regions in the world," explained Tekchandani. "In the Middle East, Siemens is one of the market leaders." Siemens' five year warranty on its RUGGEDCOM switches and support services were also a factor in Power Economy Middle East's selection of Siemens," said Tekchandani.

"Four years ago, Power Economy Middle East began building new substations and upgrading older substations for Mazoon. Because some of Mazoon's substations are larger and more complex than others, the client required a variety of switches that would meet each substation's specific needs," stated Tekchandani. In each case, RUGGEDCOM high-speed Ethernet switches provided solutions to match Mazoon's requirements.

The integrator implemented the RUGGEDCOM RSG2300, a 32-port Ethernet switch in the most complex substation environments requiring more than 20 ports. The RUGGEDCOM RSG2100, a 19-port Ethernet switch, was implemented in substations with fewer port needs.

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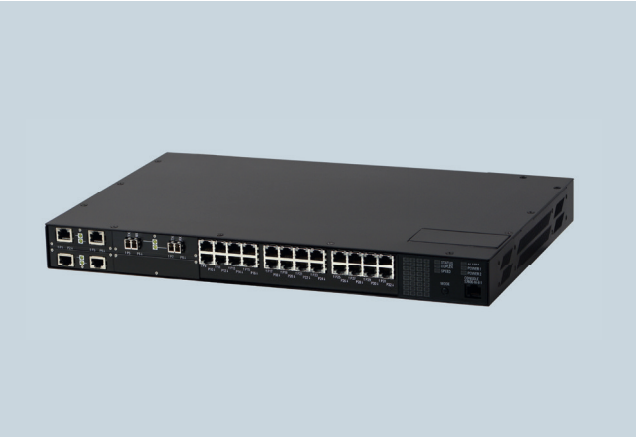
"The range of RUGGEDCOM products allowed us to choose the optimum switch with the right number and types of ports we need," said Tekchandani. "The product range is extensive enough to create the most optimal and cost-effective solution."

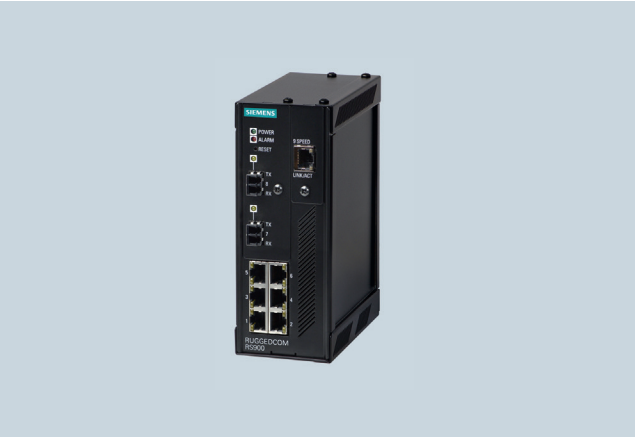
All RUGGEDCOM Ethernet switches are Layer 2 switches, which enable the use of RSTP (Rapid Spanning Tree Protocol) to ensure rapid, redundant, data paths between all nodes in the substation LAN, a switch attribute referred to as "fast convergence time."

The availability of various, small form factor switches in the RUGGEDCOM portfolio enabled Power Economy Middle East to install switches in existing, space-constrained panels.

"The RUGGEDCOM RS900 – a 9-port, managed Ethernet switch with fiber optic uplinks in a compact form factor – fits Mazoon's need for smaller substations with a modest



RUGGEDCOM RSG2300



RUGGEDCOM RS900

number of RTUs and IEDs,"commented Tekchandani. The RS900, like all RUGGEDCOM switches, has an operating temperature range of –40 to +85 degrees Celsius (–40 to +185 degrees Fahrenheit).

"We also had instances in which the existing copper Ethernet network had to be expanded to other substations using fiber optic cable," stated Tekchandani. "So we used the RUGGEDCOM RS900 Ethernet switches and the RUGGEDCOM RMC media converter."

"The RUGGEDCOM RMC media converter provides industrial strength Ethernet copper-to-fiber media conversion. It served Mazoon's needs in its legacy substations that required upgrades," explained Tekchandani.

All RUGGEDCOM Ethernet switches provide key cybersecurity features at the network level, including multi-level user passwords that helps secure a switch against unauthorized configuration and encryption of passwords and data as they pass through the network.

Power Economy Middle East also used Scalance M875 modems from Siemens to send substation data upstream to Mazoon's headquarters in Muscat via a wide area network (WAN), enabling an end-to-end solution for its customer based on a single vendor.

The results

Power Economy's selection of the high-speed Ethernet switches from Siemens RUGGEDCOM portfolio enabled secure, up-to-the-millisecond SCADA visibility, monitoring and control in Mazoon's distribution substations, increasing power quality and reliability for the utility's customers.

Over the past four years, approximately 30 of Mazoon's 200+ substations have been replaced with new fully automated, higher bandwidth and EMI-hardened substations and outdoor, legacy substations have been upgraded and hardened. The result: improved quality, reliability and resiliency of Mazoon's power distribution network to better serve its commercial/industrial and residential customers securing their productivity and quality of life.

Looking ahead, Power Economy expects Mazoon to move ahead on upgrading or replacing another 10-20 additional substations in the near future – all based on Siemens solutions. And the integrator plans to use additional functionalities in its installed base of RUGGEDCOM switches to manage its networks using Simple Network Management Protocol (SNMP) and Virtual LANs (VLANs) as part of additional cybersecurity measures.

"All of this means that RUGGEDCOM switches are a key aspect of the cybersecurity and reliability of the data communication networks inside Mazoon's substations," Tekchandani concluded. "These switches have enabled better monitoring, control and reliability across Mazoon's entire distribution network."

Case study at-a-glance

Customer: Power Economy Middle East based in Abu Dhabi, United Arab Emirates, is a systems integrator serving clients in power, oil and gas and diverse industry verticals primarily in the Middle East and North Africa.

Challenge: The systems integrator needed to source Ethernet switches to enable reliable SCADA monitoring and control for new distribution substations in harsh desert environments.

Solution: Siemens diverse suite of rugged communication products as well as service support allowed Power Economy to build new, fully automated distribution substations and upgrade existing substations with reliable, high-bandwidth connectivity for monitoring and control.

Results: High-speed Ethernet switches from Siemens RUGGEDCOM portfolio provided secure, up-to-the-millisecond SCADA visibility, monitoring and control in Mazoon's distribution substations, increasing power quality and reliability for the utility's customers.

Security information

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept. For more information about industrial security, please visit **www.siemens.com/industrialsecurity**

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