



SIEMENS



Reference



Reliable delivery of electric power to 1.5 million people in northeastern Oman

3G modems allow secured communications between far-flung substations and control center

Sultanate Oman is a state in the east of the Arabian Peninsula. The geography ranges from high mountains and deserts to fertile coastal areas along the Gulf of Oman and the Arabian Sea. To supply power to the far reaches 3G routers shall provide a robust and secured connectivity between substations and control rooms.

Mazoon Electricity Company (MZEC) is a regulated distributor of electric power in northeastern Oman, where it serves 1.5 million people across the diverse governates of Dakiliya, Sharqiya and South Al Batinah. Mazoon's service territory, which surrounds the governate and capital of Muscat, encompasses an area of 81,000 square kilometers (31,000 square miles).

The geography of this part of Oman ranges from high mountains and deserts to fertile coastal areas along the Gulf of Oman and the Arabian Sea. Mazoon is responsible for the reliable delivery of power to cities, towns and villages across this sprawling region, supporting hospitals, schools, universities, industry and agriculture – the full spectrum of life in northeastern Oman.

Hundreds of Mazoon's distribution substations are scattered across this service territory and the distances and terrain that lie between them and the utility's control center in Muscat present a significant communication challenge. The only feasible solution is a wireless wide area network (WAN), for which reliability and security are critical factors. Manual, onsite monitoring is too slow and logistically impossible with a limited field staff, and the distances, terrain and costs prohibit the use of a fiber optic network. With a reliable, secured, wireless WAN for monitoring and control, however, Mazoon's control center operators are able to detect faults in its distribution network and swiftly restore power where and when outages occur.

"We needed communication with our substations to see the behavior of our system and to ensure a reliable supply of electricity to all our customers," said Jasim Al Rawahi, head of control systems for Mazoon. "The main challenge that we faced on this project was that the 3G coverage of our service provider was not sufficient for reliable communications in some areas. And our system has to be 'on' 24/7."

The challenge to Mazoon, in the face of spotty wireless network coverage, placed increased emphasis on the selection of a powerful, reliable, secured modem and antenna at each of 90 remote substations in the utility's power distribution network.

"The modem is at the heart of our communications technology," Al Rawahi said. "And, without electricity, there is no life."

Challenge: Enable wireless connection between control center and substations

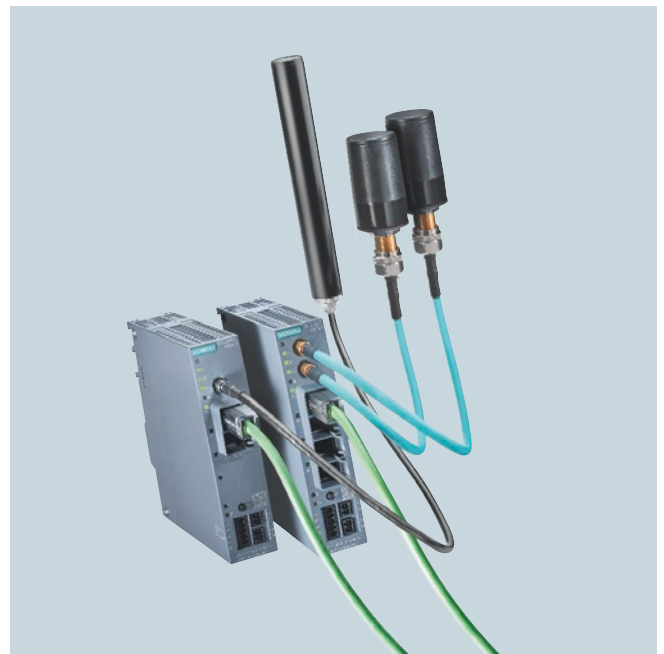
Mazoon had to identify and implement a reliable, secured communications solution that would enable wireless communications between the utility's remote substations and its control center in Muscat for monitoring and control of its power distribution network.

Mazoon's requirements for the project included 4G modems and high-gain antennas. To identify the best solution, Mazoon and its systems integrator Silver Focus LLC conducted numerous pilot projects to test various brands, including Siemens' SCALANCE M 3G modem and the Siemens ANT794-4MR antenna. Mazoon's pilot projects revealed that the SCALANCE M 3G modem outperformed other brands' 4G modems.

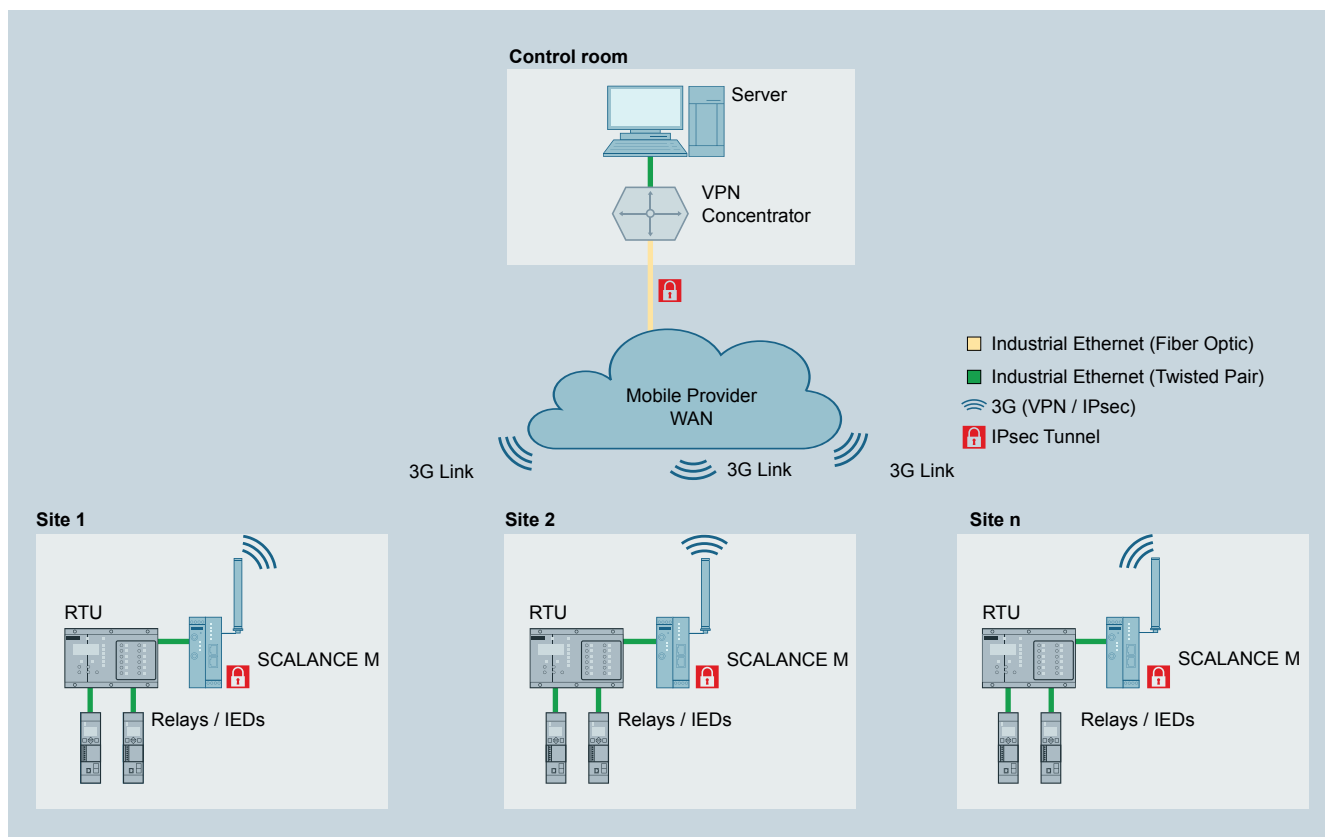
"We tested alternatives in one substation that had experienced a huge interruption in communication," Al Rawahi said. "We compared modems for one week and there were extreme differences between them. When we installed the SCALANCE M modem in a month-long pilot project, it performed the best among the options we had. That's why we decided on SCALANCE."

Two other components completed the solution for Mazoon: Siemens' ANT794-4MR high-gain antennas to optimize the SCALANCE modem's data transmission and reception capabilities and Siemens' Sitop power supply for 0.375 A to power the modems with stabilized 24 V DC.

Mazoon awarded Siemens a contract to provide modems, antennas and power supplies for 90 substations.



The included Industrial Security features of the SCALANCE M 3G modem make it possible to form a separate IPsec (IP security) VPN (virtual private network) tunnel with the control center router and allow secured communications.



Solution: 3G modems for reliable, secured communications

Mazoon's selection of the SCALANCE M 3G modem and ANT794-4MR high-gain antenna provided reliable, secured communications between substations and control center, ensuring rapid fault detection and power restoration to its customers in northeastern Oman.

Mazoon's solution illustrates the critical roles played by the SCALANCE M 3G modem and the ANT794-4MR high-gain antenna and their superior performance. "The security features in the SCALANCE modems were absolutely important," said Al Rawahi. "Because we are a live system, we need to make sure that our communications are completely secured."

The sometimes harsh substation environment includes high electromagnetic interference (EMI) and a wide range of temperatures, but the SCALANCE M 3G modem is designed to withstand high EMI and to reliably operate in a wide temperature range.

Security and reliable performance were only two of several major criteria in Mazoon's decision to select and implement

the SCALANCE brand. The reputation of the vendor and its service support was also a critical factor in Mazoon's decision to award a contract to Siemens. Siemens' support extends to assisting the utility in implementing further cybersecurity features of the SCALANCE M 3G modems, which are backed by a five-year warranty. Siemens' product support extends for a full 10 years if and when it discontinues manufacturing the device.

"Siemens is the leading organization in this field, so we were quite confident that we would have the support that we needed," Al Rawahi said.

Results

The implementation of a SCALANCE M 3G modem-based solution has provided high reliability to data communications between Mazoon's geographically remote substations and its control center, improving the reliability of electric service to 1.5 million customers.

"The objective of our project is to monitor substation operations," Al Rawahi said. "We have succeeded if the substation remains online 24/7 and there is no interruption in data communication."

The result since SCALANCE modems were installed has been “100 percent” reliability of communications between substations and the control center, according to Al Rawahi. This level of reliability has measurably improved electric service to Mazoon’s customers across northeastern Oman and contributed to the utility’s vision of being recognized as “a safe, reliable and sustainable electricity provider to customers by 2017.”

“Without our communication system, we cannot do anything, because then our substations cannot be monitored and controlled,” Al Rawahi concluded. “Due to the success of our communications project, based on the SCALANCE M 3G modem, we can now restore electric service in a very short time. This is how we measure our success.”

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 <http://www.siemens.com/industrialsecurity>

Siemens AG
Process Industries and Drives
Process Automation
Postfach 48 48
90026 Nürnberg
Germany

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Mazoon Electricity Company At-A-Glance

- **Customer:**
Mazoon Electricity Company is a regulated distributor of electric power in three governorates in northeastern Oman, serving 1.5 million people over an area of 81,000 square kilometers (31,000 square miles).
<http://mzec.co.om>
- **Challenge:**
Mazoon had to identify and implement a reliable, secured communications solution that would enable wireless communications between the utility’s remote substations and its control center in Muscat for monitoring and control of its power distribution network.
- **Solution:**
Mazoon’s selection of the SCALANCE M 3G modem and ANT794-4MR high-gain antenna provided reliable, secured communications between substations and control center, ensuring rapid fault detection and power restoration to its customers in northeastern Oman.
- **Results:**
The implementation of a SCALANCE M modem-based solution has provided reliability to data communications between Mazoon’s geographically remote substations and its control center, improving the reliability of electric service to 1.5 million customers.
- **Outlook:**
The cooperation between MZEC and Siemens succeeded very well. For future common projects there are already a lot of ideas, e.g. equipping substations with the new enhanced LTE components of SCALANCE M product family.