

APPLICATION NOTE

A US-BASED NATURAL GAS UTILITY

CUSTOMER

A US-based natural gas utility

CHALLENGES

- Convert supply stations to cellular without interrupting utility service
- Upgrade old equipment
- Improve security and resiliency
- Troubleshoot a complex system typology change

RESULTS

- A cleaner, simpler, up-to-date connectivity solution in a single box
- Enhanced security
- Improved monitoring capability and control

DEFINITION OF PROBLEM

A natural gas utility with 75 remote supply stations oversaw pipelines that delivered gas to major American cities. Equipment in the supply stations monitored pressure and valve control. The utility's SCADA system sent commands every 30 seconds to stations with requests to return data. Serial Remote Terminal Units (RTUs) connected to an Ethernet serial bridge transferred that data via satellite modem.

The organization's top priority was to convert its network to cellular. It wanted to use satellite – which is far more expensive – as a backup. That required routing traffic from both cellular and satellite sources to serial RTUs as well as TCP routers. The utility also wanted to enhance security at the supply stations by adding password protection to its serial RTUs.

The utility had plans to purchase serial RTUs from another supplier, but faced a five-month delivery delay due to a chip shortage and pandemic-related supply issues. It approached Red Lion looking for available units. As Red Lion learned more about the customer's needs, it suggested an alternative upgrade that delivered a range of additional benefits in a single device.

THE SOLUTION

Red Lion proposed the FlexEdge DA50, a modular device that enables components to be easily added and swapped out. For this application, a cellular modem (sled) was placed inside. In a single box, the DA50 fulfills the function of cellular modem, firewall and serial server.

With the FlexEdge installed, cellular traffic could be routed to both a serial RTU and a TCP RTU. Overall, the device enabled conversion to and from through-the-air cellular, the satellite router, and a serial adapter. All those capabilities are achieved in a single solution, housed in a single, rugged device.

During installation and testing, the DA50 was configured to meet the utility's specific needs. Changes introduced both ensure the device operated the way the utility needed it to, and gave the solution added security and redundancy.

SECURITY:

THE CAPACITY TO HANDLE AN OVERLY BROAD SUBNET MASK

During testing, it was discovered that the utility's cellular provider provided a very high-level subnet mask (255.0.0.0). The IP range was so broad it would override the DA50 routing table. To manage the issue, Red Lion added a Subnet Mask Filtering feature that directs the unit to automatically select the lowest level subnet based on network requirements. In this case, the minimal subnet consists of two necessary IP addresses: the address of the cellular provider and the address of the modem. Subnet Mask Filtering enhances security by preventing external traffic to enter the system.

TRAFFIC CONTROL AND REDUNDANCY:

REPLYING TO ANY DEVICE NO MATTER THE PRIORITY

The FlexEdge DA50 needed to reply to data polls the same way they came in, via satellite or cellular. However, the satellite modem was on an Ethernet connection that had higher bandwidth priority than cellular. To solve the issue, the DA50 was reconfigured with custom routing rules that ensured reply traffic was sent via the same pathway as the original request.

What originated as a configuration change became a feature. Custom route rules called "Sticky Ports" give the solution redundancy, enabling it to handle complex traffic from different sources over the Ethernet interface at the same time. The utility's SCADA automatically switches to backup (satellite) if it loses a ping after three attempts.

MONITORING:

MANAGING MULTIPLE RTU PORT SERIALS IN A SINGLE BOX

Some of the utility stations have two controllers, a mix of old and new equipment. Typically, the older units use serial RTU and the newer ones use Ethernet (TCP RTU). A routing rule was added to the FlexEdge DA50's Crimson protocol converter software to handle port forwards to the TCP devices. Specifically, a CONNTRACK feature was added that monitors and troubleshoots incoming connections, including port forwarding. The feature lets the organization decide which controller to send traffic to and manage all of its logic controllers via the same gateway over a Graphical User Interface (GUI).

THE RESULT

The solution brought great value to the utility by dramatically reducing its equipment down to a single gateway. The project entailed a complete typology change and the utility was appreciated the extensive guidance Red Lion provided, including onsite support. Red Lion worked closely with the utility to bring the utility's technical team and apps engineers up to speed on the solution's functions and features.

The solution achieved the utility's conversion and security objectives and reduced its equipment to a single, easy-to-use gateway. The utility was impressed with the control, monitoring, and diagnostic capability it gained through the FlexEdge DA50 and its web GUI.

The utility now enjoys increased security with RADIUS (Remote Authentication Dial-In User Service) user support and password capability which enables the organization to easily manage credentials access.

The utility is now looking to expand to other regional districts. With more sites to manage and a limited number of technicians, one of its top priorities is to reduce the need for in-person site visits. A follow-up phase is now focused on connecting systems and enabling over-the-air firmware updates and security patches.

FLEXEDGE DA50 WITH CELL SLED

