

Bedrock® Open Secure Automation

Open Secure Remote Operations: A Vision Fulfilled

A Bedrock Automation White Paper



For some time now, automation vendors have been promoting anytime, anywhere access to your process data, but delivering on the promise has been technically and commercially challenging to scale. Now that this actually *is* within reach, you may be suspect. But don't be deterred, as *the future is now* with open and secure IIoT solutions finally available. The core ideas that make it real include:

- Maturing and convergence of IT/OT open standards in software, applications, and connectivity, collapsing the cost of both engineering and deployment.
- The Internet as the Zero Trust OT backbone, vetted and secured by e-commerce. When this model is applied in automation systems and sensors, innovation and user value is boundless.
- A new generation of OT devices at the edge, built upon new secure digital computing components and supply chain.

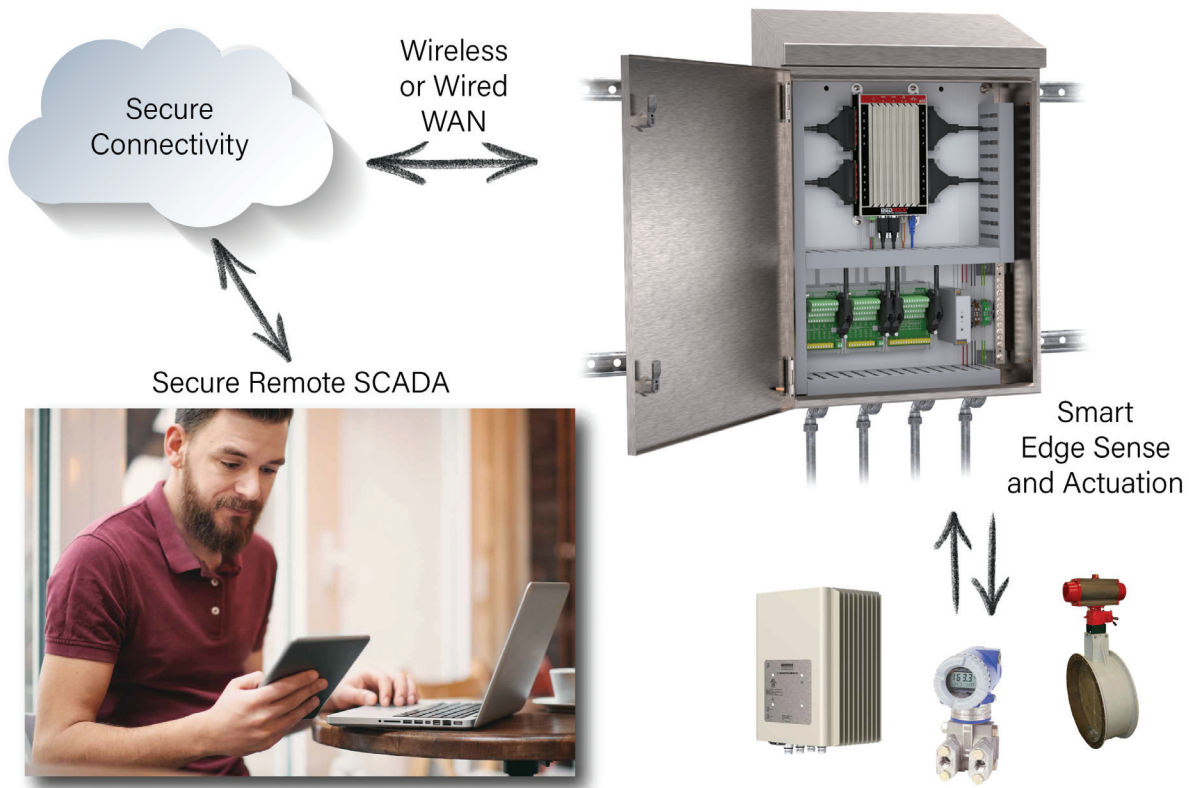
With these elements, anytime, anywhere access to process data is affordable and real, be it producing oil or gas, distributing water or power, or any other activity that must be physically detached from a central command-and-control point.

From any mobile device or platform, your supervisors and operators can participate in decentralized monitoring, control and maintenance. Huge volumes of data can be available as it is needed – in the plant, at the edge, or in the cloud. By leveraging public networks, communication costs are low-to-zero, and your critical data and processes are safe because your automation is secure.

The greatest return on operations depends on your data access and data analytics model, which is no longer hampered by limited access to data.

Bedrock OSA Proven IIoT Architecture

Intrinsically Secure from anywhere to anywhere



Open Secure Remote Operations in Practice

The ability to monitor and control remote equipment without having to locate or deploy field technicians is one of the great benefits of upgrading automation on remote sites. FLOWPOINT, a company that delivers the millions of gallons of water it takes to frack a single site estimates that it has increased operating efficiency by more than 50 percent once it moved its distribution management information system into the cloud.

FLOWPOINT manages transfer of water between water supply storage facilities and wellsites, which typically involves using 3 to 10 miles of temporary 12-inch diameter flat hose. Keeping millions of gallons of water moving through that channel requires synchronizing operation of multiple pumps along the way, many of which may be deployed in remote points, often accessible by dirt roads only. For most of today's transfer services, operating these pumps manually involves deploying field operators to monitor each pump, start or stop them as required, spot and fix leaks, and keep accurate records of transfer volume.



Pumping skid, with solar-powered controls.

This involves controlling the operation of two to four large diesel pumps spread out over the entire length of the transfer line. The pumps must be started and brought up to operating speed in series and then ramped down in series to a stop every few hours. The process is repeated around the clock with each stage of the fracking operation, which can run for several weeks. This may also require multiple boosters, which must be sequenced manually, in stages. Lag times, pressure, pump speeds must all be managed.

FLOWPOINT has automated these processes through a combination of software applications that calculate flow rates, a cyber secure automation platform, cloud-based data storage and analytics, and a SCADA interface through which operators interact with the system from anywhere using an internet connection.

The FLOWPOINT data model is built on transfer line hydraulics that determine the number of pumps required to satisfy the design flowrate and route topography. It then subjects this to transfer calculation software that provides a simple, intuitive user interface that models the entire flow operation. At job startup, the results are reconciled with readings from pressure sensors, level sensors, and flowmeters to identify equipment problems that could lead to downtime. These readings go to a Bedrock OSA® Remote control node that provides the PLC functionality to implement the flow models.

The control node has built-in cyber security which enables FLOWPOINT to use lower-cost open technologies by eliminating vulnerability to cyberattacks. Taylor says that a system designed to resist current and future security threats is important because the application is sensitive to interruptions in data communications.

FLOWPOINT's automation integrator Flow Sync deploys the OSA Remote control modules in the wiring cabinet of self-contained, portable skids. These connect to the pumps so that the entire transfer operation can be effectively monitored and controlled remotely. The OSA Remote control node reads the tags from the skid's sensors and uses OPC UA communications capability to integrate this data into the broader system.

Interacting with the System

Users interact with the automation system via SCADA software that manages integration between the Bedrock controls and the AWS cloud, where Amazon Elastic Compute Cloud EC2 servers host an SQL database. This IIoT architecture is fully scalable in terms of processor memory and disk storage. The OPC UA connection with the Bedrock OSA Remote is what extends the secure PLC architecture to remote locations via TCP/IP.

The combination of the Bedrock OSA Remote, the AWS cloud, and the SCADA database provides real-time status of all operations. This improves operator productivity by enabling them to see and interact with the entire operation from any location.

"If you are trying to start up multiple pumps at once or bring things up or down in series without exceeding pressures or overflowing pit levels, having access to real-time information to support your decision making is invaluable. Or maybe your tanks are getting low and you need to increase the speed of your pumps to boost the supply, you can see exactly what you need to do and the impact of the adjustment. This is IIoT the way it's meant to be," said Flow-Sync's Harry Browne.

"You are just putting the whole process in the operator's hand. You can start or stop the pump, change speed, spot trends or check level or pump speeds easily. You can check the flow rate of any of those parameters across your entire line," added Taylor.

Monitoring for Problems

An important component of that big picture is the ability to detect and respond to leaks remotely. Leaks are unavoidable in above-ground temporary water transfer operations so how effectively a water transfer company manages leaks can impact budgets well into six-figure totals. The Flow-Sync software monitors the line from beginning to end.

Once the pump starts up, it takes about 10 minutes to achieve a steady-state and the software application at the other end of the line knows what to expect. A significant deviation, the software signals the Bedrock controller which might sound an alarm, shut the process or some segment of it or take other preset mitigation steps. Where one operator might traditionally manage one or two pumps, the automation system enables them to control an entire transfer operation with even greater reliability and decision making. And, because problems are detected immediately, costly downtime and leakage are minimized.

Reduced Administrative Costs

Automation that is both open and secure also helps drive down administrative costs, which can also be critical to profitability. As Taylor puts it:

“We must be able to track and monitor expenses and inventory accurately. We must map expenses to projects. Without an automated system, if expenses come when we’ve already moved on to another project, we’d have to go back and find the paperwork, read the meters manually, map the data to the appropriate particular project, etc.,” he said.

“Now we generate reports every day, essentially in real-time. We provide the data to bill or to reconcile, for royalties. We’re capturing all metering and flow rates into a database that we can make accessible for both our customers and water suppliers,” he continued. “From a single screen, we can control activity on any job site, commit inventory, or otherwise manage hundreds of thousands of gallons of water from multiple pit locations. This puts massive amounts of data in the hands of our operators,” Taylor continued.

A Complete IIoT Solution

While this application was focused on a water transfer application, it demonstrates the following capabilities that can be applied broadly:

- Real-time visibility into all operations and ability to monitor multiple devices, empowering operators with control over a larger portion of operations.
- Automated problem detection, alarming and intervention. While in this case, the problem was leakage and water loss, it could easily be any variable that could potentially impact material flow, system downtime, emissions, or anything else that impacts costs and profitability.
- Reduced administrative costs in managing and reporting.
- Process optimization and design improvements.

This successful collaboration shows that great strides in productivity and cost control can be achieved with secure open technologies and the cloud. Given the current cost-cutting focus in the oil and gas industry, such efficiency improvement enables suppliers like FLOWPOINT to be more aggressive on pricing in competitive situations. Moreover, running this automation on a rugged Bedrock OSA platform with built-in cyber security shows that such gains can be achieved with a significantly reduced risk of cyberattack.

This example shows that achieving benefits from Open Secure Automation is here today; that ability to interact with your data and your process from wherever you are can really pay off. For more information about how Open Secure Automation can reduce your costs, improve efficiency and protect your operations, download our other white papers [here](#).