ZumDash Small SCADA

Fairfield Oil and Gas

Overview

Oil and gas producers – even the smaller independents – are not immune to the waves of technology that are giving rise to the "Digital Oilfield" and Industrial Internet of Things (IIoT). All producers are candidates for some level of production automation, and both good and bad market conditions offer a compelling reason for operators to adopt new technologies. Cost-saving, Edge-Intelligent automation technology can help companies overcome fluctuating market conditions, especially those "troughs" that can shrink margins considerably.

Based in Oklahoma, Fairfield Oil and Gas (Fairfield) is an independent upstream oil and gas production company that is very cognizant of costs and production efficiencies. Fairfield sought solutions that would increase production and identify potential operational problems before they occur to reduce maintenance and repair costs. A foward-looking company, Fairfield specifically expressed the need to implement automation solutions to reduce overhead while increasing efficiencies, safety and reporting accuracy. As such, it turned to a 25 year leader in wireless industrial data, FreeWave Technologies.

FreeWave recommended implementing the ZumDash Small SCADA App and the Amazon Web Services Cloud (AWS) to meet these needs. As its name implies, ZumDash is a fully customizable dashboard that allows companies to remotely monitor operations, execute logic (take action), visualize trends and generate reports. ZumDash allows producers to minimize expensive truck rolls and manual sensor inspections. Developed on FreeWave's ZumIQ Application Environment Platform and deployed on Freewave's app-hosting ZumLink 900 Series radios, ZumDash Small SCADA provides the edge-intelligent capabilities required by Fairfield. AWS is a proven and secure cloud services platform which offers compute power, database storage, content delivery, and other functionality like data visualization.

Needs

Monitoring, maintenance and repair costs are significant for companies that have operations in remote areas, and Fairfield turned to FreeWave for assistance in finding solutions that would reduce these costs, enable predictive analytics and mitigate the effects of market fluctuations. Specifically, Fairfield needed to:

- Maximize human resource effectiveness.

- Respond to problems immediately.

- Access and control all production from any device.

- Automate reporting.

  – Access to real time reporting 24/7/365.

  – Daily Reporting of pumper accuracy vs. automation accuracy.

  – Monthly Reports of Run Tickets vs. Production Runs.

  – Annual Reporting of Real Time Decline Curves.

- Implement Proactive Maintenance and identify potential problems before they occur.

- View historical data and trends.

- Automate Alerts and Alarm protocols to web-based PC, MAC, Android or IOS devices.

  – High Level Alerts to the crude purchaser.

  – No Flow Alerts after 6 hours of no flow.

  – Sudden Drop Alerts of tank leaks, theft or crude purchaser pickup.

  – Separation Alerts-High Bottoms too much water in the crude vessels.

  – High Pressure Alerts to send notification when pressure gets too high.

  – Flow Alerts to send notification when flow increases, decreases, or stops.

The initial implementation would automate and monitor five (5) wellsites at various Fairfield pad locations. Each wellsite has a maximum of three (3) tanks and three (3) pressure sensors. The edge intelligent automation solution needed to be vendor-neutral because Fairfield could not take out their existing sensors and meters without incurring significant retrofit costs. Alarms, tank level and pressure sensor data had to be accessible from a web-based device.

Solution

Utilizing existing infrastructure, the ZumDash solution was set up and installed by FreeWave software and field system engineers. To prevent any potential disruption of Fairfield's operations, FreeWave software engineers created a Modbus simulator for use in validating the solution as part of the custom development process.

An app-programmable 900 MHz ZumLink Series Z9-PE radio would pull in sensor data from the existing OleumTech Gateway via Modbus interface at each wellsite. Each of these edge intelligent Z9-PEs would be pre-loaded with ZumIQ software for full app programmability and to facilitate the publishing of real-time data to the cloud for access by web-based devices.

Integrating seamlessly with Modbus gateway interfaces, each Z9-PE has 512 MB of RAM and 1 GB of flash that can store up to 30 days of Fairfield site data. Additionally, through a ZumIQ developed app, each radio converts Modbus data to MQTT for publishing to the cloud. Connected to the cloud via a cell modem, each Z9-PE publishes well site data to AWS via MQTT.

Wellsite data and analytics would be hosted on AWS and accessed by Fairfield staff through one of AWS's intuitive data visualization tools. Because status and trends are visible from a web-based device, truck rolls would be significantly reduced.

To mitigate broadband and data costs, each Z9-PE has ZumIQ-programmed logic that allows alarms to be sent to AWS for distribution if process control limits are exceeded. AWS contains app tools that publish alarms and send them to the proper credentialed staff when certain well conditions are met.

Expected Results

> ZumIQ and the ZumLink radio integrate with Modbus wireless I/O network gateways, which eliminate the need for expensive equipment retrofits and allows Fairfield to create a small SCADA system with minimal CAPEX or OPEX. Additionally, Fairfield will be able to realize significant savings by implementing ZumDash instead of using a Software-as-a-Service (SaaS) solution.

> Truck rolls and manual inspections are expensive and potentially dangerous to field personnel. Manual inspection costs can exceed $20,000 annually, taking into account inspection, mileage, and spill costs. ZumDash results in immediate and significant safety improvements because of minimized human wellsite visits. These cost-savings enable Fairfield to be profitable even when oil prices plummet.

> Fairfield anticipates quicker oil sales via 3rd party alerts targeted for truckers to drain the oil for sale. Additionally, to ensure that all shipments are accounted for, even if a run ticket has been misplaced, producers can track when oil tanks are drained and compare the data to run tickets that are left on-site for billing.

> Remote monitoring via ZumIQ and AWS allows Fairfield to set targeted work days that reduce field personnel deployments. The company predicts workers comp claims will drop because truck rolls and manual inspections will be minimized.

> From a safety standpoint, Fairfield projects that real-time alarms facilitated by the ZumDash Small SCADA App will minimize spills and result in savings of $15,000 per spill in remediation fees.

> With intelligent edge technology like ZumDash, the need to send every packet of data to an expensive PLC network or the cloud for decision-making and action taking is significantly reduced. More importantly, costly truck runs and manual operations to visually inspect sensors and equipment can be minimized. This is possible because through the ZumDash Small SCADA App and ZumIQ programmability, the data is acted upon at the sensor, utilizing a system that combines sensors, wireless connectivity and process control via open-source App programmability.

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