Pulp and Paper Manufacturer Puts Data to Work with Ignition and MQTT

A large pulp and paper company set out to digitally transform over 50 manufacturing plants across the United States. They wanted to modernize an outdated SCADA system to improve data mobility, data standardization, and data utilization for improved operations.

Project Goals and Challenges

The customer has been investing in digital technologies to fuel transformation initiatives and continually improve production efficiency, sustainability, worker safety, and product quality. They wanted to adopt a shop floor migration strategy that could unify a variety of heterogeneous and siloed operational technology (OT) systems, collect valuable data, and send the data to cloud and enterprise systems. They needed a solution that could scale rapidly and easily across any number of plants and bridge OT to IT with a simple, unified infrastructure.

Solution Requirements

The customer desired a hub-and-spoke architecture they could use to rapidly upgrade all their manufacturing plants with a modern SCADA platform and expanded data transport capabilities. They planned to leverage cloud and enterprise tools including OSI PI and AWS for advanced analytics, so they needed to unify disparate OT data, easily share it with these systems, and scale the entire solution rapidly to tens of sites at a reasonable cost.

Specifically, the solution needed to meet the following requirements:

- High speed data transmission to handle over 20,000 tag change events per second at each plant
- Store and forward capabilities in the event the solution goes offline
- Data mobility to meet the data needs for a central SCADA system, OSI PI and AWS
- Data standardization for easy integration with various data consumers

To meet these requirements the customer began to look for a modern SCADA platform and associated protocols with all the required capabilities at an affordable price point. They decided to upgrade all the pulp and paper manufacturing facilities to the Ignition SCADA platform with Cirrus-Link's MQTT modules to send data to the Ignition server and to OSI PI and AWS for analytics.

Implementation

Each of the facilities installed the Ignition SCADA platform for local plant operations. They chose Ignition for its industry-leading toolset with all required SCADA functions including alarming, dynamic reporting, real-time monitoring, and powerful visualization tools. Ignition also offered a comprehensive set of data acquisition tools and the ability to connect to IIoT devices and publish the data to a central system through MQTT via a MQTT server called MQTT Distributor from Cirrus Link.

MQTT is a proven, standard machine-to-machine data transfer protocol that allows for multiple data consumers and is designed for constrained devices and low-bandwidth, high-latency, or unreliable networks. MQTT standardizes and decouples data so the customer can publish OT data and multiple applications can subscribe to it, all at the same time. Sparkplug is a newer specification that provides a single source of truth for models, assets and tags at the edge, defining OT data from various data sources and protocols for IT.

The MQTT Distributor sits at the central hub on Ignition and acts as the data bridge from the edge to the cloud. It connects to all data producers at each facility, scans the data, and publishes the data with report by exception via MQTT / Sparkplug to the central system.

In addition to installing Ignition at each facility, the customer installed Ignition as the gateway in the cloud at the central site with MQTT modules from Cirrus Link to allow the remote facilities to connect and receive all updates automatically. This hub-and-spoke architecture allows data from every facility to be sent to the cloud and then accessed securely by any third-party application that subscribes including OSI PI and AWS.
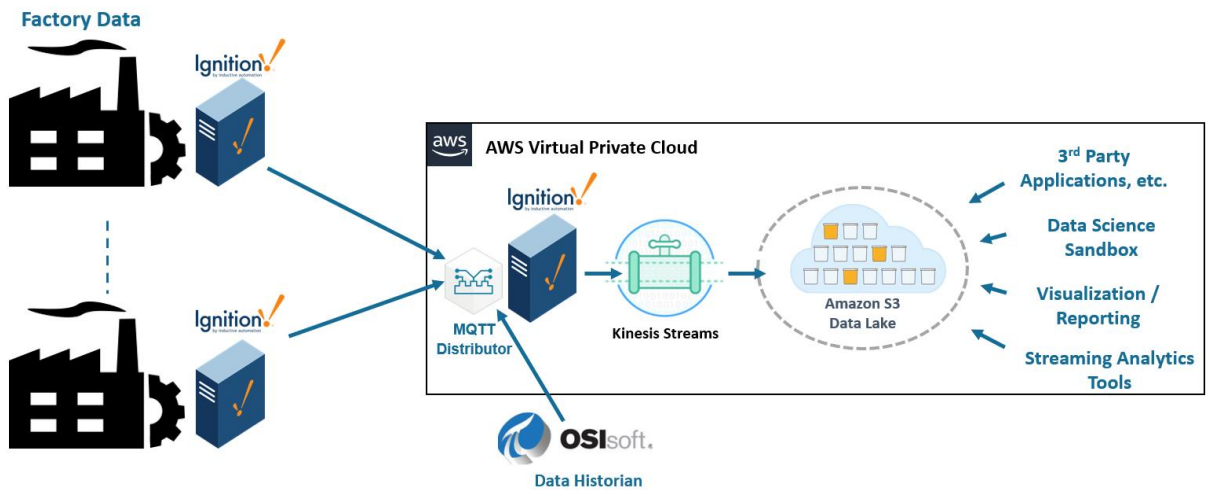
With so many edge sites and data sources in the deployment, the MQTT modules from Cirrus Link are essential to take Ignition tags and convert them to MQTT / Sparkplug, send them upstream, and then convert them back to Ignition tags for the central system in the cloud. This scalable solution converts OT data from all facilities to IT data, pushes it to the central system in a standard interface for data consumers, and then into data lakes for further analytics.

One of the primary use cases for the customer was to send the data to OSI PI, a time-series database for OT that is critical to the client's custom backend applications for manufacturing operations. They worked with Cirrus Link and developed an MQTT / Sparkplug connector in-house to connect to OSI PI and allow it to consume MQTT / Sparkplug data. With the new system in place, OSI PI and its applications can subscribe to and automatically self-learn the edge data.

Results

The project went smoothly as the customer rolled out one factory first to solve all the technology challenges, and then they moved rapidly from proof of concept to full rollout over an 18-month period.

Since MQTT decouples data, it was perfect for the customer to send data to OSI PI and the central Ignition system for corporate reporting and business activities, and to AWS for advanced analytics. Ignition plus MQTT gave them the data standardization and data mobility they needed to put the data to work across the business

at all the plants to improve operations. The solution allowed them to do that securely and efficiently, at a reasonable cost per site despite the 20,000 tag change events happening per second at each facility.

Thanks to the Cirrus Link MQTT modules – all the data is now in the corporate data center for reporting, business applications and long-term storage. The data can be utilized for any modern use case as the customer matures their digital transformation strategy – from big data to predictive maintenance to AI. The deployment has already led to scalable data insights and business improvements.