OT Site Sync Ignition Module Instructions

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Why Lora Wan is the Idiot Easy Button and How to Scale from Proof of Concept to Enterprise-Wide with Little Technical Debt By: Stefanie Funk

Contents

Overview

Digital Transformation and Industry 4.0 initiatives are hot topics in the manufacturing industry right now because of the benefits that AI, Machine Learning, and Analytics can deliver to end users.
Lora WAN is a technology in the Digital Transformation space that provides cost effective sensors and the wireless infrastructure to provide the data for the Digital Transformation team to utilise in their Industry 4.0 efforts.

And while there are incredible benefits to these initiatives, they are notorious for being difficult to scale from the Proof of Concept phase to an Enterprise-Wide Solution. This white paper is going to discuss strategies in the Lora Wan space for developing a successful Proof of Concept and then scaling that Proof of Concept up to an Enterprise-Wide deployment with minimal investment and very little technical debt on the hardware side.

Introduction to Lora Wan

Lora Wan is the wireless technology that was created for large scale, Internet of Things deployments that covers long ranges and runs on low power. By optimising battery life, distance covered, and maximising the number of sensors that can be used on gateways, Lora Wan is the technology that makes previously inaccessible data affordable for use in Industry 4.0. Lora Wan is also an open protocol so multiple sensors can be deployed on the same network infrastructure, allowing for scalability. For more information on Lora Wan, check out our website resource here:
https://sitesync.cloud/lorawan/

Figure 1. Lora Wan end devices with a Site Sync Lora Wan Conduit gateway.

Digital Transformation Tiers

There are three tiers of personnel in the Digital Transformation effort that are key to making any initiative successful. These are the Technicians, the Automation Engineers, and the IT/Digital Transformation team.

Tier 1: Technicians

The Technicians make up Tier 1 and are the boots on the ground that will be critical in deploying the large number of Lora Wan sensors and will be the first call out if there are any issues with the system.

Tier 2: Automation Engineers

The Automation Engineers make up Tier 2 and provide the connectivity from the sensors to the format where the Digital Transformation can utilise the data.

Tier 3: IT and Digital Transformation Team

The IT and Digital Transformation Team make up Tier 3 and provide the infrastructure and analysis for Industry 4.0 initiatives.

Each tier plays an important role in Industry 4.0 and all are needed to ensure that the Enterprise-Wide roll outs are successful. This white paper will discuss how the Digital Transformation journey starts with the Tier 3, IT/Digital Transformation Team, but ends up in the hands of the Tier 1, Technicians, with high level support from the Tier 2, Automation Engineers, to bring the ownership and roll out to the plant level, so that the initiative is more successful.

How to Execute a Successful Proof of Concept

When beginning the Digital Transformation journey, the best place to start is the low hanging fruit, which are easy solutions that will provide an immediate Return on Investment. The Tier 3, Digital Transformation team, selects this low hanging fruit and initiates a Proof of Concept test to ensure that the solution is going to give them the expected data for the ROI.

Examples of common problems that can be solved with Lora Wan are:

- Inventory Management
- Personnel Safety
- Manual Equipment Monitoring
- Predictive Maintenance

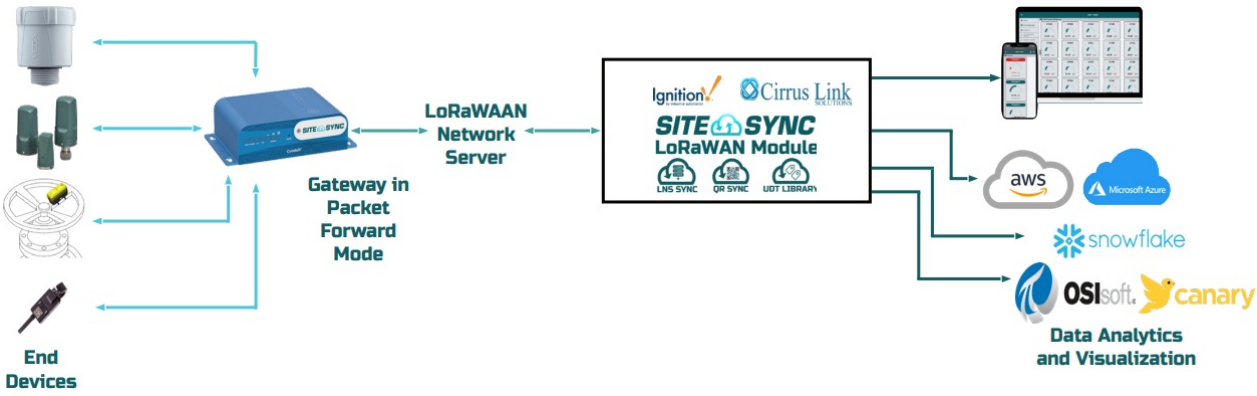
Once the Digital Transformation team picks the low hanging fruit, then they are ready to select the sensor that is going to be able to solve that particular problem. Sensor selection is very important because if the sensor that is selected, can't get the data that is needed, the Proof of Concept is going to fail. Sensors that can be used for the common problems listed above are:

- **Inventory Management –** Ultrasonic or Radar Levels
- **Personnel Safety** – GPS Trackers
- **Manual Equipment Monitoring** – Manual Valve Monitoring
- **Predictive Maintenance** – Vibration and Energy Monitoring Sensors

After the team has selected the right sensor for the problem they are trying to solve, then they are ready to determine what network architecture is best suited for this Proof of Concept. Because Lora Wan is packaged for efficient communication, the data has to be decoded into a usable format.
In the Proof of Concept phase, the data decodes and data movement can be done through custom scripts or could only be available in the viewing platform that the sensor manufacturer provides. Both methods are ok at this phase but neither work well at scale.

A better network architecture scheme is to implement a modular architecture that provides the flexibility for adjustments without incurring the technical debt of additional hardware. This is shown in the below network architecture diagram. The end devices send their signal back to a packet forwarding gateway and the gateway sends the data to an external LNS where the data is captured.
The SiteSync LoRaWAN module for Ignition, gets the data from the LNS and allows the Digital Transformation team to take the data where they want it for the higher-level Industry 4.0 analytics.

By going ahead and putting this structure in place, the Digital Transformation team has the foundation in place for the Enterprise-Wide rollout. This architecture is modular and not locked in, so it can be modified with without incurring technical debt in the latter phases of the Digital Transformation journey.



Data Flow Encryption

Lora Wan AESOP Encryption

MITT 3.1.1 Qos O, TLS

MQTT Spark plug B, TLS

Figure 2. Displays the flow of data from End Devices to Data Analytics and Virtualisation platforms in a Lora Wan Proof of Concept deployment.

Now that the hardware is specified, the Digital Transformation team needs to define metrics for what a successful proof of concept looks like. This can be overlooked step, but it is a critical step in the Proof of Concept process, so that you can know if it was successful or not.

The Digital Transformation team has defined the problem, selected the sensor and architecture to solve the problem, and defined what a successful trial looks like, and now they are ready to deploy the sensors and measure the results. It is important to ensure that the sensors are installed correctly in the field so that they are gathering accurate data for the trial. It is also important to analyse the data throughout the Proof of Concept to

ensure it is going well, or if it is not going as expected, then there is the opportunity to pivot or make changes.

After the Proof of Concept is completed and the data shows that this is a good solution that should be scaled up, the Digital Transformation team is ready to start working on the Enterprise-Wide roll out.
Because of the module architecture that Lora Wan allows for and that was setup in the Proof of Concept, the Digital Transformation team will have a much easier path to engage their Technicians and Automation Engineers to ensure that the Enterprise-Wide roll out is successful.

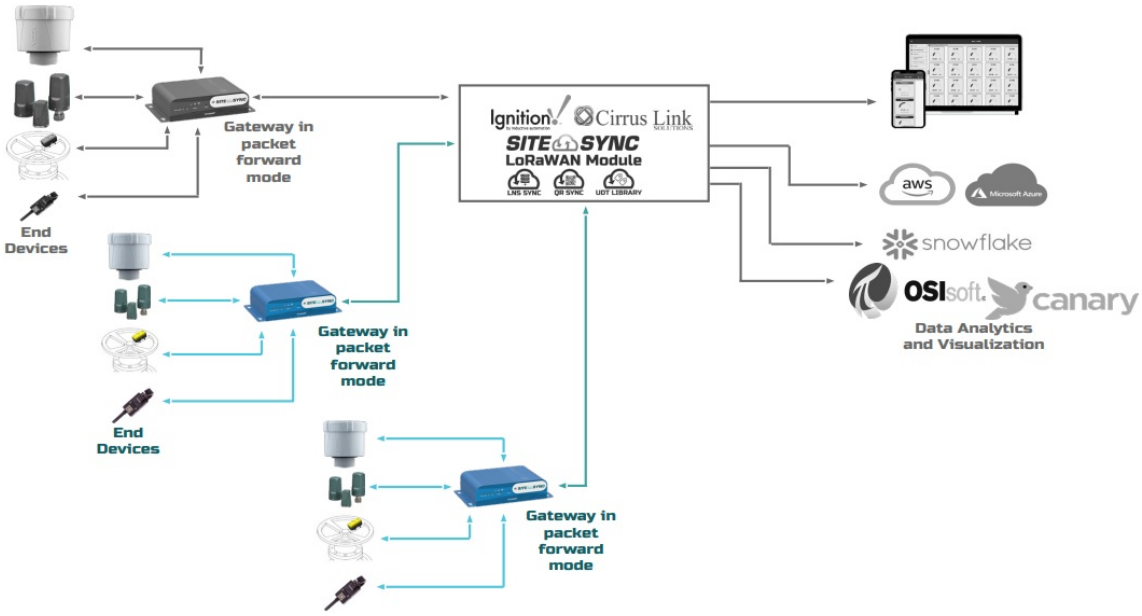
Enterprise-Wide Roll Out

The Tier 3, Digital Transformation team, is typically a small, centralise group of people, which works great for Proof of Concept projects, but makes it incredibly difficult to scale them. Because of this, the Enterprise-Wide roll outs require the support of the Tier 1, Technicians and Tier 2, Automation Engineers to be successful. By engaging the Tier 1 and Tier 2 personnel, you eliminate one of the main reasons that Riot Enterprise-Wide roll outs fail, which is lack of resources. Page 4

The molecularity of the gateway and network architecture that was used in the Proof of Concept phase allows the Digital Transformation team to move the gateway (if needed) from the Proof of Concept phase to the initial Enterprise-Wife roll out site. The gateway and LNS are already configured to decode and take the data where it is needed, so the connectivity piece does not have to be recreated or modified. The below network architecture shows what an Enterprise-Wide roll out would look like, where the hardware and software that was implemented in the Proof of Concept phase is shown in Gray. The molecularity and scalability of Lora Wan only requires the addition of gateways and sensors for the scaling up of the Proof of Concept packages.

Because of the number of end devices needed in a Lora Wan system, the Digital Transformation team has to enable the Tier 1, Technicians to be the primary implementation and troubleshooting team for these systems, with additional support from the Tier 2, Automation Engineers as needed in order for the Enterprise-Wide roll out to be successful.

A key component of that is to put the power to add and troubleshoot sensors into the hands of the Technicians by giving them the tools to add sensors through a basic QR Scan or similar and an accessible dashboard that indicates if there are any issues with the sensors and what those issues might be. It is also important to make the system diagnostics accessible to the Tier 2, Automation Engineers so that they can support the Technicians if there is an issue that can't be solved at the Tier 1 level. The accessibility of this data make it so that limited support from Tier 3 is needed once the Enterprise-Wide roll out starts.



Data Flow Encryption

Lora Wan AES128 Encryption

MQTT 3.1.1 Qos O, TLS

MQTT Spark plug B, TLS

Figure 3. Displays a Sample Enterprise Wide Lora Wan deployment utilising many of the components already put in place during the Proof of Concept phase.

Similar to the Proof of Concept phase, it is also important to have success metrics for the Enterprise-Wide roll out. These are critical to have because it helps this large scale roll out to focused on the key portion and it shows that the investment in the system is providing the desired data to be able to realise the ROIL.

Once the Enterprise-Wide roll out is completed, that facility now has a full Lora Wan infrastructure and can continue to add new applications and additional sensors to the network without the overhead of the networking equipment. The Tier 1 and Tier 2 teams will also have the knowledge to implement the next application on their own with little support needed from the Digital Transformation team and they become multipliers in the company for the various Idiot initiatives.

Contact us to find out how the Site Sync Lora Wan module can become the Easy button for the Digital Transformation team to take a Lora Wan Proof of Concept system and scale it up to an Enterprise-Wide roll out by enabling the front line Technicians and Automation Engineers to become the key support personnel in Industry 4.0 initiatives.

Website: SiteSync.cloud
Email: contact@sitesync.cloud
Linked in: linkedin.com/company/sitesyncsolutions/

Documents / Resources

	SITE SYNC OT Site Sync Ignition Module [pdf] Instructions OT Site Sync Ignition Module, OT, Site Sync Ignition Module, Sync Ignition Module, Ignition Module, Module

References

- User Manual