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Smart Building Playbook:

Turning Your Building into a Data-Powered Resource with LoRaWAN Networks and Sensors

The proliferation of connected devices and networks is reshaping industries across the globe, and building and facility management is no exception. Outfitting a structure with wireless sensors that collect and report data about the environment and sharing that information in real time allows building managers to automate and optimize operations. But not all networks are created equal.

For companies looking to reap the benefits of sensor-enabled building management, LoRaWAN networks with flexible deployment options and robust management features provide a cost-effective, efficient, and secure solution for device connectivity.

This playbook is designed to explain the value that LoRaWAN brings to building and facility management. From its robust feature set to the low-cost of deploying and maintaining the infrastructure, we will explore how LoRaWAN is providing new opportunities to manage and automate building systems.

Identifying a Business Case

As with any new use of technology, it is important start with a solid business case. In some markets, there is a single "anchor" use case that drives adoption, like water metering in the municipal sector or temperature monitoring in the food service market. The building management market, however, is taking a more comprehensive approach.

Building owners and facility managers are turning to a broad portfolio of standards based LoRaWAN sensors to automate many operational and occupant related tasks.

Comprehensive building management platforms capable of supporting multiple use cases in one building or across a real estate portfolio aim to help building owners reduce insurance premiums and repair costs, and provide proactive risk mitigation, and time savings, while improving tenant satisfaction.

Understanding the Solution Architecture

At a basic level, the architecture of LoRaWAN solution is straightforward and includes sensor-enabled end-devices, a wireless network (gateways and network management software), and application software. Think of it as the solution DNA (Device, Network, Application).

Devices: LoRaWAN end-devices are the battery-powered physical endpoints of the LoRaWAN solution where sensing occurs and control is exercised. End-devices communicate wirelessly with a network gateway using the LoRaWAN Layer 2 protocol as defined

Important Questions to Ask

With a wide range of options available, what is the best way to get started with a sensor enabled building management solution? To begin, it is important to address to the following questions:

- What operational, occupant, and business problems are you trying to solve?

- What data do you need to collect and how often?

- How many devices will be deployed, and is there a need to add devices in the future - for the same or different use case?

- Are the devices you need readily available and are they easy to deploy and manage?

- What areas of your facility must have network coverage and what is the optimal gateway placement?

- Is the solution for a single building or are you using it across multiple properties or a campus?

- Can the LoRaWAN solution integrate with existing building management systems or platforms to maximize efficiencies and streamline operations?

- Does the solution vendor and/ or network provider you are considering have experience in the building market?

- How will you measure success?

by the LoRa Alliance. They use a regionally designated ISM radio frequency band and LoRa Alliance specified channel plan to transmit data at an application-controlled interval, as well as to listen for control and application data messages if necessary.

End-devices available today support a wide variety of smart building use cases, including:

- Water leak sensors
- Natural gas leak sensors
- Boiler temperature sensors
- Exhaust fan sensors
- Temperature & humidity sensors
- Roof & terrace drain monitors
- Sump pit water level sensors
- Trash container level sensors

- Water tank level monitors
- Mouse trap monitors
- Door/Window sensors
- Automatic/Remote water shutoff valves
- Smoking/Vaping, THC & tobacco sensors
- Water metering
- Elevator motion detectors

Network: LoRaWAN networks can be deployed in public, private, and hybrid configurations with gateways providing wireless LoRaWAN connectivity for end-devices and relaying device data to and from the Network Server via IP backhaul (Ethernet, Wi-Fi, cellular or satellite). While LoRaWAN gateways can connect devices over a very long range, the ability of LoRaWAN to penetrate physical obstacles like concrete walls and metal enclosures and cover subterranean areas also makes it ideal for the building environment – outperforming cellular and Wi-Fi.

Though an outdoor public network can penetrate buildings and provide suitable coverage for some applications, solution providers often choose private networks and deploy network gateways exclusive to the building environment they are serving. Network planning tools are available to help right-size the deployment and the low cost of indoor LoRaWAN gateways supports a an extremely cost-effective network infrastructure even when multiple gateways are needed.

Because of the critical nature of the environment being monitored (for water and gas leaks, for example), many solution providers also choose to partner with a network operator like Senet to ensure the delivery of secure, cloud-managed, carrier-grade wireless network service.

In this model, the solution provider deploys the gateways and devices, while Senet maintains the cloud-based Network Operating System, delivering private connectivity through its Platform-as-a-Service (PaaS) offering.

Applications: Building Management Platforms and applications are used to compile and visualize the sensor information, providing facility managers with new insights into the building environment. Automated data collection, visualization, and reporting through a centralized platform allows building owners/managers to uncover critical operational issues that need to be addressed and help maintain compliance with safety and insurance regulations in a single location or across a portfolio of properties.

Benefits and ROI: Driving Efficiency, Sustainability, and Cost Savings

The ROI opportunity in smart buildings is multi-dimensional. The value delivered by LoRaWAN-enabled solutions spans several operational areas, including:

Water Leak Detection: Water leak sensors placed in areas where leaks are likely to appear, including kitchens, bathrooms, laundry areas, and basements, can be used to instantly notify building management, property owners, and tenants so immediate action can be taken. These sensors can also connect to automatic water valves, enabling prompt water source shutdown.

Gas Leak Detection: Natural gas detectors can alert residents, workers, and staff of leaks to facilitate rapid evacuation and notify maintenance and safety personnel. Like water leak detection, gas leak sensors can also connect to automatic shutoff valves, enabling prompt service shutdown.

Energy Management: Real-time data on energy consumption and operating conditions allowing facility managers to optimize usage, address inefficiencies, and implement proactive maintenance and energy-saving measures.

Submetering (water, gas, electric): The long-range capability of LoRaWAN eliminates the need for network extenders or repeaters, contributing to lower infrastructure installation and maintenance costs for submetering in large commercial, mixed-use, or multi-family buildings with long ranges between units or utility service locations.

Environmental Monitoring: Monitoring indoor air quality, temperature, humidity, and other environmental parameters, support healthy and comfortable building environments while reducing energy waste.

Pest management: Connected pest management solutions allow building managers to automate time consuming manual trap inspections and offer a humane and safe alternative to rodenticides.

Waste Collection: Automatic notification alerts when bins are reaching pre-defined thresholds provide intelligent route planning for collection service providers and eliminates unnecessary visits and overflowing garbage bins for end users.

Occupancy Monitoring: With real-time information about parking, workspace, and equipment availability, occupants can make better decisions about when and how to use the building.

Physical Security: Wireless sensors can be used to monitor the open/close state of doors and windows, providing real-time alerts in the event of unauthorized access or breaches.

Asset Tracking: Network-connected devices can be used across buildings and campus environments to track the location of equipment or inventory both indoors and outside.

Supply Management: Tracking deliveries and replenishing supplies throughout facilities can have a significant impact on operations and related costs.

The Connected Future of Buildings

In an era of rapidly advancing technology and evolving occupant expectations, building owners face the challenge of meeting high demands while making timely investments. Network connectivity plays a crucial role in the puzzle of smart buildings, and although it has traditionally been a hurdle, deploying innovative solutions such as LoRaWAN can revolutionize the way building owners serve their occupants and stakeholders.

By integrating intelligent building systems with LoRaWAN networks, building owners and managers can unlock a wealth of actionable data, enhancing operational visibility, gaining valuable insights, and improving occupant experiences.

Additionally, a cost-effective sensor network offers building owners and insurance providers a proven solution to proactively mitigate risks and decrease maintenance and repair costs, leading to an improved market value of the property.

By embracing the power of LoRaWAN, building owners can open doors to a smarter, more efficient, and future-ready built environment.

Senet develops cloud-based software and services used by Solution Providers, System Integrators, and Network Operators for the on-demand deployment of Internet of Things (IoT) networks. Disruptive go-to-market models and technical advantages, including our patented Low Power Wide Area Virtual Network (LVN™), enable the full value of connectivity by delivering services that are easy to use and scale, making our customers successful in their digital transformation initiatives. With a multi-year head start over competing solutions, Senet offers services in over one hundred and eighty countries and owns and operates one of the largest public carrier-grade LoRaWAN® networks in the United States.

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