

Use unlicensed LPWANs for cost-effective & secure massive industrial IoT

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Introduction

The Internet of Things (IoT) allows us to collect and read data from sensors that have been added to industrial functions or measurable aspects of everyday life. Among its uses, this data can be leveraged to improve operational processes, enhance worker safety, and monitor maintenance requirements. Due to the diverse and multifaceted character of IoT technology, it can be extremely difficult to determine the right connectivity path for each usage. While established technologies, such as Wi-Fi, Bluetooth, and 4G have added IoT connectivity to their portfolios, the group of technologies that is quickly gaining traction in the massive industrial IoT segment is Low Power Wide Area Networks, or LPWANs. The reason this group of technologies, standards and smart devices has rapidly gained territory over the past several years is that they have been specifically designed to address the needs of the majority of IoT use cases to provide long-range communication on small, inexpensive batteries that often have a life of ten years or more. LPWANs can connect many types of sensors and offer a strong, cost-effective, secure and rapid, massive connectivity. In this article, we explore how LPWANs, and in particular unlicensed LPWANs and the LoRaWAN® standard, enable fast, reliable, and massive IoT through billions of connections.

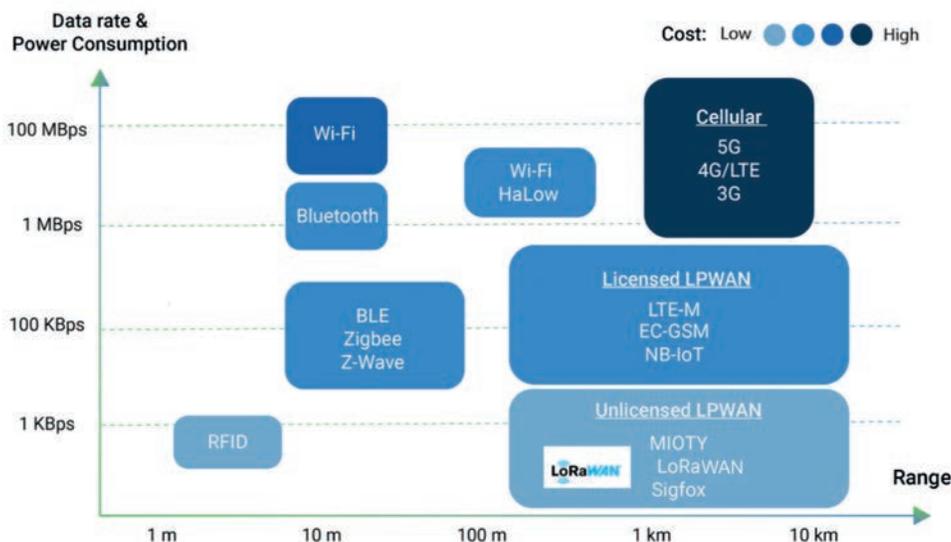
Building a smart future while limiting additional cost

Not all LPWAN's are created equally or within the same radio frequency. A key distinction is whether the spectrum is licensed or unlicensed. Each technology within these two categories offers different strengths and weaknesses, and delivers varying levels of performance depending on the requirements of an IoT use case. Factors, such as power consumption, quality of service, scalability, and standardization (for interoperability purposes) all play a role in choosing the right fit. There are benefits to operating within the licensed spectrum, yet it often involves a higher Total Cost of Ownership (TCO) compared to unlicensed LoRaWAN. One of the primary benefits of the unlicensed, open standard is flexibility and ease of deployment on either public, private, or hybrid networks. Other benefits include wide area connectivity, low-cost chipsets and networks, limited data usage, coverage in rural and non-cellular areas, and the ability to penetrate concrete and metal walls. To mitigate unwanted interference within the unlicensed band, standards bodies, such as the LoRa Alliance*, have ensured maintenance of secure connectivity *via* encryption and authentication protocols.

Various studies predict a prosperous future for LPWANs. For instance, the number of connected devices is expected to grow from 13.9 million in 2017 to 1,151 billion in 2023⁽¹⁾.

(1) "Structural Health Monitoring Market by Solutions (Hardware: Sensors, Data Acquisition System; Software & Services), Technology (Wired and Wireless), End Users and Geography - Global Forecast to 2022", summary available at www.marketsandmarkets.com/Market-Reports/structural-health-monitoring-market-101431220.html

The figure below shows the positioning of LPWANs, less recent, and legacy protocols when looking at power consumption & data rate against range.



Positioning of IoT Technologies (Source: Behr Technologies)

LoRaWAN is a nonproprietary, unlicensed technology for large-scale IoT

Within the unlicensed LPWANs, LoRaWAN uses the radio frequency spectrum that satisfies industrial IoT applications that require a long range, low bit-rate, low power consumption, and low throughput. This combination of long range and low power is better suited for frequencies lower than those used for Wi-Fi and Bluetooth. LoRaWAN operates in the sub-1 GHz license-free band, more specifically 868 MHz in Europe and 902-928 MHz in the US. It is accessible to anyone wishing to set up a network, whether it be a private, public, or hybrid one.

The goal of LoRaWAN is to connect millions of IoT devices in a secure and cost-effective manner. Where some other technologies require a data plan for every sensor deployed, LoRaWAN does not charge for spectrum use from the sensor to the gateway, and each gateway can support thousands of sensors. Network deployments consist of LoRaWAN end-point nodes connected wirelessly to gateways that in turn connect to a network server in the cloud or on premises, securely routing data to an application or business system.

Compared to licensed technologies, such as NB-IoT and LTE-M that are suited for critical IoT, LoRaWAN is ideally suited to serve the needs of non-critical and massive industrial IoT (e.g., billions of sensors). Like all LPWANs, it does not facilitate transmission of large messages, and, when needed, can send short, fast ones at specific moments only, preserving battery life. Once a basic LoRaWAN network has been set up, any type of sensor serving any type of application can be very quickly connected in order to obtain valuable data.

A unique ecosystem promoting LoRaWAN

As the importance of global collaboration increases, solution providers, manufacturers, operators, and system integrators will continue to partner and face the challenge of returning positive ROI early in their projects. The group of IoT companies that strive for promotion of the LoRaWAN standard around the world is the LoRa Alliance®. The LoRa Alliance is a non-profit organization representing over 400 member companies developing and operating LoRaWAN equipment from silicon to solutions. Member companies are active across the entire LoRaWAN value chain, producing chipsets, modules, sensors, gateways, servers, and platforms that enable complete end-to-end LoRaWAN solutions for customers and enterprises. Thanks to numerous fruitful collaborations, LoRaWAN networks are currently available in 171 countries, and there are 156 LoRaWAN network operators, enabling thousands of use cases across cities, rural areas, and industries.

For more information, please visit lora-alliance.org.