

Comparing LoRaWAN[®] and Zigbee[®] Wireless Sensing Technologies

Wireless technologies have transformed the way we live and work, and two of the most popular wireless protocols in the IoT (Internet of Things) ecosystem for wireless sensing are LoRaWAN and Zigbee. Both protocols are designed to enable low-power, low bandwidth communications, making them ideal for IoT applications. However, they have different strengths and weaknesses and are best suited for different use cases.



LoRaWAN (Long Range Wide Area Network) is a low-power, long-range wireless protocol that uses the unlicensed radio spectrum to send small packets of data over long distances. It is designed to enable IoT applications that require low data rates and long battery life, such as smart cities, agriculture, and cold chain monitoring.

One of the main advantages of LoRaWAN is its long-range capability. It can transmit data over several kilometers, making it ideal for outdoor applications where devices are spread out over a wide area. Additionally, it is low power, so devices can operate on batteries for up to many years, depending on the application.

Another advantage of LoRaWAN is its ability to penetrate obstacles like walls, making it suitable for indoor and outdoor applications. However, its data rates are limited to a few kilobits per second, making it unsuitable for applications that require high-speed data transfer.

LoRaWAN also has a low cost of deployment and operation, making it an attractive option for businesses and organizations that want to implement IoT solutions on a large scale.



Zigbee is a low-power, wireless protocol that is designed for short-range, low-bandwidth communication between devices. It is ideal for home automation, building automation, and low to medium range outdoor applications such as automated meter reading.

One of the main advantages of Zigbee is its mesh networking capability. Although restricted to powered device use cases, those devices can form a network and communicate with each other, enabling them to cover larger areas and ensure that data is transmitted even if a device fails. Additionally, Zigbee has a higher data rate than LoRaWAN, making it suitable for applications that require faster data transfer, such as smart lighting control.

Zigbee also supports a wide range of devices, including sensors, switches, and actuators, making it suitable for complex IoT applications that require different types of devices to work together. Furthermore, it has a low power consumption, allowing devices to operate for extended periods on batteries.

Differences between LoRaWAN® and Zigbee®

The main differences between LoRaWAN and Zigbee are:

- **Range:** LoRaWAN has a longer range and better building penetration than Zigbee, making it ideal for outdoor and large commercial applications.
- **Bandwidth:** Zigbee has a higher bandwidth than LoRaWAN, making it suitable for applications that require faster data transfer.
- **Mesh networking:** Zigbee supports mesh networking, while LoRaWAN does not.
- **Power consumption:** Both protocols have low power consumption, but LoRaWAN consumes less power than Zigbee, making it ideal for battery-powered devices that need to operate for extended periods.

Applications

LoRaWAN and Zigbee are best suited for different applications, as shown below:

Zigbee Applications

- **Home automation:** Smart lighting, security systems, and temperature control.
- **Building automation:** HVAC (heating, ventilation, and air conditioning) control, lighting, and access control.

LoRaWAN Applications

- **Smart cities:** Monitoring and controlling public infrastructure such as street lights, waste management, smart parking and air quality sensors.
- **Asset monitoring:** Monitoring the condition or utilization of assets over large areas such as cold chain monitoring for food safety in commercial food production or monitoring utilization of remote, dispersed assets such as chemical tanks in oil & gas fields.
- **Smart building:** Applications such as leak detection, environmental monitoring, utilization monitoring. Some traditional building control systems are using LoRaWAN to extend their reach and applications.
- **Service industry:** Applications such as pest control, specialized waste management.
- **Agriculture:** Monitoring soil moisture, temperature, and humidity for crop management.

Conclusion

ZigBee was well adopted in commercial lighting, home automation and select automated meter reading applications. It's primary limitation is its short range.

The newer LoRaWAN technology benefits from excellent range and building penetration as has quickly become the fastest growing low power wireless sensing technology for IoT applications.

MultiTech was a founding member of the LoRa Alliance and a market leader in LoRaWAN gateways, sensors and modules. MultiTech is headquartered in Minnesota with both US and global manufacturing capabilities.

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