Commentary

iMedPub Journals
www.imedpub.com

International Journal of Advanced Research in Electrical Electronics and Instrumentation Engineering

2022
Vol.5 No.3:011

The role of LoRa and LoRaWAN

Neha Tomar*

Department of Electrical and Electronics Engineering, University School Basic and Applied Sciences, New Delhi, India

***Corresponding author:** Neha Tomar, Department of Electrical and Electronics Engineering, University School Basic and Applied Sciences, New Delhi, India, E-mail: tomar_n@gmail.com

Received date: 07-Feb-2022, Manuscript No. Ijareeie-22-13330; **Editor assigned date:** 09-Feb-2022, PreQC No. Ijareeie-22-13330 (PQ); **Reviewed date:** 23-Feb-2022, QC No. Ijareeie-22-13330; **Revised date:** 28-Feb-2022, Manuscript No. Ijareeie-22-13330 (R); **Published date:** 07-March-2022, DOI: 10.36648/Int J Adv Res.5.3.11

Citation: Tomar N (2022) The role of LoRa and LoRaWAN. Int J Adv Res Vol.5 No.3:11.

Description

In the world of the Internet of Things (IOT), connectivity is everything. It's the "I" in IOT and the vehicle through which we deliver remote products and applications that can pipe their on-the-ground smarts to the cloud for monitoring, management, and decision-making. While it's never been easier to add connectivity to a product, device, or machine, choosing the right connectivity option for a solution is still rife with complexity.

It may be obvious in some cases that Ethernet or Wi-Fi is the right choice such as in a home or factory. In others, near-field communication (NFC) or Bluetooth may be a preferred option because your solution requires short-range device-to-device communication. However, if your product is mobile, or in an urban, agricultural, or other setting where the complexity of Wi-Fi setup simply won't do, you're left looking elsewhere. Specifically, at cellular or LoRa (formed from the phrase "long-range") and LoRaWAN (long-range wide-area networking).

The global reach of cellular via global harmonization of frequency bands and inter-carrier roaming agreements, as well as the availability of high-bandwidth connections for data-intensive applications, makes this approach appealing for many use cases. Despite the appeal, some applications favor LoRa, where signals are noise resistant, and the availability of free, unlicensed frequency bands makes the unit costs of individual devices significantly lower.

Given that different needs will lead you to choose either cellular or LoRa, and that these approaches are more complementary than competitive, let's dive more deeply into LoRa.

Using LoRa Without LoRaWAN

Step one in using LoRa without LoRaWAN is that you must implement your own medium access protocol so that nodes may agree amongst themselves on how to identify one another, how to conceal communications, and how and when to communicate on the air without stepping on one another. Connecting a LoRa deployment to the cloud without LoRaWAN also requires implementing your own mechanism for handling backhaul to cloud services.

Time Division Multiple Access

This may feel overly complex, however, it can be quite simple depending upon your need: a two-node peer-to-peer connection can just alternate send and receive roles, and a small network of a few dozen nodes can use a quite straightforward Time Division Multiple Access (TDMA) time slot protocol. LoRaWAN was designed for large-scale networks, and LoRa nodes need not re-implement every piece of the LoRaWAN protocol if the goal is a flexible and lower-cost point solution. This approach is not uncommon in the market.

LoRa is a low-power communication protocol intended to operate over long distances using an unlicensed spectrum, specifically radio bands reserved for industrial, scientific, and medical (ISM) purposes. LoRa devices communicate at sub-gigahertz frequencies, thus enabling long rage data transfer, though the available bands are narrow, and some governments have strict rules about how often a device on these bands may transmit. A LoRa chip is the physical layer that underpins everything above it and enables hardware devices to leverage unlicensed spectrum for Low-Power Wide-Area Networking (LPWAN) applications. Basically, it dictates the spectrum and protocol used for radio communication.

A concentrator acts as a gateway that manages connections from LoRaWAN nodes, as well as connections to wide area network servers over the internet. Many concentrators available on the market tend to include eight channels for simultaneous receipt of request packets from LoRaWAN nodes and a single channel for sending response packets back to those nodes. The gateway cooperates with the network servers to manage devices as they join the LoRaWAN network, and to handle communications to and from cloud-based application servers.

Although not the only media access protocol for LoRa, the LoRaWAN protocol enjoys broad industry support and has a healthy ecosystem. It was started and is maintained by the LoRa Alliance, an association created in 2015 to support the collaborative development of the LoRaWAN protocol and ensure interoperability across LoRaWAN products and services.

In some parts of the world (most notably in Europe), cellular carriers have seen revenue potential in offering their own proprietary LoRaWAN networks, many of these targeting smart city and agricultural applications. Elsewhere, it is more common to think of LoRaWAN networks as "build your own" wide-area private networks that a customer would need to fund and deploy themselves.

A LoRa radio performs its modulation by representing each bit of information in a payload with multiple chirps of information. In this case, the "spread spectrum" in the name means that devices using this technique, including the LoRa derivative, all use allocated bandwidth to broadcast, making these signals resistant to the channel noise common on ISM bands.

LoRa devices allow engineers to tune their applications and choose between high data rate or high sensitivity using something called the spreading factor (SF). Using a tunable radio parameter, engineers can select the number of chirps sent per second. A low SF will send more chirps per second, meaning that you can encode more data per second, but the signal is not very sensitive from the receiver's point of view.

A low sensitivity translates to a higher likelihood that the data you intend to send is lost along the way. A high SF, on the other hand, will send fewer chirps per second but produces a signal that is more sensitive to the receiver, thus more reliable. However, high SF chirps need more "airtime" (transmission time on the network) and require more power because the modem is running for a longer period than with a low SF approach.

By setting the SF for radio, as well as changing the modem's transmission power (tunable between 2 dBm and 20 dBm depending on the region), LoRa provides engineers with capable tools for configuring an application for power consumption and communication range based on their needs.

As a physical layer, LoRa covers everything needed to enable long-range communication between devices on a common spectrum that can speak the same protocol. It does not, however, cover how devices identify one another, how they communicate with one another in a way that minimizes crosstalk on the network, or how data from local network devices can be securely transmitted to the cloud or remote locations. That's where LoRaWAN (and others) come in.