

LoRaWAN: The Future of IoT Connectivity

LoRaWAN technology opens up another subset of IoT entrepreneurship, bringing smart cities and smart homes ever closer to reality. But we're not there yet. Our inventors are hard at work exploring all that LoRaWAN has to offer and creating an enhanced reality geared toward helping individuals, communities and businesses accomplish more.

A lot of attention was paid to the Internet of Things (IoT) in 2016, and by now the concept has filtered down from the tech elite to mere mortals like you and me. Platforms and ecosystems have evolved to the point where even elementary school children can plug-and-play puzzle pieces to develop their concept and design skills early on. However, whether it's a child's maker project or an enterprise-level oil fleet tracking system, one rule holds true: Without connectivity, the system is nothing more than a sheet of silicon.

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For most IoT entrepreneurs, owning, renting, or utilizing a continental system of cell towers to aid in discovery and innovation isn't an option. No matter. We still have Bluetooth® for short range communications (about 100 meters in a best-case scenario) or Wi-Fi for long range communications as options, right? But what is new and available now?

Enter low power, high range, wide area networks – or LoRaWAN. Intended for wireless, battery operated devices, LoRaWAN targets key requirements of IoT such as secure bi-directional communication, mobility, and localization services in regional, national and global networks. With a range of 1–5 miles and the ability to integrate into a mesh network (where

each router can connect wirelessly to another to increase range), small communities to large cities can be covered with very few devices. Indeed, just one LoRaWAN router in your living room could provide IoT connectivity to low-powered devices all over your home, greatly enhancing important parts of your daily life.

Technically speaking

The LoRa Alliance, a nonprofit group of industry innovators, provides this quick description of the system and its flexibility:

“Communication between end-devices and gateways is spread out on different frequency channels and data rates. The selection of the data rate is a trade-off between communication range and message duration. Due to the spread spectrum technology, communications with different data rates do not interfere with each other and create a set of “virtual” channels, increasing the capacity of the gateway. LoRaWAN data rates range from 0.3 kbps to 50 kbps. To maximize both battery life of the end-devices and overall network capacity, the LoRaWAN network server is managing the data rate and RF output for each end-device individually by means of an adaptive data rate (ADR) scheme.”

National wide area networks targeting IoT applications such as critical infrastructure, confidential personal data, or critical functions for society have a special need for secure communication. This has been addressed by several layers of encryption:

Unique Network key (EUI64) ensures security at the network level

Unique Application key (EUI64) ensures end-to-end security at the application level

Device-specific key (EUI128)

More information about different classes for the specification

is available here, but what is impressive so far is how wide the possibilities for the technology are at during this early stage of development. Extensibility – the ability to extend or add new functionality to core capabilities – and Flexibility appear to have been primary considerations in the technology from the start.

Your life, connected

LoRaWAN technology opens up another subset of IoT entrepreneurship, bringing smart cities and smart homes ever closer to reality. Whether it's a geofenced area around your own house or an alert system to identify when your pets leave a predetermined range, LoRaWAN is at its best solving the minutiae and tasks of our daily lives.

Imagine a system of connected home devices that start kicking off events as you approach your home –doors unlocking, stoves preheating, furnaces or air conditioners firing up – extended beyond to a city filled with smart parking spots all broadcasting if they are empty or filled. With LoRaWAN, we now have the capability to create seamless, long range experiences without the common reliance on an internet or cellular provider.

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But we're not there yet. One of the biggest challenges facing a mainstreamed system is adoption. As with any new platform of services, there are many competing solutions. Wikipedia's LPWAN page lists more than a dozen implementations in a mixture of proprietary and civic usage. This bodes well for future development as it details both private and public interest is moving the technology forward. Fortunately, the LoRaWAN specification is open source and eager for early adopters to make this technology widespread and attractive to the development community.

What's next for LoRa?

With LoRa as a base, it doesn't take much of a leap to envision ways to extend this technology with APIs like Microsoft's Cognitive Services, IoT Hub, or Machine Learning Studio to create devices and experiences that can see, hear, speak and to some degree – think and predict.

At Vectorform, we see LoRaWAN solutions as a way for humans and machines to interact – to connect – in new and natural user environments where your day-to-day experiences are enhanced by devices providing a hyperawareness of the world around you. Our Inventors are hard at work exploring all that LoRaWAN has to offer and creating an enhanced reality geared toward helping individuals, communities and businesses accomplish more.

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