

Q&A with the LoRa Alliance's Geoff Mulligan

The group's chairman discusses its mission and LoRa technology in general.

CD: Can you tell us about LoRa technology for those who may not be so familiar?

GM: The LoRa radio and LoRaWAN specification define an interoperable low-power and low-cost communications solutions for the Internet of Things (IoT). By using LoRaWAN, IoT devices can communicate over tens of kilometers but still be powered by batteries and utilize chips that cost below \$2. It is prime technology where the application has both power and cost constraints, but still requires two-way communication over a wide area.

Besides incorporating low-cost chips in the end nodes, the overall operating expenditure (OPEX) and capital expenditure (CAPEX) costs for the base stations and infrastructure is 1% of the cost of most alternatives. The architecture is a star network, but has unique features that provide improved robustness. It has no single points of failure and can provide geolocation/localization without the need for GPS chips.

Additionally, the LoRa Alliance (www.lora-alliance.org) ecosystem is "open," meaning it is an openly available specification based on open standards (TCP/IP), [an] open certification program, and most importantly an open business model. The latter means that companies can choose to build their own network, partner with operators, or even become an operator themselves.

CD: It seems like there are countless IoT wireless technologies. Where do you see LoRa in all of this?

GM: LoRaWAN fills a gap for low-power wide-area connectivity. It is perfect for covering very large distances while still providing battery-powered solutions. It provides an extremely cost-effective and power-efficient bi-directional communication capability. A 30-square-kilometer farm could be covered for less than \$10,000. And because LoRaWAN utilizes unlicensed spectrum, end-users, solutions providers, and operators can build their own networks. Furthermore,



being based on open internet standards (TCP/IP) allows for future proofing and eliminates vendor lock-in.

I do not see any one technology as the panacea for all IoT communications. Just as Wi-Fi and cellular provide higher-speed data communications, so shall there be different technologies for interconnecting IoT devices. The LoRaWAN protocol is a good fit for applications requiring low-cost, low-power two-way communication over large distances. It is a particularly good solution when end-users want or need to operate their own network.

CD: What applications do you see as the main beneficiaries of LoRa technology?

GM: It can readily be used in areas like smart agriculture, intelligent transportation, smart cities (traffic management, air quality, smart parking, energy management, etc.), and oil/gas/water distribution condition monitoring. All of these require large a coverage area. But LoRa technology is equally capable of providing cost-effective connectivity for building control, perimeter monitoring, and energy and HVAC control.

Because of the extremely low CAPEX and OPEX costs, LoRa and the LoRaWAN protocol make it now possible to start deploying large-scale IoT applications. For example, a 1,000-acre farm or vineyard could deploy a moisture/crop sensor network for less than \$10,000. Cities can start to deploy a LoRaWAN network immediately and scale it up as needed to increase coverage. A single gateway can cover a small downtown—though at least three gateways are required in order to provide geolocation/localization.

CD: Can you tell us a little about the LoRa Alliance?

GM: The LoRa Alliance consists of over 500 companies that span the globe. These companies work together in "coop-etition" to build a strong ecosystem that supports the development and deployment of the LoRaWAN specifications. Our Alliance members work in our various committees (marketing, technical, strategy, and certification) to develop

and publish our specifications, build a strong certification program, identify key technologies, and plan our roadmap and market our activities.

One new key project we are kicking off in 2018 will be a broad developer program with open-source hardware and software. Besides being founded on the concept of openness, another key feature is the broad member base. Members companies include chip providers, module and components builders, service and network operators, and end-users. Our members cover everything from “silicon to solutions” and are building the technology to bring the IoT to fruition.