Low-Power, Wide-Area Networking: Opportunities & Options

EXECUTIVE SUMMARY

There has been great excitement about the Internet of Things (IoT) over the last couple of years, with staggering forecasts of the number of devices that will be connected to the Internet – Ericsson's Mobility Report from June 2016 forecasts 26 billion devices by 2020.

Some parts of the IoT have seen significant traction (wearable fitness devices is one example, smart metering and utility grids another), and others are the subject of intensive efforts by major verticals, such as manufacturing (through Industrial Internet Consortium and Industrie 4.0 initiatives), automotive, real estate and retail. Smart city efforts are also driving an increase in connected devices of various kinds, from street lights and transportation infrastructure to dense networks of environmental sensors and building control systems. However, there is a sense that IoT is finding some barriers hard to overcome – and one of the most significant of those barriers is the need for very low-cost, power-frugal and ubiquitous networking.

It is in this context that low-power, wide-area (LPWA) communications technologies have a role to play. Yes, very many connected devices in the IoT will be connected via a gateway, using local networks, such as WiFi, Bluetooth, ZigBee and various proprietary, industry-specific local wireless and fixed protocols, but there is also a large and growing choice of options for direct connectivity to the Internet for devices that are battery powered (and therefore need the communications to be "low power") and too far from a gateway (hence, "wide area") to use these short-range networks.

It is very early days for LPWA. Much of its success will depend upon the anticipated demand for wide-area IoT solutions actually crystallizing. It will also depend upon finding a business model that justifies the costs of roll out but that does not make IoT economically unattractive. Services demanding excessive ongoing monthly payments will look unattractive for many IoT solutions.

Low-Power, Wide-Area Networking: Opportunities & Options considers the types of IoT applications that might be served by LPWA technologies deployed as public networks, it compares the technical capabilities of the various technologies and the network deployment implications. It reviews market traction of each technology and profiles 13 organizations that are providing (or developing) LPWA solutions for customers.

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The key challenge for companies considering deploying LPWA technologies is to effectively compare them and understand which technologies are best suited to which applications and use cases. They do vary widely. Choosing between them is not an easy task, as the different players tend to present the capabilities of their technologies in non-comparable ways. One of the key differences between the different types of LPWA technology is the spectrum band in which it is designed to work and how much spectrum is needed. This has big implications for both accessibility and performance. The excerpt below shows the key LPWA technologies, the frequency bands used and the bandwidth requirements.

Excerpt: Frequency Bands Used & Bandwidth Requirements

Technology	Frequency Band(s) Used	Bandwidth Required
EC-GSM-IoT	Can be deployed in-band in any licensed GSM spectrum used by an operator: trials have taken place at 900 MHz	200 kHz
Ingenu	2.4 GHz (worldwide)	1 MHz per channel (eight channels used of 40 maximum available in 2.4 GHz band)
LoRaWAN	868 MHz (Europe, Middle East); 915 MHz (North America); 433 MHz (Asia)	125 or 250 kHz up, 125 kHz down (Europe); 125 or 500 kHz up, 500 kHz down (North America); Asian requirements still in development
LTE Cat-M (CAT-M1)	Can be deployed in-band in any licensed LTE spectrum used by an operator: 700, 900, 1700, 1800, 1900 and 2100 MHz are all likely early bands that will be used, but devices are expected to be available for use in most LTE bands used globally (from 700 MHz to 3.7 GHz)	1.4 MHz
NB-IoT	Can be deployed in-band in any licensed spectrum used by an operator. Devices are expected to be available for use in most bands from 700 MHz to 3.7 GHz. Can also be deployed in guard bands and using a standalone carrier in GSM spectrum (most likely in 900- and 1800 MHz bands).	180-200 kHz
Sigfox	868 MHz (Europe, Middle East); 915 MHz (North America); 920 MHz (South America, Australia, New Zealand)	100 Hz (UNB)
Weightless-P	All sub-GHz ISM bands (169, 433, 470, 780, 868, 915, 923 MHz)	12.5 kHz per channel

Source: Heavy Reading

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