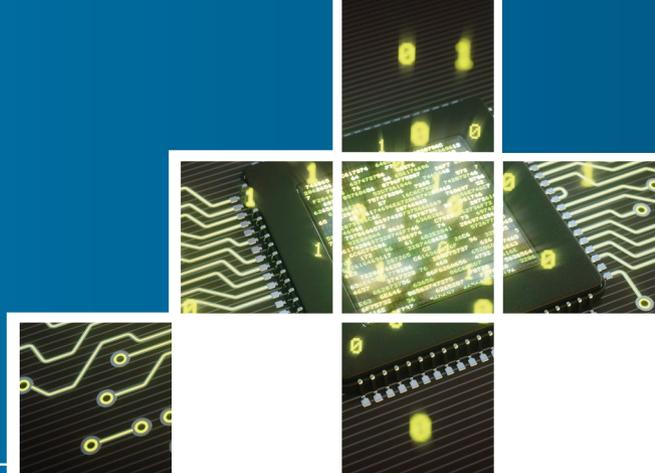


Cellular and LPWA IoT Device Ecosystems



Cellular and LPWA IoT Device Ecosystems gives a comprehensive overview of the main wide area networking technologies for the Internet of Things – 2G/3G/4G/5G cellular, LoRa, Sigfox and 802.15.4 WAN.

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- **360-degree** overview of the main IoT wide area networking ecosystems.
- **Comparison** of technologies and standards.
- **Updated** profiles of the main suppliers of IoT chipsets and modules.
- **Cellular** IoT module market data for 2018.
- **Early** adoption trends for emerging LPWA technologies.
- **Cellular** and non-cellular LPWA IoT device market forecast until 2023.



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5G will reach the IoT market in late 2020

The Internet of Things is weaving a new worldwide web of interconnected objects. At the end of 2018, approximately 1.3 billion devices were connected to wide area networks based on cellular or LPWA technologies. The market is highly diverse and divided into multiple ecosystems. This report will focus on the four most prominent technology ecosystems for wide area IoT networking – the 3GPP ecosystem of cellular technologies, the emerging LPWA technologies LoRa and Sigfox and the 802.15.4 ecosystem.

The 3GPP family of cellular technologies support the biggest ecosystem in wide area IoT networking. Berg Insight estimates that the global number of cellular IoT subscribers increased by 70.0 percent during 2018 to reach 1.2 billion at the end of the year – corresponding to around 13.0 percent of all mobile subscribers. Yearly shipments of cellular IoT devices increased by 76.2 percent in 2018 to reach 651.9 million units. Growth was fuelled by an exceptional market expansion in China, where the installed base of cellular IoT connections increased by 124.1 percent year-on-year to reach 767.0 million at the end of 2018.

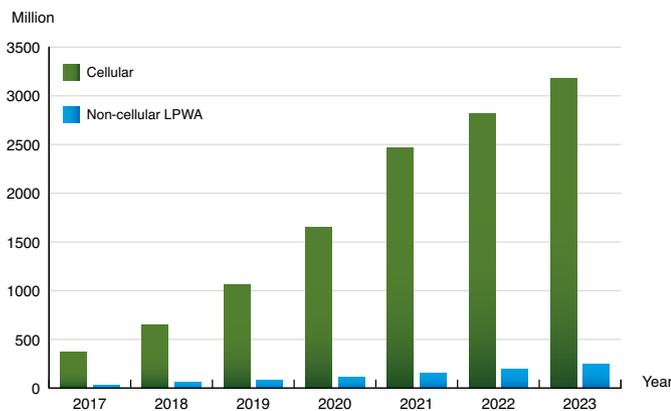
The cellular IoT technology landscape is in a phase of rapid transformation. Developments in China accelerate a global shift from 2G/3G to 4G technologies. As the initial focus for 5G will be high-bandwidth applications, Berg Insight believes that 4G will become the preferred platform for IoT in the foreseeable future. The move from 2G to 4G began in North America with 3G as an intermediate technology. The region has seen rapid uptake of LTE CAT-1 since 2017 and CAT-M starting in 2018 at the same time as GPRS and CDMA are fading away. Europe began to see adoption of LTE CAT-1 in 2018 and is now followed by an accelerated uptake of LTE-M and NB-IoT in 2019/2020. China is moving fast from GPRS to NB-IoT in the mass-market segment and cumulative NB-IoT shipments are expected to exceed 190 million units by the end of 2019. At the same time there will also be fast-growing demand for LTE CAT-1 and LTE-M, as well as LTE CAT-3+. 2G and 3G will be in steady decline in all developed markets with demand shifting to developing countries with limited availability of 4G networks. Berg Insight expects that 5G will become commercially available for verticals such as automotive in 2020.

LoRa is gaining momentum as a global connectivity platform for IoT devices. According to Semtech, the global installed base of LoRa ►

► devices was approximately 87 million at the beginning of 2019. The first major volume application segments are smart gas and water metering, where LoRa's low power consumption matches the requirements for long-life battery operation. LoRa is also gaining traction for metropolitan area and local area IoT deployments as a platform for networking smart sensors in cities, buildings, manufacturing plants and similar. Semtech has stated that it generated in the range of US\$ 78 million in revenues from LoRa chips in its financial year ending in January 2019 and expects to reach US\$ 100–140 million in fiscal 2020. Berg Insight estimates that yearly shipments of LoRa devices were 36.3 million units in 2018. Until 2023, yearly shipments are forecasted to grow at a compound annual growth rate (CAGR) of 33.7 percent to reach 155.0 million units. While the Asia-Pacific region accounted for about 60 percent of total shipments in 2018, LoRa device shipments in Europe and North America are expected to scale into significant volumes in the coming years as early adopters move from pilots to large-scale deployments.

Sigfox has very ambitious plans for establishing the technology bearing the company's name as the leading global platform for ultra-narrow band IoT networks. In order to meet its strategic goals, Sigfox must be able to break into entirely new mass-volume device segments and prove its capability to create value by adding connectivity to things that never communicated before. At the end of 2018, Sigfox reported 6.2 million connected devices. In a positive scenario where early trials ramp up to large-scale commercial deployments, Berg Insight forecasts that shipments of Sigfox devices will grow at a compound annual growth rate (CAGR) of 63.1 percent from 3.8 million units in 2018 to 43.9 million units by 2023.

802.15.4 WAN is an established connectivity platform for private wide area wireless mesh networks used for applications such as smart metering. Faced with increasing competition from emerging LPWA standards, 802.15.4 WAN is however only expected to grow at moderate rate in the coming years. Berg Insight forecasts that shipments of 802.15.4 WAN devices will grow at a compound annual growth rate (CAGR) of 19.3 percent from 19.3 million units in 2018 to 46.6 million units by 2023. Smart metering is expected to account for the bulk of demand. Wi-SUN is the leading industry standard for smart electricity metering networks in North America, with adoption also spreading to Asia-Pacific and Europe.



Annual shipments of cellular/non-cellular LPWA IoT devices (World 2017-2023)

This report answers the following questions:

- How will the IoT wide area networking technology market evolve over the next five years?
- Who are the new challengers in the cellular IoT module market?
- Which new mass-volume segments can be addressed by low-cost LPWA technologies?
- Why are the new standards LTE-M and NB-IoT so significant for the cellular IoT ecosystem?
- How are Chinese national policies driving the migration from 2G to 4G?
- When will 5G appear in the cellular IoT market?
- What is the current installed base of LoRa and Sigfox?
- What are the prospects for emerging LPWA technology standards?



Executive Summary

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Glossary

About the Author



Johan Fagerberg is co-founder and an experienced analyst with a Master's degree in Electrical Engineering from Chalmers University of Technology. His areas of expertise include several wireless IoT markets including automotive telematics and fleet management.

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