

Summary

Executive summary

Berg Insight estimates that the global number of cellular IoT subscribers increased by 56 percent during 2017 to reach 647.5 million at the end of the year – corresponding to around 8 percent of all mobile subscribers. Until 2022, the number of cellular IoT subscribers is forecasted to grow at a compound annual growth rate (CAGR) of 33.1 percent to reach 2,700.1 million at the end of the period. During the same period, cellular IoT network revenues are forecasted to grow at a compound annual growth rate (CAGR) of 27.3 percent from € 6.3 billion in 2017 to approximately € 21.2 billion in 2022. Meanwhile the monthly ARPU is expected to drop to € 0.65.

The global cellular IoT market is going through a massive change, driven by the Chinese government's policies for accelerating adoption. China has set the ambitious goal of reaching 600 million NB-IoT connections in 2020, three years after the launch of the first commercial networks. Berg Insight believes that the target must be seen as realistic in light of the 150 million net additions and almost 100 percent yearly growth rate in 2017, the year before low-cost NB-IoT devices were even available. China has embarked on one of the world's largest digital infrastructure projects that will result in billions of new connected devices in the coming five years. The massive effort will be a catalyst for reducing the price of cellular IoT chipsets and modules below US\$ 2 and driving the global transition from 2G to 4G networks. China's choice of NB-IoT as the country's preferred LPWA technology will elevate the emerging standard to global dominance. It will also change the structure of the global cellular IoT subscriber base.

The next wave of cellular IoT adoption is focused on new vertical segments like smart cities and infrastructure, smart industrial supply chains and connected consumer products. Berg Insight believes the new wave will start in China, where government authorities and manufacturing companies will be first in the world to deploy connected devices using NB-IoT technology on a massive scale. Berg Insight does not expect to see similar levels of adoption

in any other world region in the coming five years. Most new connected consumer products will launch first in China and get exported if successful. Berg Insight finds it likely that embedded cellular IoT connectivity will become a standard feature in mass-market whitegoods and similar high-volume consumer goods.

China Mobile is the world's largest provider of cellular IoT connectivity. At the end of Q2-2017, the operator reported 150 million IoT subscribers and a year-on-year growth rate of 87 percent. Vodafone ranked second with 59 million IoT subscribers and a yearly growth rate of 43 percent. China Unicom captured the third spot with 50 million, surpassing AT&T at close to 36 million. China Telecom grew at an exceptional 250 percent year-on-year to reach 28 million cellular IoT subscribers in the period. Deutsche Telecom, Softbank/Sprint, Verizon and Telefónica currently have in the range of 15–20 million cellular IoT subscribers, which are growing at yearly rates of 15–30 percent. Telenor was the last player in the top ten with approximately 12 million cellular IoT subscribers. With an aggregate base of 407 million connections in mid-2017, the top ten mobile operators had a combined global market share of 76 percent. IoT is starting to make a substantial contribution to the revenues of the world's mobile operators. Top international players such as AT&T, Verizon and Vodafone generate in the order of € 1 billion in sales from IoT. Overall, the share of mobile operator revenues from IoT is in the range of 1 percent. This is consistent with IoT's share of total mobile data traffic reported by telecom regulators in Scandinavia.

Cellular IoT communication providers are at the forefront of adopting next generation network technology. Global IoT connectivity platforms aggregate cellular and non-cellular networks in every part of the world on a shared core network infrastructure. Some players have even developed complete mobile core networks based on virtualized network infrastructure and operated as a service on commercial clouds. From a technical perspective, network aggregation has intrinsic advantages in terms of coverage and flexibility. Any provider of international IoT connectivity must rely on external radio networks. Being tied to a single radio network in the domestic market can sometimes be a disadvantage. The main competitive advantages of traditional telecom operators in IoT are not technical but commercial. In the end, any technical platform will only be as good as the underlying commercial relationships between the connectivity provider and the radio network operators.

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The Internet of Things is weaving a new worldwide web of interconnected objects. By the end of 2018, approximately one billion devices will be 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 56 percent during 2017 to reach 647.5 million at the end of the year – corresponding to around 8 percent of all mobile subscribers. Yearly shipments of cellular IoT devices increased by 82.2 percent in to 318.1 million units. Growth was fuelled by an exceptional market expansion in China, where the installed base of cellular IoT connections more than doubled.

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 industrial 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 will begin to see adoption of LTE CAT-1 in 2018, followed by an accelerated uptake of LTE-M and NB-IoT in 2019. China is moving fast from GPRS to NB-IoT in the mass-market segment with deployments expected to exceed 100 million units by the end of 2018. 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 IoT applications 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 50 million at the beginning of 2018. 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\$ 42 million in revenues from LoRa chipsets in 2017 and expects to reach US\$ 80–100 million in 2018. Berg Insight estimates that yearly shipments of LoRa devices were 17.1 million units in 2017. Until 2023, yearly shipments are forecasted to grow at a compound annual growth rate (CAGR) of 31.6 percent to reach 89.1 million units.

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 2017, Sigfox reported 2.5 million connected devices and issued a forecast to reach 6.0 million in 2018. 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 94.3 percent from 1.2 million units in 2017 to 64.6 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 19.2 percent from 16.2 million units in 2017 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.