

# NB-IoT

## When narrow-minded is best

IoT predictions for 2020 from analysts Machina are bursting with zeros – both in the 14 billion IoT-enabled devices we'll see by then and also in the trillions of dollars that the IoT market will be worth. More modest is the bandwidth that IoT devices require (narrow) and the unit cost that makes them viable (US\$5). For operators, the right NB-IoT business models coupled with the right plays open up a multitude of verticals. Let's find out more.

By Gary Maidment



## A shot in the arm for LPWA

**T**hough superficially promising, the decade-old Low-Power Wide-Application (LPWA) market has hobbled along with multiple ailments since it was born. Expensive to run and maintain, patchy standards, low reliability, poor security, and complex network overlay...LPWA didn't seem to have much to offer.

Then NB-IoT arrived on the scene like a cure-all, eliminating LPWA's defects while keeping its kaleidoscope of power-lite

advantages.

### Stay narrow to go wide

IoT dramatically expands the scope of people-based computing into the area of autonomous smart devices. For telcos, NB-IoT provides the conduit to enter this lucrative market. For them, selling data and selling connections will bring in the revenues.

NB-IoT as a subset of IoT has much room to grow. But to connect things, the capacity of an NB-IoT cell needs to be much larger than an MBB cell. Assuming 40 devices per household, for example, a capacity of 100K for concurrent connections in each cell is required. When this is possible, NB-IoT can help telcos manage the commercial value of big data.

### Where will this big data come from?

There are four types of IoT use cases where LPWA tech can apply: public, industry, IoT appliances, and personal.

**Public:** Application scenarios include smart metering for water, gas, and electricity; alarms for both security and events like fires and gas leaks; and smart trash cans.

**Industry:** Examples include logistics, asset tracking, and smart agriculture.

## >> Snapshot: Smart agriculture

Normally a sector of slim margins, agriculture is a keen IoT adopter. Precision agriculture is where this sector is heading, with a market that will be worth a predicted US\$3.7 billion by 2018. Using GPS and in-field and in-equipment sensors to provide a steady data stream for big data analytics to unscramble, farms can achieve gains like improving crop yields, maximizing water utilization, and optimizing feed mix for cattle.

Such improvements are essential because of population growth – three days from now, the world will have more than 684,000 mouths to feed according to the Population Institute, with a 2 billion jump in population expected by 2050 from our current figure of around 7.4 billion. To keep pace, we need to produce 70 percent more food.

This is why IoT and analytics are being sown in areas like soil, weather, crops, pesticides, and weather. Precision agriculture can maximize productivity and minimize waste by helping farmers know when to plant and harvest and predict expected yield.





**+ 20 dB**

**better indoor coverage than GSM**



**100 k**

**connections per cell**

high reliability  
carrier-class security ubiquitous coverage rapid network upgrades unified business management



**10-year**

**battery life**

low power costs



**\$5-10 per module**

**\$1-2 per chipset**

low cost terminals  
plug and play

**Appliances:** Requiring a home gateway, appliances such as fridges with NB-IoT embedded devices rely on short-wave technologies like Z-wave and Zigbee to improve home management.

**Personal:** The next big thing for individual use is wearables – an estimated 168.2 million units will be shipped by 2019, representing a CAGR of 74.8 percent. A few years later in 2022, the industry will be worth US\$1.6 billion. Often centering on health and fitness, companies like Jawbone, Nike, and GoPro are active in the wearables area, while heavy hitters like Samsung, Apple, and Sony are making a noise in the smart watch space. Smart bikes and tech for monitoring children are other examples of personal IoT.

## Deployment scenarios

The recently agreed 3GPP tech for the LPWA deployment of NB-IoT offers three

deployment scenarios: guard band, in-band, and standalone. Standalone deployment mainly uses new bandwidth, guard band adopts the bandwidth reserved in the guard band of existing LTE networks, and in-band uses the same resource block as existing LTE networks.

Deploying NB-IoT in frequency bands like 700 MHz, 800 MHz, and 900 MHz is the best option, because these bands are popular with telcos and thus exist in already large and established ecosystems – as of July 2015, there were 14 LTE 900 MHz networks.

Advantageously, mobile operators running GSM 900 MHz or LTE 800 MHz have a clear upgrade pathway to NB-IoT. Equally, 1800 MHz enables the largest number of commercial LTE networks in the world, with L1800 coverage dominant in the UK,

China, Australia, and Singapore. L1800 software upgrade is in fact the simplest way to launch NB-IoT, especially for telcos that are short of low-band spectrum.

## How's the NB-IoT ecosystem shaping up?

Unlike traditional telco services, NB-IoT has a long tail ecosystem, starting from chipsets, modules, and vertical devices and moving down to the application platform. Although this makes it hard to commercialize the NB-IoT industry, more companies are developing NB-IoT products like chips, modules, devices, and infrastructure.

As a precondition for a healthy industry, vendors, telcos, and verticals are starting to cooperate on building an E2E ecosystem. 2015 was indeed a busy year for NB-IoT – Neul produced the first NB-IoT chipset, performing several trials with telcos with its first-gen chipset Icen1, with plans to release its second-gen chipset, Boudica, in 2016. Doing so will help create standardized NB-IoT technology. Also in 2015, Switzerland's U-blox stepped on the scene as the first company to produce an NB-IoT module in which it embedded the Neul chipset. This year, U-blox plans to release 850 MHz and 900 MHz modules in a further commitment to standardizing NB-IoT

technology in 2016.

Connectivity is a valuable contributor to telcos' bottom lines, and so teaming up with IoT tech vendors and chipset manufacturers makes good business sense to make the most out of solutions like smart metering, smart parking, and pet tracking. Connectivity platforms already exist in the cloud in many markets where telcos have deployed IoT services. But there's more to it than just connectivity – telcos can climb further up the value chain with an infusion of ambition.

By offering NB-IoT Network-as-a-Service on cloud to governments and industries, telcos can exploit their security, billing, and big data assets. They can also incorporate QoS and SLAs into their NB-IoT NaaS business models to become E2E service providers, while keeping their options open to outsource aspects of their business to partners.

Where does Huawei come into play? Huawei's business modeling framework can be tailored to specific nations and scenarios to give the right mix of investment, use case deployment, and business models for telcos.

With this in mind, one thing is clear: The all-pervasive future of IoT is narrow. 

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