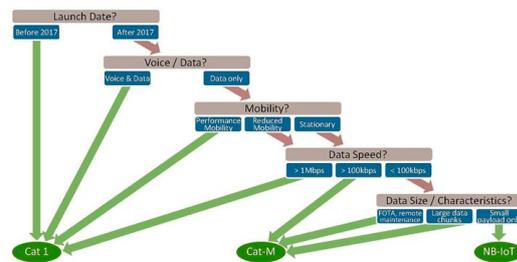
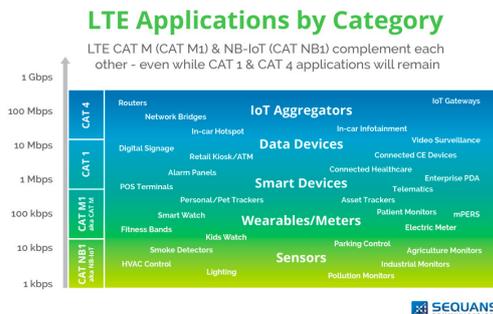


Pycom's view of LTE-M around the World

According to the GSMA: "LTE-M is the simplified industry term for the LTE-MTC LPWA technology standard published by 3GPP in the Release 13 specification. It specifically refers to LTE CatM1, suitable for the IoT. LTE-M is a low power wide area technology, which supports IoT through lower device complexity and provides extended coverage, while allowing the reuse of the LTE installed base. This allows battery lifetime as long as 10 years or more for a wide range of use cases, with the modem costs reduced to 20-25% of the current EGPRS modems."

"Supported by all major mobile equipment, chip set and module manufacturers, LTE-M networks will co-exist with 2G, 3G, and 4G mobile networks and benefit from all the security and privacy mobile network features, such as support for user identity confidentiality, entity authentication, confidentiality, data integrity, and mobile equipment identification".

M1 is currently deemed as the most popular standard in the US and Japan and NB-IoT (NB1) is more popular in Europe and China.



According to the GSMA and confirmed by the partners we are in negotiations with commercial launches of LTE-M networks will take place globally in 2017.

All the world's major operators have put together an LTE-M Task Force to:

- Facilitate demonstrations and proof of concept trials which strengthen the LTE-M solution to meet LPWA requirements
- Lead industry partners and the ecosystem to build a strong end-to-end industry chain for LTE-M growth, development and deployment
- Reduce complexity of LTE-M device introduction
- Drive and proliferate LTE-M applications in vertical markets for new business opportunities
- Promote collaboration between all LTE-M industry partners to ensure interoperability of solutions

Participating operators, many of whom are already customers of Pycom, include:

AT&T Mobility • Bell Mobility • Bermuda Digital Communications • China Mobile • China Telecom • China Unicom • Etisalat • KDDI Corporation • KT Corporation • NTT Docomo • Orange • SingTel Mobile • Singapore • Telecom Italia • Telefónica • Telenor Group • TeliaSonera • Telstra • T-Mobile Austria • Verizon Wireless • Vodafone

Here's what we think we know about LTE-M roll out.

| | Primary coverage | Roll out | Notes |
|---|-------------------------|---|--|
| Vodafone | | | |
|  | Europe / Australia | Will test NB-IoT network technology in Turkey and Spain this year(2016) with the goal of rolling it out across most of Vodafone's European network in Q1 2017 starting with Ireland, The Netherlands and Spain.. | Even though it is primarily Europe focused, Vodafone Australia revealed it had successfully carried out a pre-standard NB-IoT trial with Huawei at multiple sites in Melbourne's central business district and suburbs |
| Verizon Wireless | | | |
|  | USA | Pilot completed in Q4 2016. Will launch Cat M1 commercially before the end of 2016 and will go nationwide with Cat M1 in the first quarter of 2017. | In October they completed live, over-the-air LTE Cat M1 data call, conducted on Verizon's pre-commercial LTE Cat M1 network in South Florida. |
| AT&T Mobility | | | |
|  | USA | Has switched on first LTE-M enabled commercial site in San Francisco Plans to make LTE-M widely available across its commercial network throughout 2017. Pricing includes new prepaid plans, which target developers and businesses, include three tiers of data and text messages: 1 gigabyte of data valid for up to 1 year and 500 text messages for \$25; 3 GB of data valid for up to 1 year and 1,000 text messages for \$60; and 5 GB of data valid for up to 2 years and 1,500 text messages for \$100. The plans are set to be available later this month. | |
| EE/Orange | | | |
|  | Central Europe | Coverage believed to be achieved by the end of 2017 | |
| SK Telecom | South Korea | Pilot Q1 2017. | |



SK Telecom, announced the completion of its nationwide deployment of a LPWAN LoRa network, covering 99 percent of the population in Korea. Covering its bases, securing both nationwide LTE-M and LoRaWAN as the two main pillars for its IoT network. The company completed its nationwide LTE-M rollout in March 2017.

Telstra



Australia

On 02 November Telstra announced that Ericsson and Qualcomm Technologies have undertaken network and device testing of data communications on Cat M1. It is speculated that they will start roll out in 2017.

Telstra has announced support for Category 1 (Cat 1) devices on its LTE network. Telstra said NB LTE-M which is also called NB-IoT will be the next big breakthrough, delivering deeper coverage into buildings, and remote and rural penetration beyond the telco's existing geographical range, while heralding very low cost devices.

Deutsche Telekom



Central Europe

Deutsche Telekom (DT) and Huawei were the first to announce a field trial of pre-NB-IoT in October 2015. The field trial took place in Bonn, Germany.

China Telecom



China

China Telecom plans to have nationwide narrow-band IoT (NB-IoT) coverage using the 800MHz band by the end of the first half of 2017.

The operator is upgrading its 4G network using two-carrier aggregation on the 1.8GHz and 2.1GHz bands, and will also refarm the 800MHz band for LTE services, C114.net reported. The 800MHz band was previously used for CDMA service.

China Unicom



China

In late 2015, Chinese vendor Huawei has partnered with domestic telecoms operator China Unicom to stage a Cellular Internet of Things (CIoT) pilot project in Shanghai. Planning large-scale NB-IoT field trials in more than five cities this year and aims to start commercial deployment by the end of the year and take coverage nationwide in 2018.

China Mobile

China

Not announced yet



Etisalat


Middle East

Not announced yet

Softbank


Japan

Have not yet given a timeline for its launch of the NB-IoT or CAT-M. SoftBank will launch a narrowband-IoT (NB-IoT) network, which is a standardized cellular technology that is part of the 3rd Generation Partnership Project's (3GPP) LTE Release 13 and a LTE CAT-M network, another standardized cellular technology. LTE CAT-M will deliver about 1 Mb/s speeds in a 1.4 MHz channel while NB-IoT will deliver about 40 kb/s speeds in a 200 kHz channel.

SoftBank said that by deploying different types of technologies, like LoRa and NB-IoT as well as WiFi, it will be able to offer IoT solutions that are geared toward different customer preferences.

Singapore Mobile One


Singapore

Singapore's Mobile One cellular operator has said it will launch an NB-IoT network in the first half of 2017.

T-Mobile


USA

Not announced yet

T-Mobile promotes its CAT-1 capable IoT network, in particular supporting GSM customers

NTT Docomo


Japan

As of November 2016, evaluating NB-IoT / CAT-1 technologies