Mobile IoT: Choosing Between the New Mobile Connectivity Technologies

TT Electronics

Introduction

Mobile IoT is an excellent choice for global IoT needs. It is a term that refers to the 3GPP (3rd Generation Partnership Project) standardised LPWA (Low Power Wide Area) technologies using licensed spectrum bands such as NB-IoT and LTE-M. LPWA technologies are networks designed for IoT applications that are low cost, use low data ranges, require a long battery life and can operate in hard to reach locations.

As an IoT-enabler and design-led solutions business, we provide connectivity ranging from low-frequency sensor networks to more sophisticated 5G-enabled networks. Connectivity is a crucial part of product design and performance, and the choice of connectivity technology must be considered early in the process. In this article, we discuss mobile connectivity and choosing between LTE-M and NB-IoT technologies and more.

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Mobile Connectivity Evolution From 1G to 5G

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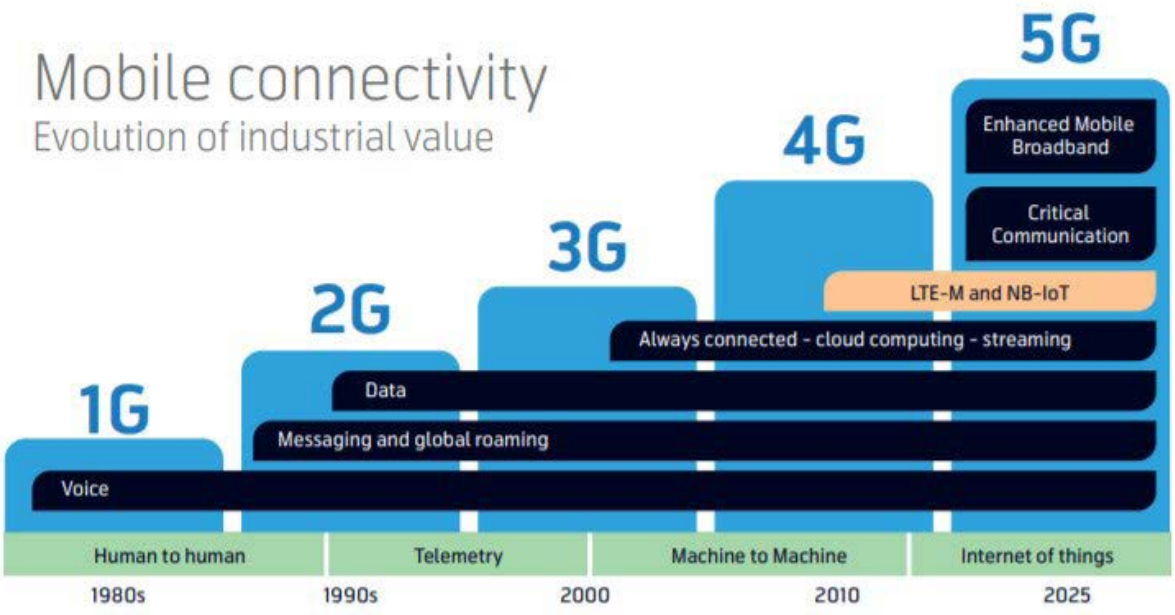
How Does Mobile IoT Fit Into the 5G Future?

Chapter 1

Mobile Connectivity Evolution

Connectivity is key to the sharing of data and bringing together systems that optimise efficiency and performance. Mobile connectivity has evolved from human to human communication to the internet of things applications.

From 1G to 5G: The History of Mobile Connectivity



Source: Telenorconnexion.com

Find more detailed information in this whitepaper by Telenor Connexion

1 G - Refers to the first generation of wireless cellular technology, human to human. The introduction of wireless voice. (Made for the internet of humans)

2 G - Telemetry is the automatic recording and transmission of data from remote or inaccessible sources to an IT system in a different location for monitoring and analysis. Telemetry data may be relayed using radio, infrared, ultrasonic, Global System for

Mobile communications (GSM), satellite or cable, depending on the application. [source]

Short Message Service (SMS) messaging and General Packet Radio Service (GPRS) became widely used for basic telemetry. Roaming made mobile technology suitable for deployments in multiple countries.

3 G - Machine to Machine. 3G evolutions were mainly centred around high-speed data applications.

2G and 3G are slowly disappearing and not future-proofed.

4 G - Refers to the fourth generation of broadband cellular network technology, succeeding 3G. (Made for the Internet of Things)

4 G begins to introduce LTE-M (Long-Term Evolution) and NB-IoT (Narrowband IoT) as part of 5G.

LTE-M and NB-IoT are both excellent connectivity options for industries looking to take advantage of LPWAN (Low Power Wide Area Networks) technology. They enhance the battery life of devices and connects devices that have previously been hard to reach.

With connected products, manufacturers can extend their customer relationships far beyond the assembly line. LTE-M and NB-IoT are designed explicitly for the Internet of Things.

5 G - 5G networks use a combination of existing 4G LTE and new 5G New Radio (5G NR) technology. The number of mobile intelligent and interconnected devices continues to grow as we shift into the Internet of Things (IoT) era.

Aragon Research cites, “Leveraging sensors, smart sensors, and controllers for expanded pattern sensing, decisions, and appropriate actions at the edge is a new and growing trend.”

5G will have several new features, compared to traditional 4G-LTE networks. One being lower battery consumption meaning that 5G networks will be more energy-

efficient, allowing for connections of all kinds to be made with lower overall power consumption and battery usage.

5G will build upon current wireless low-power standards like NB-IoT (Narrowband IoT) and LTE-M (LTE Cat-1) technologies. These existing technologies already offer extremely low-power data transmission so that 5G will improve this even further.

Resources

11 Industrial IoT Experts Weigh In on the Opportunity to Transform the Industry

Mobile and IoT - Managing Mobility in the Enterprise

Chapter 2

How to Decide Between the New Mobile Connectivity Technologies

Two new technologies, both based on mobile (cellular) technology, are entering the market in the form of LTE-M and NB-IoT - both created to be suitable for enabling **global IoT connectivity**.

But the question raised is, *Which one is the best choice for your application?*

First, let's look at - **Why LTE-M and NB-IoT?**

Here are the similar benefits of the technologies:

- Designed to support IoT devices.
- They support devices that need longer battery life.
- They have better coverage (coverage enhancements using repetitions).
- LTE-M and NB-IoT both use simplified versions of regular 4G, which reduces hardware complexity and cost once the technology is operating at scale.
- Both are starting to become globally available.
- They operate on dedicated radio frequencies in telecom networks

To summarize...

Key Benefits of Mobile IoT Technologies

Source: How Mobile IoT is Changing the Industrial Landscape

Back to the original question...

How do you decide between the two new mobile connectivity technologies?

The optimal choice of technology... depends on your use case.

A business needs to choose the technology that will grow with new use cases. The application should evolve with time.

Let's look at a few of their differences.

Here's how LTE-M and NB-IoT differ:

Characteristic/Element	LTE-M	NB-IoT
Growth of Data/Usage	Can grow into new use cases	Suitable for stationary use cases
Bandwidth	Has the bandwidth to support software updates	Narrow bandwidth leads to challenges in software updates
Design	Designed for the global internet age, better fit for 2G/3G replacement	Designed for local deployments (lower responsiveness)
Feature	Variant of LTE	Treated as a new access technology
Global Availability	Initially designed for roaming	Initially designed for static devices - not made for roaming
Response Time	LTE-M provides the same consistent response time as regular 4G so that it can be used by people to remotely control devices	NB-IoT is designed to send small amounts of data and is not designed for a fast response.

LTE-M can grow into new use cases

- can support human interaction
- can support the growth of the data, for devices with a long life cycle
- has the bandwidth to support software updates
- designed for the global internet age, better fit for 2G/3G replacement
- another variant of LTE
- made for roaming

NB-IoT is suitable for stationary use cases with limited need for growth.

- the narrow bandwidth of NB-IoT leads to challenges in software updates (these updates require time and capacity)
- designed for local deployments
- treated as a new access technology

Watch the video below from Telenor Connexion for a full comparison of LTE-M and NB-IoT:

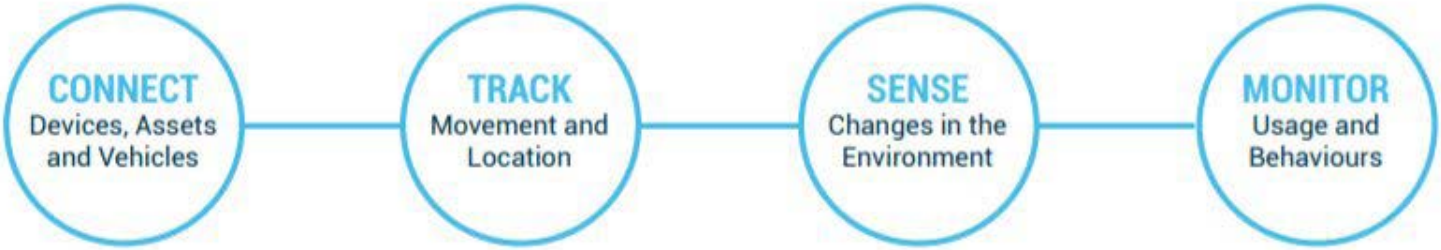
Source: [Telenor Connexion, "LTE-M vs NB IoT, An urgent matter for global companies," via YouTubescape]

LTE-M uses standard IP protocols, making it easier to develop applications. New mobile IoT connectivity standards, LTE-M and NB-IoT, opens up for new and evolved use case by offering better coverage, longer-lasting batteries and lower device cost.

Chapter 3

How Does Mobile IoT Fit into the 5G Future for the Industrial Landscape?

It answers the specific needs of connecting things...



Time to market is essential when launching new products.

Access to people with the right competence is vital to ensure time to market, which is why many businesses choose standard technologies over specialized technologies.

Conventional technologies make product development:

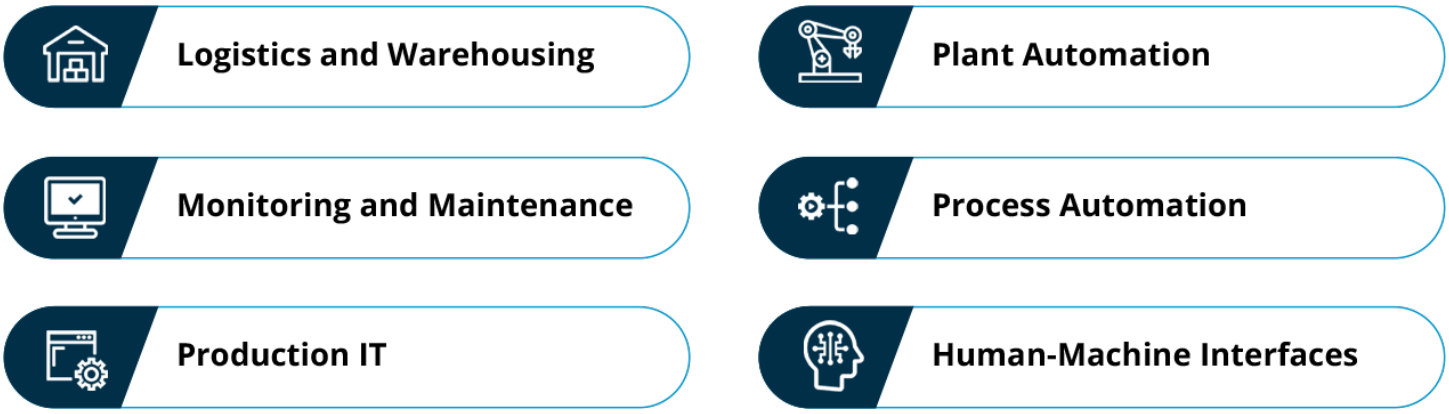
- Faster (reduces development time)
- Product maintenance more cost-efficient
- Easier to get access to developers and other specialists
- Increased product quality

Mobile IoT will help manufacturers achieve tangible results such as improving efficiencies, eliminating unnecessary maintenance, reducing carbon footprint and enabling data-led business decisions. It will allow more significant production planning with a direct automatic contribution to operating margins.

IoT-enabled manufacturing refers to an advanced principle in which typical production resources are converted into smart manufacturing objects (SMOs) that can sense, interconnect, and interact with each other to automatically and adaptively carryout manufacturing logics. [source]

IoT has countless numbers of applications in manufacturing plants. It will continue to rise in manufacturing, logistics, and transportation. Mobile IoT technologies play a central role in connecting manufacturing plants, equipment, and sensors. The IoT devices track and trace the inventory system on a global scale.

The industrial application categories cover a wide range of use in:



Demand will continue to grow as the roll-out of Mobile IoT networks using LTE-M and NB-IoT advances.

Resources

How Mobile IoT is Changing the Industrial Landscape

Applications of IoT in Manufacturing Plants

Conclusion

Mobile IoT has blended hardware and software with the internet to build a more technically-driven environment. LTE-M and NB-IoT are adapted to provide cost-effective and reliable connectivity with a long lifespan.

At TT Electronics, we have an end-to-end IoT framework that seamlessly delivers hardware, connectivity, infrastructure and user experience solutions. Our **speed to connect** system enables customers to deploy IoT solutions faster, smarter and more cost-effective **than going it alone**.

Let's Start a New Project Together

Get in Touch