

A young woman with long brown hair is smiling broadly while looking at her smartphone. She is wearing a light blue denim jacket over a white floral-patterned shirt. She has white earbuds in her ears and is holding a silver smartphone in her right hand. Her left hand is raised, holding a pair of glasses. The background is slightly blurred, showing what appears to be an indoor setting with wooden beams.

**Why MNOs need to
invest in dedicated
core network for mobile
IoT connections**

Cellular IoT technology, an integral part of 4G and 5G connectivity, is playing a key role in enabling mobile operators and their partners in deploying innovative solutions spanning almost every segment of the economy.

3.1 billion devices are expected to have cellular IoT connections, including 1.8 billion licensed LPWA connections, by 2025¹ (See Figure 1). This growth in mobile IoT connections has big implications for the Mobile Network Operators (MNOs).

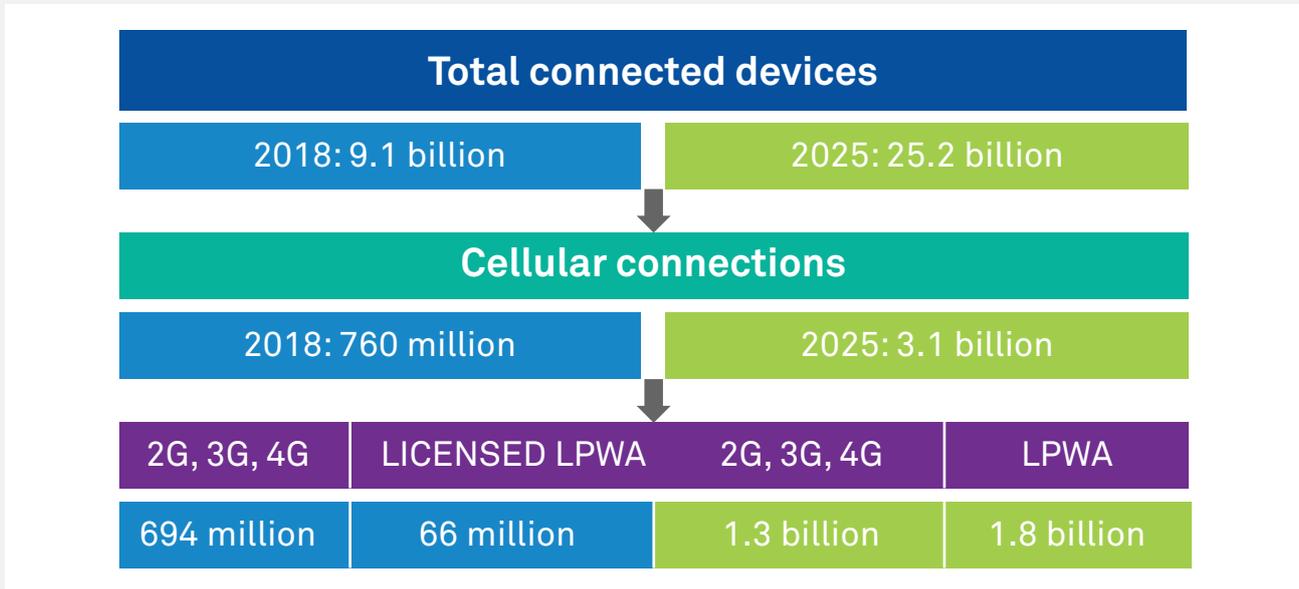


Figure 1: The internet of Things by 2025² (Source: GSMA guide to Internet of Things)

The core market for MNOs is mobile voice and data. According to GSMA Intelligence, the MNO ARPU for mobile voice and data is between \$41 to \$49 per month in USA³. IoT and M2M devices, on the other hand, typically provide an ARPU of \$2 to \$5 per month⁴. Some of the IoT Mobile Virtual Network Operators (MVNOs) are offering connectivity at very low prices. To stay competitive in this dynamic market, MNOs need to build capabilities that help them offer low cost per connection.

In addition, there are many types of IoT services, each with specific performance or economic requirements. Based on comparison of four different types of IoT services (Figure 2), we can see how different IoT service types demand different requirements. For instance, a connected car service or a smartphone service drives a large amount of signaling traffic over the control plane due to mobility events, whereas smart meters interact infrequently with the network and therefore generate far less signaling.

	Devices & Bearer Scale	Control Plane Signaling (Transaction/hour)	Data Plane Throughput	Mobility	Latency
Smart Meters	Massive (Many Millions)	Low (2-10 t/hr)	Low	None	High tolerance
Non-Consumer Video	Moderate (Thousands)	High (2-10 t/hr)	Low	None	Low tolerance
Connected Car	High (Millions)	High (500-1000 t/hr)	High	Frequent	Moderate tolerance
Smartphone Users	High (Millions)	Moderate (200-500 t/hr)	Moderate	Frequent	Moderate tolerance

Figure 2: IoT services type and performance aspects. (Source: Nokia)⁵

The two aspects related to lower cost per connection and varied IoT service types demand that MNOs find ways to remain competitive in the emerging IoT connectivity market.

Need for virtualized mobile IoT core network

The smart phone oriented core network and associated costs are not suitable for an IoT service with a different traffic profile and pricing model. The diversity of service types and the need to offer connectivity at lower cost per connection demand that operators pursue dedicated virtualized core networks for IoT. Networks must be able to accommodate a large number of connections for different types of IoT services. A classic traffic model requires a single cell to serve over thousands of connections. A cellular-based IoT end-to-end network design needs to scale to meet such requirements.

To handle diversity of service types, MNOs need to create virtual cores based on the type of service being delivered (connected car / smart meter / video surveillance etc.) and optimize this core according to the traffic profile. For example, if the service involves large number of IoT connections with low throughput from a stationary device, then low throughput would be sufficient at the core but should support massive IoT. Similarly, if the service generates a large amount of data (eg. video surveillance and analytics in a shopping mall), high throughput will be required, but mobility may not be needed.

Virtualization and Cloud will play a big role in driving a radical decrease in the cost of IoT core network connections and lower the price per connection. Based on a TCO study carried out by Bell Labs Consulting, an estimated 60% decrease over five years can be achieved by virtualizing IoT core⁶.

MNO approach

Large and successful MNOs such as AT&T have collaborated with global IoT network providers such as Nokia WING, Nokia's global managed IoT service for network operators⁶. Nokia WING is designed to act as a borderless IoT network.

MNO Sprint has invested on building a dedicated IoT Core network. In November 2018, Sprint launched its Curiosity IoT platform, which operates a dedicated virtualized core and uses software to route IoT traffic on the network. This allows Sprint to guarantee performance of the IoT traffic and reduce latency.

It is estimated that by 2022, competition with IoT MVNOs will intensify in the 20 main countries that control 84% of IoT connectivity revenue⁷. MNOs have to expand geographic infrastructure deployments to support 20 main countries and to conform to local regulations in countries banning permanent roaming.

To conclude

The number of IoT connections is growing rapidly with almost all operators seeing rapid growth in the number of connections. However, the average revenue per connection is very low and there is increasing competition from IoT MVNOs offering connectivity at very low prices. In addition, different types of IoT services come with specific performance or economic requirements driving the need for a dedicated IoT core network. MNOs have to invest on deploying virtualized mobile core or partner with IoT network providers to lower IoT connectivity costs and handle different IoT service types.

About the author

Aravind Sorake, Senior Architect - Cloud & Infrastructure Services, Wipro

Aravind has industry experience in the areas of Consulting, Business Development, Pre-sales, Solution Design and Software Development. As an experienced IoT and Smart Cities professional, Aravind has worked extensively with companies around the globe in providing innovative and cutting-edge solutions. Aravind has special interest in cellular communication technology trends and IoT. You can reach him at aravind.sorake@wipro.com

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Wipro Limited

Doddakannelli, Sarjapur Road,
Bangalore-560 035, India

Tel: +91 (80) 2844 0011

Fax: +91 (80) 2844 0256

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please write to us at
info@wipro.com

