



LTE-M Commercialisation Case Study

How AT&T and Telstra Connect
Million More IoT Devices





The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with over 350 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai, Mobile World Congress Americas and the Mobile 360 Series of conferences.

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About the GSMA Internet of Things Programme

The GSMA's Internet of Things Programme is an industry initiative focused on:

- **COVERAGE** of machine friendly, cost effective networks to deliver global and universal benefits.
- **CAPABILITY** to capture higher value services beyond connectivity, at scale.
- **CYBERSECURITY** to enable a trusted IoT where security is embedded from the beginning, at every stage of the IoT value chain.

By developing key enablers, facilitating industry collaboration and supporting network optimisation, the Internet of Things Programme is enabling consumers and businesses to harness a host of rich new services, connected by intelligent and secure mobile networks.

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Summary

This paper outlines how two of the world's leading mobile operators – AT&T and Telstra – are using LTE-M technology to roll out innovative new services. In Australia, Telstra is using LTE-M to support a solar-powered asset location tracking solution that enables manufacturers and distributors to see in near real-time the location of their fleet of moving assets.

In North America, AT&T is working with white goods manufacturers to provide simple and secure connectivity to their appliances, so they can use the resulting data to improve their products and provide better services to consumers and businesses, such as hotels and restaurants.

In both cases, LTE-M is making it cost-effective for the operator to provide customers with simple and secure connectivity that will work reliably over large geographic areas and deep inside buildings.



Introduction

As demand for the Internet of Things (IoT) grows, mobile operators are increasingly harnessing Mobile IoT networks to provide their customers with low power wide area network connectivity. Employing licensed spectrum using technologies standardised by 3GPP, Mobile IoT networks are designed to support solutions that need to be low cost, require long battery lives and operate in remote, harsh or hard-to-reach locations. Between them, the two Mobile IoT technologies – LTE-M and NB-IoT - can support a diverse range of vertical industries, applications and deployment scenarios.

Deployed via software upgrade to existing LTE base stations, LTE-M (Long-Term Evolution for Machines) can provide extended coverage to low-cost and compact devices. LTE-M connected devices can have a battery life of up to 5 to 10 years for a wide range of use cases, while enabling a reduction in modem costs to between 20% and 25% the cost of EGPRS modems.

Supported by major mobile equipment, chipset and module manufacturers, LTE-M networks benefit from all the security features of mobile networks, such as support for user identity confidentiality, entity authentication, data integrity and mobile equipment identification.

As of December 2018, there have been 83 commercial launches of LTE-M and NB-IoT markets around the world.



18 Operators  **16 Markets**
November 2018 | **Commercial LTE-M Services Globally** 

AT&T – CONNECTING MORE WHITE GOODS



Simple and highly-secure connectivity

AT&T regards LTE-M as a compelling, simple and highly secure alternative to Wi-Fi for white goods and smart home solutions that don't need a high-speed connection. AT&T believes there is a pent-up demand for solutions that work straight out of the box and bundle the cost of the connectivity into the up-front cost of the device. The operator is, therefore, offering customers simple, all-in pricing models where the SIM, data, and self-service API interfaces are bundled into the price of the device itself. For example, the AT&T LTE-M Button, which is designed to help customers to initiate or order services simply by pressing the button is currently available for a **promotional price of \$29.99** inclusive of the device, SIM and three years of data or 1,500 clicks.

AT&T provides LTE-M coverage across much of North America, using Bands 2, 4, and 12 (1900MHz, 1700MHz

and 700MHz spectrum) in the US, and Band 4 (1700MHz) in Mexico. AT&T has also certified LTE-M chipsets and modules from a broad range of suppliers, with LTE-M modules costing as little as \$7.50 introduced in 2017. Furthermore, LTE-M modules have a much smaller form factor than conventional cellular modules.

Bringing white goods online

In developed markets, refrigerators, washing machines, dryers, dishwashers, ovens, room air conditioners, hot water tanks and other appliances increasingly ship with built-in Wi-Fi for connectivity. Manufacturers want to use this connectivity to monitor how their products are utilized, monitor hundreds of sensors, improve repair services and provide customers with value-added services, such as proactive offers of filters, detergents and other related products.

But AT&T says most consumers ultimately don't connect them to their Wi-Fi network. "Manufacturers already want connectivity to their products, but currently, there is a very low adoption rate among consumers," says David Allen, Director of Internet of Things, Advanced Product Development, at AT&T. "Historically, there has been a low adoption rate in white goods and home automation products attempting to utilize Wi-Fi. With



“ There has been a low adoption rate in all industries that have utilised WiFi. With appliances that have no clear interface, such as a WiFi dash button, it requires multiple steps to register the product and then use the product. ”

David Allen, Director of Internet of Things, Advanced Product Development, AT&T.

devices that have no user interface, such as a Wi-Fi button, it requires multiple steps to register the product and then use the product. There can be even more steps in the case of a business, such as a hotel, where there are firewalls and landing pages to complete the Wi-Fi registration process.”

A simple, highly secure alternative to Wi-Fi

With LTE-M, the connectivity can be activated during the appliance manufacturing process, so that the product is connected throughout the product life cycle, including the factory, during distribution, in the retail store and prior to arriving at the consumer’s home. “As soon as the consumer plugs the appliance in, it is communicating. It’s that simple,” says David Allen. The consumer can then download the relevant app and register the product. But even if they don’t take this step, the appliance can still transmit usage and telemetry information (without any personally identifiable data) back to the manufacturer.

LTE-M also has cost advantages. “With LTE-M, the cost of the modules and data has come down dramatically compared with LTE, and there is only a small amount of data being transmitted with white goods. The module cost with LTE-M may be slightly higher than Wi-Fi, but you can address a much larger percentage of the market. As the cost per connected unit comes down, the return can be much better,” says David Allen.

LTE-M is also deployed on licensed spectrum. “With LTE-M the mobile operator has dedicated licensed spectrum and builds dedicated private VPNs back to the manufacturer’s data centre,” says David Allen.

In homes and businesses, internal walls and equipment can interfere with wireless signals. But both LTE-M and NB-IoT have a coverage extension feature, which means the device and network can repeat the message multiple times to improve the success rate of connectivity.

Better products, quicker repairs, enhanced services

Once an appliance is connected, the manufacturer can collect operational data from its on-board sensors that monitor filters, motors, when the door is opened, which cycles are used and other factors. This is analogous to how car OEMs provide diagnostic codes via their OBDII

ports. This data can then be used to optimise future products and predict any problems before they arise. “You can offer improved warranty services and repair experience,” says David Allen. “When a product is not performing how it should, the service technician will know in advance which parts to bring.” The manufacturer can also use the connectivity to engage the customer, proactively offering value added services that complement the core appliance. For example, a connected washing machine could flag when it has completed 50 cycles, indicating the owner may need more detergent.

Proof of concepts pave the way to commercialisation

AT&T is conducting proofs of concept of LTE-M-connected appliances with manufacturers now. “We don’t have to convince them to add connectivity. The appliance manufacturers are already believers in the value of connectivity. We are showing them the value of using LTE-M to increase the connectivity adoption rate,” says David Allen. The next step will be to work with the manufacturers to roll out a customer proposition. “The aim is not to have the consumer subscribe to a separate data plan,” he adds. “The connectivity will be bundled into the upfront cost of the appliance. It just works.”

Once they have downloaded an app, buyers of the connected appliance will be able to monitor and manage their equipment using their smartphone, allowing them to activate a dishwasher or washing machine from wherever they are. AT&T is also expecting to see strong demand for LTE-M-connected white goods from hotels, laundromats, restaurants and other businesses that use white goods. For these customers, internal firewalls, Wi-Fi landing pages and network congestion can make relying on Wi-Fi particularly problematic.

And LTE-M can be a part of a holistic solution, Allen added. “This includes platforms to manage connectivity, device management, resources such as the **AT&T Foundry** where manufacturers can collaborate to integrate the Internet of Things into their products. Then, **AT&T Professional Services** can help bring products to market.”

“We see this analogous to the connected car market,” says David Allen. “There are tens of millions of white goods being shipped every year. Once LTE-M connectivity is embedded, it could grow exponentially.”

TELSTRA – TRACKING ASSETS ACROSS AUSTRALIA



Coverage above and beyond conventional cellular

Using the 700MHz spectrum band, Telstra has deployed LTE-M across selected locations in Australia, providing coverage of around three million square kilometres* (compared with around 2.5 million square kilometres for its 4G cellular network). “It’s a compelling proposition and, excluding satellite, no one else offers that level of IoT coverage today,” says Wayne Law, Network Technology & Innovation at Telstra.

A solar-powered asset tracking solution

Telstra is now rolling out an LTE-M-based device, equipped with solar panels and a GPS chip, which can be used by enterprises to track the location of high value, non-powered assets, such as shipping containers, semi-trailers, rail freight wagons, and large machinery. It is available for use in Telstra LTE-M and NB-IoT coverage areas in selected metropolitan and regional areas. The solution can give businesses new insights into their supply chains based on near real time data which allows them to reduce costs, increase efficiencies and ultimately the customer experience.

Utilising the LTE-M connection and when in range, the tracker is designed to report its location once a minute when moving, and once every four hours when stationary. Moving from cell tower to cell tower, LTE-M enables tracking in near real time. Each location message uses approximately 1KB of data. If the device sends an average of one location message an hour, under typical

conditions it can last up to four months on a full charge, explains Stelios Trikoulis, Global IoT Solutions at Telstra, adding: “The solar panel can take the lithium ion battery from completely flat to fully charged in approximately 4-8 days depending on location conditions, charging every day in direct sunlight.”

Designed to last between five and seven years, the device is about the length of two mobile phones lying end-to-end. As a result, it has a large antenna, assisting it to receive a GPS signal in urban areas with tall buildings, such as downtown Sydney, enabling deeper in building and fringe coverage.”



As well as providing the hardware and the connectivity, Telstra provides the customer with access to the location data via APIs or a web portal. “Customers can zero in on the map and see that they have 50 containers in Melbourne, for example,” says Wayne Law. The operator anticipates its smaller enterprise customers will use between 250 and 1,000 devices, while its larger enterprise customers will look at deployments of between 2,000 and 5,000 devices.

“ The service charge for the connectivity and the use of the APIs is a flat monthly fee. It is a tiered approach in which we provide volume discounts. ”

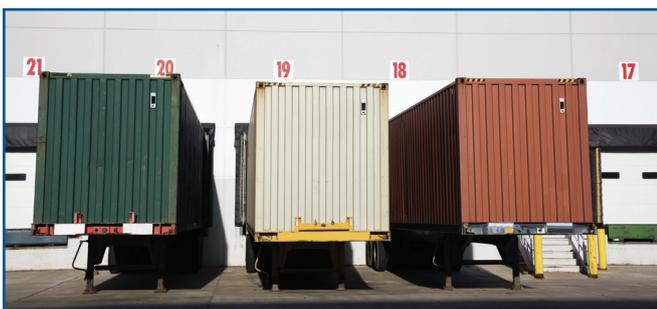
Stelios Trikoulis, Senior Product Manager, Global IoT Solutions, Telstra

Solving supply chain challenges

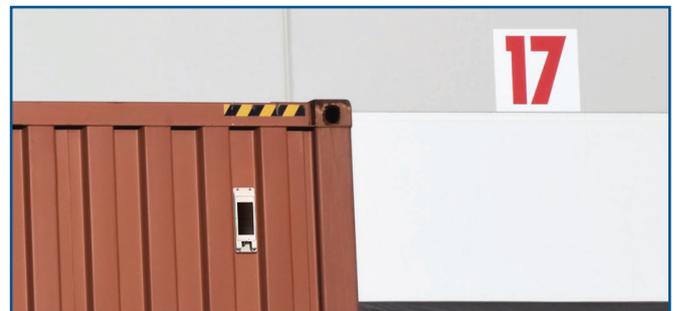
Telstra says the new solution is designed to help enterprises avoid the loss of assets and cargo, retrieve those that go missing in action, and in turn increase supply chain efficiency. Traditional tracking mechanisms such as RFID tags do not support near real time data, as businesses only know if an asset has been checked in or out, and not its actual location. Telstra estimates manufacturers can lose approximately 10% of their asset fleet every fiscal year, as well as business being impacted from operational inefficiencies including manual tracking and stocktake processes. Up until now, it has not been economic to track assets of this value, but with lower data use and devices with longer battery life, tracking of high and low value assets is increasingly cost efficient.

Telstra says companies using rail freight are also looking for solutions that enable them to track wagons in terminals and yards. Today, each wagon has to be manually scanned in order to be identified and allocated to the next train unit or for maintenance. Other Telstra customers in manufacturing require near real time asset location to better manage their supply chain, including where deliveries are, and where the distribution asset is located post-delivery.

Having launched the solution in October 2018, Telstra is now deploying it with customers in several vertical industries, including freight logistics companies, manufacturing, construction and retail. Initially, customers tend to purchase up to ten devices to run a trial, provide feedback to Telstra and finalise the business case and calculate the potential return on investment (ROI). “The customer can purchase the hardware outright or re-pay over 12, 24 or 36 month periods,” says Stelios Trikoulis. “The service charge for the connectivity and the use of the APIs is a monthly fee, which is also required. The hardware and service charge also follows a tiered approach in which volume discounts are available.”



With Telstra developing case studies that quantify the benefits and the ROI, Stelios Trikoulis believes adoption could grow exponentially. “Based on my interactions with customers, few have been averse to the price as improvements in efficiency and data insights have reduced overall business costs or gained efficiencies” he says. “Telstra is at the epicentre of Australian business – we have existing relationships with a significant number of Australian business. With the customers we have spoken to, we’ve been able to outline a use case for asset tracking, which up until now has not been cost efficient to deploy.”



The functionality of the solar device can also be extended to support other use cases. “The device contains a connector for adding sensors or to plug in for an external power sources,” says Stelios Trikoulis. “We are hopeful that in the future we might be able to offer increased functionality, for example adding a temperature, pressure or door sensor or configuring the web portal to send a notification if the metric rises above a certain threshold”. The device also has a Bluetooth radio. Telstra is now exploring how to enable the asset tracking solution to work internationally. From a technical perspective that should be straightforward: The hardware contains GSM and NB-IoT radios, as well as the LTE-M radio, while supporting 13 different spectrum bands. Once Telstra has reached appropriate international roaming agreements with its operator partners, Telstra sees a future where an enterprise could use the solution to track the movement of its assets across the world.

* For compatible LTE-M devices within Telstra NB-IoT and LTE-M coverage areas. Coverage at any location can be affected by local building density, terrain and vegetation. Speed and performance may vary on location, device, and demand on the network. Refer to Telstra’s IoT Coverage Maps (<https://www.telstra.com.au/business-enterprise/solutions/internet-of-things/iot-coverage>) Online Coverage Maps

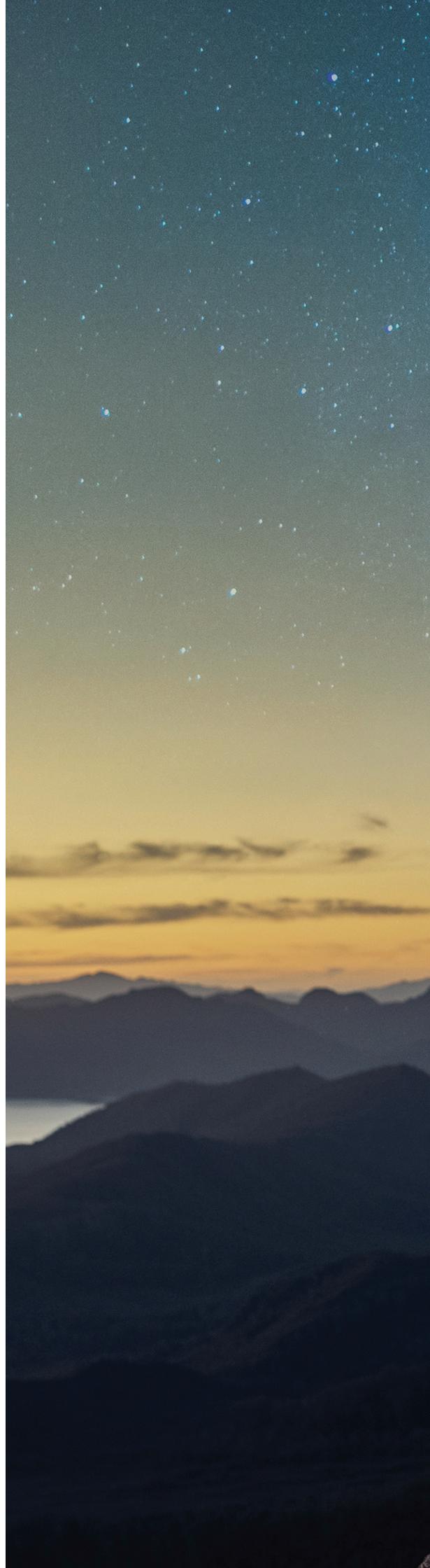
Conclusions

The rollout of LTE-M connectivity in the white goods and logistics sectors highlights how this Mobile IoT technology is set to be widely used by both enterprises and consumers. As the number of LTE-M connections rises, economies of scale will increase, creating a virtuous circle that will drive wider deployments.

Moreover, LTE-M is set to be an integral part of operators' 5G proposition for Internet of Things applications. That ensures that LTE-M is future-proof and will continue to serve applications that need simple and secure connectivity over large areas at a low cost and with low device complexity.



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