Supporting Secure, Flexible, Data-Centric Applications with Private LTE
Executive Summary

For many enterprises, their ability to analyse, capture and use data securely and reliably from many devices across their business determines their levels of productivity, innovation and profitability.

Today, companies still tend to rely heavily on fixed Ethernet networks for connectivity, supported by Wi-Fi for wireless access. For example, 86 percent of the respondents to a survey of enterprise Internet of Things (IoT) use, conducted by Beecham Research at the end of 2019, said they use Wi-Fi. This result is far ahead of the second-most popular wireless technology, which was cellular at 48 percent.

Wi-Fi looks set to remain an important enterprise communications technology. However, its legacy limitations come under greater scrutiny as data becomes a more critical business asset and dependence on automation and IoT grows. As a result, a growing number of enterprises are evaluating the use of unlicensed private LTE. Unlike Wi-Fi, private LTE running on unlicensed spectrum can optimize the flow and security of different types of IoT traffic while currently approaching enterprise-grade Wi-Fi on cost-effectiveness.

The need for secure wireless networks capable of accommodating a variety of IoT devices is becoming a pressing concern for some enterprises. The research company Gartner Inc. forecasts that the enterprise and automotive IoT market will grow to 5.8 billion endpoints in 2020 alone, a 21 percent increase from 2019. Growth will not stop there. With the full spectrum of consumer and enterprise use, International Data Corporation (IDC) expects there to be 41.6 billion connected IoT devices in operation by 2025, including machines, sensors and cameras.

As enterprises make use of a wider array of wirelessly connected sensors and devices to deploy video surveillance, automate manufacturing, improve asset management or enhance logistics, not only is the number of connected objects set to increase but also the demand for edge to enterprise cloud security. This involves keeping data from sensors, people or systems inside the corporate firewall. It is both fast and secure because it keeps data on-site rather than transferring it to an external cloud or network. However, it requires reliable, secure network connectivity and not necessarily in areas served by wired networks.

In this whitepaper, we will look at the role of private LTE in supporting secure, cost-effective digital transformation and how it can complement Wi-Fi as companies evolve towards 5G.
Companies in sectors ranging from manufacturing, energy and healthcare to transport, mining and logistics are all showing a keen interest in private LTE networks as their need for scalable, secure, high-performance, flexible wireless connectivity outstrips the capabilities of Wi-Fi.

Wi-Fi, in general, cannot compete with private LTE networks that can support mobility and enable point-to-point HD-UHD video, native voice support, remote operability, configurable quality of service (QoS) on a class of device basis and enhanced security robustness. In a survey conducted by Beecham Research, 51 percent of enterprises have considered using 4G/LTE and 71 percent believe that private 4G/LTE networking can address Wi-Fi’s limitations.

Individual sectors will benefit in different ways, with private LTE often operating as a complement to Wi-Fi.

Mining facilities and large agricultural sites can gain in increased service coverage area as well as improved security by operating a private LTE network in places where public network coverage is unavailable or patchy.

In healthcare, applications such as hospital medical devices can benefit from the high speeds of LTE and 5G in fully private networks that comply with strict patient communication regulations. These networks also help maintain devices, including vital sign monitors, IV dispensers and other devices, by keeping them more accurately updated with the latest operating parameters and firmware for performance and regulatory compliance. Also, medical devices in hospitals must adhere to the highest levels of security, which can be achieved using private LTE technology. In contrast, Wi-Fi technology has a higher vulnerability to malicious attacks in this case.

For manufacturers, meanwhile, private LTE offers an opportunity to not only extend production lines but also start ridding their sites of kilometres of cables, which are expensive to maintain and limit physical deployments to certain areas. Many aspects of manufacturing automation depend on real-time data transfer. The movements of robots on a production line, for example, are tightly synchronised with each other and surrounding sensors and machinery and require a precisely timed data exchange with interdependent systems to function efficiently. For this reason, manufacturers have traditionally relied on fixed networks to connect them. However, that trend is quickly changing. By deploying a private LTE-based wireless network, they can combine high service levels with flexible, cable-free coverage with enhanced security.
Enterprise-Grade Carrier-Level Performance

The advantages of private LTE networking spring from LTE being a cellular network technology designed to deliver carrier-grade enterprise performance. Private LTE is a local network built with dedicated LTE cell sites and core network servers that can operate independently of a mobile network operator’s public LTE network.

Today, Wi-Fi remains popular in the enterprise market for stationary or semi-stationary applications, such as connecting smartphones, laptops and tablets, because it is relatively inexpensive and easy to both deploy and use, and it will continue to be so. Wi-Fi, however, runs into scalability, coverage and performance issues when asked to deal with many of the applications used by ports, railroads, mines, the oil and gas extraction industries and healthcare providers. That is because IoT applications that improve productivity and safety in these sectors are often dynamic, distributed and, in the case of vehicles, highly mobile. They may also be outdoors with a usage that extends over large areas.

Since Wi-Fi was not designed for mobility, it falls short when it comes to hand-off between cells, jeopardising network connectivity for automated vehicles or goods as they move quickly around a site. Nor is a Wi-Fi router designed to safeguard mission-critical communications. As home-users of Wi-Fi can testify, the quality of Wi-Fi connections drops precipitously over distances, outdoors and between walls.

Wi-Fi’s lack of mobility and reliability poses a serious obstacle to some IoT applications. Even though the availability of lower-priced sensors makes it more attractive to build out widespread networks, it still only makes sense to do so if they are secure, reliable and cost-effective and improve an enterprise’s operations and productivity.

In contrast, LTE is architected to manage the simultaneous connection of thousands of devices over vast areas and provide true mobility in the form of seamless hand-off as devices travel between cells on the network. Whereas Wi-Fi requires a dense network of routers, which quickly becomes expensive to install, operate and maintain, private LTE typically needs one 20 MHz access point for every 800 data clients versus about 250 for a Wi-Fi access point.5

Unlike Wi-Fi, private LTE networks come with the multiple levels of security necessary for carrier networks, combining SIM-based authentication with over-the-air encryption and integrity protection. As they are using a private network, enterprises can choose to ensure all their sensitive data stays on site.

LTE also offers configurable traffic prioritisation, which allows enterprises to optimise performance and service quality for different applications. Private LTE technology continues to evolve. IoT applications, such as smart metering and agricultural monitoring, could soon benefit from private LTE low-power wide-area (LPWA). Private LTE LPWA would reduce the power required for IoT devices, using small amounts of data over extended distances and long periods.
Shared and Unlicensed Spectrum’s Potential to Drive Innovation

It isn’t just performance that is driving the current interest in private LTE networks. Some enterprises choose to use a mobile network operator’s public private LTE network, which can simplify installation, management and technology upgrades. Private LTE can also operate in shared or localised licensed spectrum, allowing enterprises to build and manage their networks.

Using these types of spectrum to operate a private LTE substantially alters the economic calculation, bringing the cost of running a private LTE network close to that of Wi-Fi, particularly on larger sites.

An enterprise’s ability to operate private LTE depends on the availability of compatible, unallocated spectrum in its geographical location.

In the U.S., the FCC has made 150 MHz of CBRS spectrum in Band 48 available for a mix of unlicensed and licensed applications, including private enterprise networks. The FCC aims to drive technology innovation, including within enterprise communications, by making it less costly to run applications on wireless networks.

Band 48 is in the 3550–3700 MHz spectrum range, which is ideal for both private LTE and 5G. Indeed, Band 48 is also called N48 because it will be used for future 5G services. As a result, the U.S. is now well-positioned to lead the world in private LTE deployment, while encouraging 5G service uptake.

Band 48 also straddles the 42 and 43 spectrum bands used in Europe, Asia-Pacific and Latin America.

To ensure new actors and enterprises can access spectrum without suffering from interference, the FCC has devised a three-tier spectrum usage scheme, with the bulk of spectrum designated as unlicensed.

The first tier guarantees the rights of existing users. Today, the 3.5 GHz CBRS band is used primarily by the Department of Defence, for shipborne radar systems and military applications, including U.S. Navy radar systems. These applications will make up the first tier of usage and will have priority over all other users. However, they operate in limited geographies, such as harbours and tend to use relatively little of the available spectrum.

The second tier is for holders of Priority Access Licenses (PAL). The FCC will allocate ten-year, renewable PALs for a 10 MHz channel within the 3550–3650 MHz band on a county-by-county basis through competitive bidding. Up to seven PALs may be licensed in any given county, with a cap on four PALs for any one licensee, which will absorb up to 70 MHz of the total 150 MHz available.
The third tier is for General Authorized Access (GAA). As the name suggests, this tier is available for general use. However, it is not entirely unregulated. Access and operations will be managed by an automated frequency coordinator, known as a Spectrum Access System (SAS). The SAS allocates frequency dynamically to prevent interference with PAL and first-tier users and to eliminate the risk of channel interference. It also ensures efficiency by making unused spectrum available. The industry body, CBRS Alliance, has set up OnGo to manage subscriber and network identity and the dynamic allocation of service.

As a result, up to 80 MHz of shared spectrum will be available for enterprises to use, freeing them to build application-specific private LTE networks that offer more exceptional performance than Wi-Fi at similar price points, while facilitating evolution towards 5G. The U.S. CBRS structure lends itself to several business models. Existing network operators, for example, can bid for the 10 MHz PAL channels. Equally, a neutral host network could acquire PAL licences and focus on offering localised private LTE networks, for example, to a sports stadium or a theme park. Of course, enterprises can also use the approximately 80 MHz of unlicensed spectrum to create their private LTE networks if they have the in-house capability, or with value-added resellers or systems integrators instead.

The U.S. is not the only country that is opening spectrum to enterprises so they can benefit from operating private networks that are tightly aligned with their application and security needs, even if today the U.S. is markedly ambitious. In Germany, for example, telecoms regulator BNetzA has published details of plans to charge for the local usage of spectrum in the 3.7–3.8 GHz ranges, priced with the aim of driving innovation by start-ups, agricultural businesses, SMEs and industrial companies.

The Swedish regulator, PTS, has proposed setting aside a quarter of the 3.5 GHz band for local use. Meanwhile, operator 3 Sweden has agreed to lease spectrum to Finnish operator Ukkoverkot, which will use it to fulfil the Swedish industry’s demand for private LTE networks.

Free or very low-cost spectrum will be an essential driver of new service adoption. Still, it will not be enough to ensure that private LTE is a cost-effective alternative to other networking technologies. There also needs to be a device ecosystem that creates large enough economies of scale to drive down the prices of chipsets and, therefore, equipment. The good news for private LTE in the U.S. is that OnGo-compatible mobile devices from major vendors are already on the market, including the Google Pixel 4, Motorola’s 5G Moto Mod, Samsung Galaxy S10, Apple iPhone 11, LG G8 ThinQ and OnePlus 7 Pro. The chipset technology used in mass-market consumer smartphones and tablets can easily be deployed in other devices, which will help drive down the cost of barcode readers, gateways and routers for enterprise use in Band 48 networks. In addition to handsets and tablets, private LTE network appliances like routers, gateways and firewalls are gaining OnGo certification thanks to data cards like the Telit LM960A18, a Gigabit LTE class cellular data card in mini PCIe form factor supporting B48 and certified for use in OnGo CBRS devices of all kinds. Learn more about Telit’s LM960A18 data card.
Evolving Toward 5G

Despite growing interest in private LTE networks, enterprises also need to evaluate whether it is better to wait to deploy 5G, which promises to deliver new features such as ultralow latency, that may better suit their precise application needs.

The answer depends on each enterprise's digital transformation plans, time frame and budget. Even though mobile network operators are rolling out initial 5G services in several countries, it is still early days for 5G, and much of the current focus is on consumer coverage and applications. Also, the rollout of 5G networks looks set to be slower than the previous upgrade from 3G to 4G. In mid-2019, for example, the research company Gartner estimated that fewer than 45 percent of communication service providers globally would launch a commercial 5G network by 2025.¹

In the meantime, LTE service development and deployment are not standing still. Indeed, investment in 5G network research and development in recent years has fed directly into numerous LTE network enhancements, including the addition of network slicing, allowing enterprises to adopt features that help them evolve towards 5G. LTE-Advanced Pro is already designated as a 5G technology. From now on, both the existing LTE Core (Enhanced Packet Core/EPC) and the new 5G Core (5GC) are set to continue supporting the evolution of mobile IoT.

At the same time, LTE usage continues to grow, providing the economies of scale that help lower overall chipset and equipment costs. According to 5G Americas, the number of global LTE subscriptions reached 4.7 billion worldwide by the end of June 2019, and the body expects the number of global LTE subscriptions to peak at 6 billion by the end of 2022.²

The strength of private LTE and private 5G networks in supporting data-centric enterprise applications, including IoT, makes them a viable and cost-effective long-term complement to Wi-Fi. This advantage will serve enterprises, offering them the possibility to choose between networks and deploy the one that fits their specific requirements.
Telit is the global leader in IoT enablement. Our enterprise-grade hardware, connectivity and platforms transform businesses through the power of IoT. With over 1,000 of the world’s leading IoT experts, we share a relentless commitment to delivering the future of digital business for our customers.

Find out more at www.telit.com

Produced by the mobile industry for the mobile industry, Mobile World Live is the leading multimedia resource that keeps mobile professionals on top of the news and issues shaping the market. It offers daily breaking news from around the globe. Exclusive video interviews with business leaders and event reports provide comprehensive insight into the latest developments and key issues. All enhanced by incisive analysis from our team of expert commentators. Our responsive website design ensures the best reading experience on any device so readers can keep up-to-date wherever they are.

We also publish five regular eNewsletters to keep the mobile industry up-to-speed: The Mobile World Live Daily, plus weekly newsletters on Mobile Apps, Asia, Mobile Devices and Mobile Money.

What’s more, Mobile World Live produces webinars, the Show Daily publications for all GSMA events and Mobile World Live TV – the award-winning broadcast service of Mobile World Congress and exclusive home to all GSMA event keynote presentations.

Find out more at www.mobileworldlive.com

2 Laurence Goasduff, Gartner Says 5.8 Billion Enterprise and Automotive IoT Endpoints Will Be in Use in 2020 (Gartner Inc. Egham, U.K., 29 August 2019).
7 PTS Spectrum Department, The Swedish Post and Telecom Authority’s Intents for the Assignment of Frequencies for 5G, Following Referral (PTS, Stockholm, S.E., 3 May 2018).
8 Gartner, Key Questions to Evaluate and Plan for Enterprise 5G, July 2019.
9 Vicki Livingston, 5G Network Rollouts Accelerate as LTE’s Long Tail Extends (5G Americas, Bellevue, WA, 19 September 2019).

Disclaimer: The views and opinions expressed in this whitepaper are those of the authors and do not necessarily reflect the official policy or position of the GSMA or its subsidiaries.

© 2020