



Why private LTE needs edge computing

Private LTE, and other private cellular networks including private 5G, are being deployed to meet the needs of enterprises and provide an alternative to the existing connectivity choices. This article explores how and why edge computing is necessary to deliver private cellular networks.

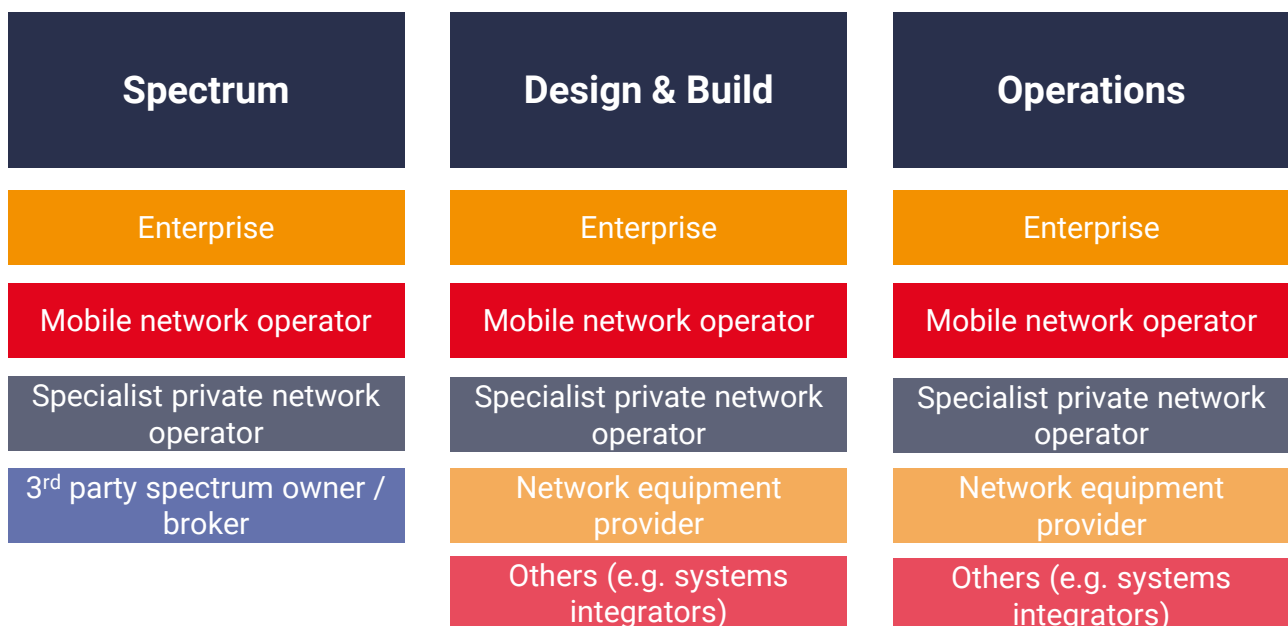
Dalia Adib, Edge Computing Practice Lead

What are private LTE networks?

Private LTE networks are an LTE-derivative of private cellular networks, which can also use 5G technology. There are local on-premises networks designed to serve a single enterprise, providing reliable and predictable connectivity with ultra-low latency and enhanced control and security. Enterprises can benefit from deploying private cellular networks to complement, or even substitute, Wi-Fi or ethernet.

This requires spectrum to be ring-fenced for the customer and is usually tied to a single location, although there are examples of private networks being used at a national level (e.g. for public services). Recent landmark changes in spectrum regulation has meant that enterprises in certain countries can gain access to spectrum directly through auctions. For example, in the US, regulators have granted shared spectrum for CBRS (Citizens Broadband Radio Service) in the unlicensed 3.5 GHz band. In Germany, 100MHz in the 3.7-3.8GHz band was set aside for enterprise private networks. Siemens and Bosch were among the first companies to acquire the spectrum for private networks.

There are several models available to enterprises who are looking to deploy private mobile networks. They could own spectrum, build the network and run it end-to-end. However, in most cases, enterprises will not have the knowledge, skills nor a willingness to operate the private network. Nonetheless, there are several parties who can offer services for each part of the value chain:



What are the benefits of private LTE networks?

The key drivers for why enterprises want to deploy private cellular networks often encompasses one or two of the following:

- **Coverage:** it is difficult to access public cellular networks at a given site or deploy fixed/alternative wireless networks easily

Why private LTE needs edge computing

- **Low latency:** mission-critical use cases need to be able to analyse data and make decisions in real-time and therefore cannot use networks which cannot meet those low latency requirements
- **Data privacy and security:** certain industries and enterprises have such strict policies to protect their data that it is more viable to completely segregate the data in a private network
- **Control:** some enterprises want to be able to design their own wireless network to meet applications' needs, particularly as connectivity becomes increasingly important to core business processes and operations
- **Commercial model:** with so many devices and so much data being transported by the network, a private cellular network may have a more attractive model compared to pricing models where enterprises pay per device or by the amount of data used
- **Mobility:** enterprises using more mobile devices (e.g. robots, automated guided vehicles) need adequate wireless networks that can support these applications

What are examples of private LTE use cases?

Given the above benefits of private cellular networks for enterprises, the industries that are the earliest adopters are manufacturing, mining, ports and airports. Many of these sectors are characterised by being in remote locations, using wireless devices increasingly for mission critical processes and have a need to keep data secure (on-site).

STL Partners has been tracking publicly announced trials and deployments of private cellular networks. Across these four industries, there are similar use cases that are being explored, as seen in the table below. One example are automated guided vehicles, which are being used in manufacturing to transport raw materials, parts and products quickly throughout the production process. Another use case is augmented reality to aid maintenance workers during equipment inspections and repairs. The benefits of this include being able to make maintenance workers more productive, by reducing the need to wait for experts to provide assistance on-site and ensure the maintenance/repair task is done at a higher level of quality.

Use Case	Number of public deployments tracked exploring use case			
	Manufacturing	Mining	Airports	Ports
Automated Guided Vehicles	3	1	3	1
Remote inspection				
Industrial robots	2			
Digital material management across the production chain	1			
Precision monitoring and control	1			
Tracking products along production line	1			
AR/VR	4			
Video surveillance and analytics	1			
IoT	1			
Predictive Maintenance				
Remote operated equipment		6		1
Automated mining processes		1		
Condition monitoring	1			
Port Security				1
Fully automated trains to exchange relevant data with trackside equipment by 5G radio.				
Urban mobility				
Track and Trace e.g. Luggage Tracing			3	
Remote expert	1			
Asset tracking	1			
Health and safety	1			
Mobile robotics				
Video analytics	1			
Quality inspection	2			
Automation and Safety		5		
Environmental monitoring		1		
Digital twins				
Multi-site production chains				
Push to talk		1		
Dam monitoring		1		

Why private LTE needs edge computing

Why is edge computing relevant?

Private cellular networks cannot be decoupled from edge computing for three key reasons:

1. Private cellular networks will be deployed on edge compute infrastructure

Network equipment (e.g. access points) need to run on-site in a private network. Although, technically, some network functions (e.g. core network) could run in a cloud, most customers are choosing to deploy these on-premises. This means that edge infrastructure will be required to run the private cellular network.

However, within this we are seeing two deployment models, broadly speaking. Vendors, such as Nokia, are choosing to provide separate hardware for the network software and the edge computing platform for third party applications. Others, such as Microsoft, are opting for a single box approach – running both the private cellular network functions and the customer's applications.

Each has its merits and it is yet to be seen which one will play out as the de facto mode of choice. Some customers prefer to keep networking and applications separate, as they have different requirements, whereas others see the economic benefits of using a single box.

2. Use cases require application to run at the edge to ensure requirements are met

As detailed above, many use cases that are driving enterprises to adopt private cellular have requirements around low latency and data privacy. If applications and data are not processed on-site, at the edge, the private cellular network alone will not meet these demands.

3. Telecoms operators are in a strong position to offer both

As telcos develop MEC (multi-access edge computing) platforms and solutions, they are in a good position to own multiple parts of the private cellular network solution value chain and provide an end-to-end offering to customers. Plus, they have existing capabilities from their core businesses, e.g. managing customer devices, providing supports, ensuring security, etc. which can be leveraged for a private cellular network and edge service.

What is the telco opportunity in private LTE and edge?

Mobile network operators (MNOs) are continuously looking for new sources of revenue beyond providing traditional connectivity, particularly in the enterprise segment. With the introduction of 5G and edge computing, MNOs are in a good position to provide these new offerings. Edge computing can be part of a larger opportunity for MNOs to verticalize their proposition for sector specific use cases and bundle their service as part of its other enterprise offering such as IoT or private mobile networks. Hence, MNOs can take private network solutions to market coupled with edge computing platforms and applications. An example of this is Vodafone, who is working with Microsoft to provide Azure Private Edge Zones to enterprises.

We are also starting to see non-mobile operators make a play. **Verizon Business announced a partnership with Nokia** to take private 5G networks to market, even though the telco does not own spectrum in markets outside the U.S. However, it believes it is in a good position to take such solutions to enterprises, given the size of its existing enterprise network services business globally

Dalia Adib is a Edge Computing Practice Lead at STL Partners, specialising in edge computing and 5G-related topics.

Get in touch with the author to learn more

dalia.adib@stlpartners.com

Or visit STL Partners' Edge Hub

www.stlpartners.com/edge-computing