ERICSSON

# A PRIVATE CELLULAR BUYERS' GUIDE:
## THE ESSENTIALS OF BUILDING A PRIVATE 5G OR LTE NETWORK

HOW PORTS AND TRANSPORTATION HUBS LEVERAGE PRIVATE CELLULAR NETWORKS FOR IMPROVED CONNECTIVITY, PERFORMANCE, AND SECURITY

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## OVERVIEW

Our supply chain is increasingly adopting modern technologies, connected devices, and the data-rich, highly actionable business insights they enable. Even the largest and most challenging environments need the flexibility of wireless connectivity to connect those devices and leverage their data. But in some cases, existing network technologies, including Wi-Fi solutions, aren't optimised to address this challenge because:

- The sheer size and scope of many deployments demand long-range coverage, and the number of Wi-Fi access points needed to cover that range isn't feasible.
- Business-critical devices and highly sensitive information call for layers of security unavailable within Wi-Fi networks alone.
- Applications such as live streaming of HD video footage require dedicated bandwidth and low latency.
- The broad scope of what organisations connect puts a premium on the ability to easily monitor and control network traffic flow, and Quality of Service (QoS).

When we consider everything big and small that can now be Internet-connected, the boundless potential of 5G adds expanded opportunity to the long term vision of ports and shipping businesses. With a private cellular network, new efficiencies, operational models, and business cases can be built upon the underlying premise that seamless, secure, and
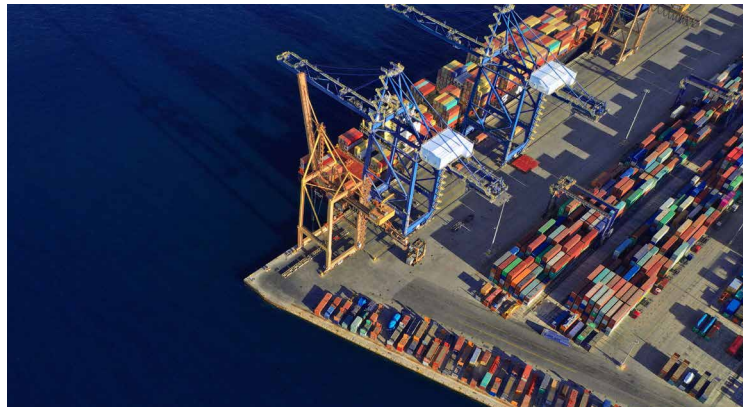


# "IN SPRAWLING AREAS WHERE WIRELESS CONNECTIVITY IS CRITICAL, PRIVATE CELLULAR NETWORKS HAVE EMERGED AS AN OPTIMAL OPTION."

frictionless connectivity can be assumed across all people (dock workers, seafarers, passengers), places (ports, warehouses), and things (vehicles, ships, cranes, devices), at all times.

In sprawling areas where wireless connectivity is critical, private cellular networks have emerged as an optimal option. Private cellular networks, which include both private LTE and private 5G deployments, are helping organisations with locations that require wireless connectivity but are not well supported by current wireless infrastructure.

Private networks play a unique role in wireless networking, providing benefits that range from

increased coverage, capacity, and mobility, as well as enhanced security and reliability.

## ADDRESSING THE CHALLENGES OF SECURE NETWORK COVERAGE IN LARGE AREAS

Across cities, campuses, and other facilities, Wi-Fi is an excellent tool for connecting a multitude of devices. However, for organisations like ports that oversee operations across vast, sprawling areas and/ or rapidly changing spaces, Wi-Fi alone can be challenging, if not untenable. Private cellular networks can help port operators address challenges associated with relying solely on Wi-Fi or public cellular.

## COSTS

Many large logistics hubs and industrial sites like ports can now deploy Internet of Things (IoT) sensors and equipment capable of machine-to-machine (M2M) communication, all of which require reliable connectivity. Unfortunately, laying fibre in the ground and installing a huge quantity of Wi-Fi access points is exceptionally expensive. Outfitting just one large site could cost millions of dollars for the fibre alone.

The infrastructure needed for a private cellular network can be considerably less expensive than a widespread Wi-Fi deployment. Whereas dozens of Wi-Fi access points with extensive wired line installation would be required in a big area, a local area network (LAN) based on cellular broadband would call for just a few private cellular network radios.
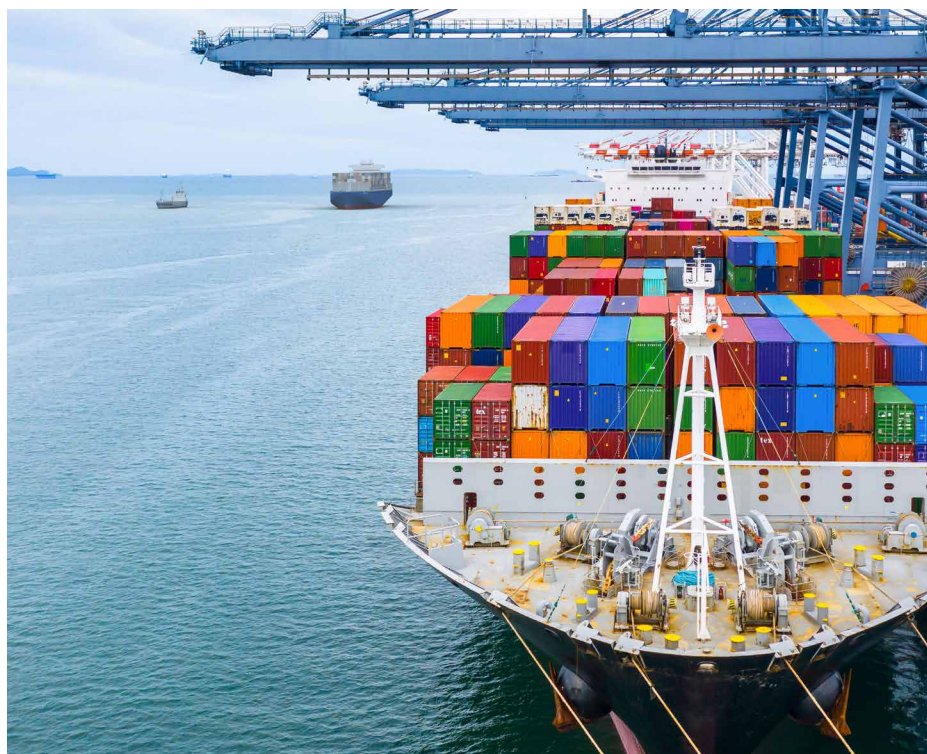
Keeping high-bandwidth content on site with a private cellular network and local servers can increase data security and reduce data plan costs. While public service providers may charge per device and per data usage, private network owners can avoid those recurring fees.

## PERFORMANCE AND RELIABILITY IN PUBLIC AND PRIVATE NETWORKS

Private cellular networks have proven to be excellent wireless networking options in both backup (failover) and primary roles, depending on the use case. However, in certain scenarios, public cellular doesn't provide the cost-efficient, unwavering high performance needed to keep business-critical applications running smoothly around the clock.

For instance, many enterprises operate sites that gather and pass huge amounts of data, including a lot of information that is pushed to the organisation's data centre.

This traffic encounters increased network latency and drives up data costs when carried via a public LTE or 5G network with pay-per-bit pricing.

Organisations that rely on Wi-Fi for connectivity may still encounter performance limitations when supporting the types of high-bandwidth applications that are becoming standardised in most business operational situations, especially across vast areas. Examples include automated guided vehicles (AGV) and real-time video surveillance streaming.

One significant cause of Wi-Fi deficiency is when portable user equipment such as a phone, tablet, or IoT device clings to a Wi-Fi connection even when it has no actual coverage — a phenomenon known as "sticky Wi-Fi" or "sticky client." Through the prioritisation and preemption orchestration capabilities of a private cellular network, the organisation controls the connections between access points (APs) and user equipment, resulting in better coverage flexibility and overall reliability.

## SECURITY

In many cases, Wi-Fi security is limited to a username and password, which may be acceptable for logging in at a coffee shop but concerning within the framework of a large organisation's network. While Wi-Fi 6 has made improvements, the presence of sensitive data and critical IoT devices underscores the need for additional layers of security. Altogether, these factors give private cellular inherent security advantages over other wireless infrastructures and help protect an organisation's most critical information from malicious attacks.

Private 5G and LTE deployments include SIM/eSIM authentication and edge devices, offering additional layers of security through encryption that Wi-Fi cannot provide. Additionally, the network architecture of private 5G or private LTE usually includes on-site servers, enabling organisations to keep traffic between IoT devices and corporate servers on their internal network rather than routing it through the public network.

## HOW PRIVATE CELLULAR NETWORKS WORK

Businesses and ports today are increasingly becoming familiar with the process of using cellular-based connectivity for wireless wide area networks (WAN) — whether for primary links, failover, or augmentation. However, turning LTE or 5G into wireless local area networks (LAN) is uncharted territory for many organisations.

Placing cellular access points on-site allows companies to mimic a standard public cellular network while gaining control and visibility of the devices and applications on their network. This creates a purpose-built wireless network that provides the reliability, high-performance, security, and cost-efficiencies required to support business-critical applications.

Private networks can be installed in various ways: by either a third-party network provider, a traditional cellular operator, or the enterprise customer itself. The decision of which operator or infrastructure provider to use mostly hinges on the spectrum of choice and the level of network management the enterprise is willing to undertake to gain cost savings and control over its digital infrastructure.

## WHAT DO PORTS NEED TO BUILD A PRIVATE CELLULAR NETWORK?

For the successful implementation of a high-performance, high-capacity private cellular network throughout an enterprise, IT teams must be familiar with the components that bring the network to life. On top of that, it's important to recognise that when each component is developed and deployed by a single vendor, the resulting unified solution gives users the ability to orchestrate their network within a single management platform.

## SPECTRUM USED FOR PRIVATE CELLULAR NETWORKS

**Licensed**: This enables carriers, such as your mobile service provider, to operate private cellular networks for enterprises as a managed service. Alternatively, enterprises can deploy their own private cellular network using spectrum licensed by carriers. In some countries, such as Germany, industry spectrum serves as another licensed spectrum option.

**Shared**: Enterprises can operate private cellular networks in a spectrum owned by others. For example, enterprises in the US can use Citizens Broadband Radio Service (CBRS), which leverages up to 150 MHz of interference-free spectrum.

**Unlicensed**: Enterprises or carriers can operate LTE or 5G networks in unlicensed spectrum and use carrier aggregation to augment capacity for their networks.

# "PRIVATE CELLULAR NETWORKS HAVE PROVEN TO BE EXCELLENT WIRELESS NETWORKING OPTIONS IN BOTH BACKUP (FAILOVER) AND PRIMARY ROLES, DEPENDING ON THE USE CASE."
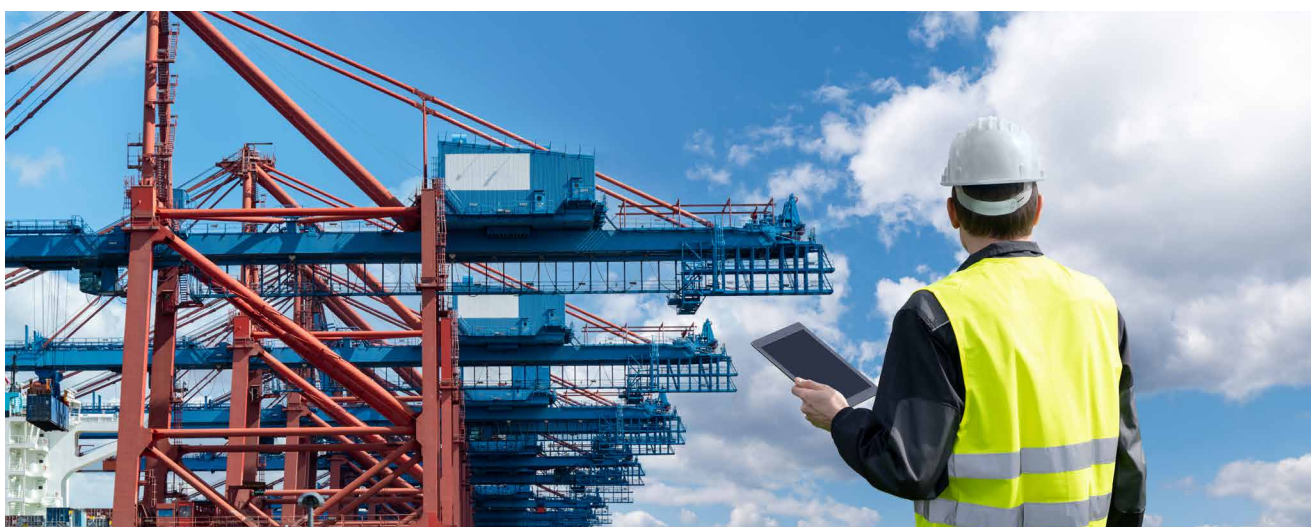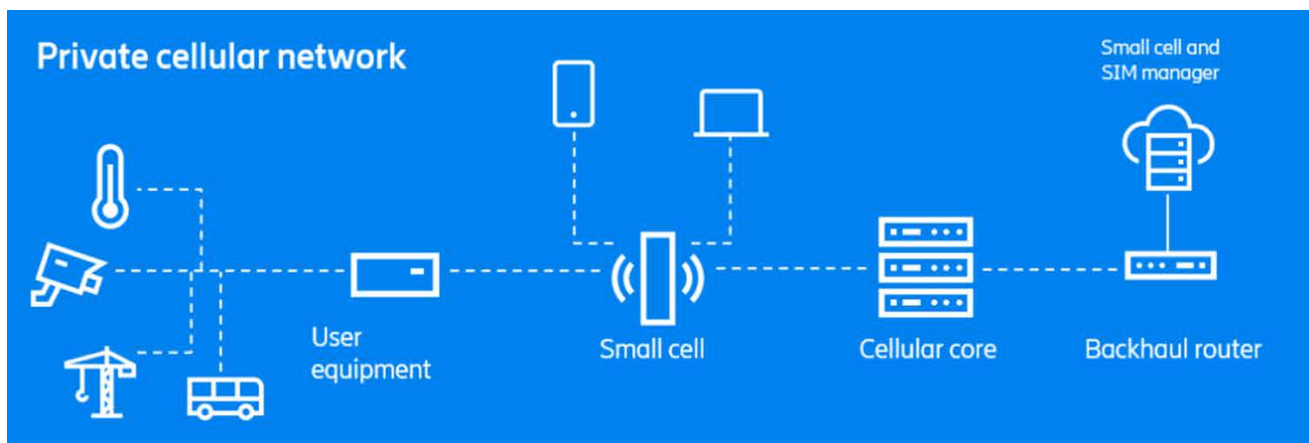
## PARTS OF A PRIVATE CELLULAR NETWORK

- **Cellular core**: The cellular core, also known as the evolved or converged packet core, is the brain of the private cellular network. This is where policies are set to determine which devices can access the network and how traffic can move throughout the network.
- **Cellular access points**: The cellular access point (CAP), also referred to as part of the radio access network (RAN) or a small cell, is used to provide access to the network for SIM-enabled edge devices such as laptops, IoT sensors, surveillance cameras, tablets, and more. This is similar to how a Wi-Fi access point connects TVs and printers to an in-home Wi-Fi network.
- **Endpoints and private SIMs**: A SIM card, whether physical or embedded, is required to gain access to the network and for authentication to the private 5G or LTE cellular. This step is necessary before connected devices, including cameras, autonomous vehicles, or IoT sensors, can become part of the network.
- **Network management tools**: A single dashboard provides real-time visibility and control over the private cellular network. This is crucial for configuring, monitoring, and troubleshooting the network from anywhere, gaining access to key insights, and simplifying network maintenance.

## "PRIVATE 5G PROVIDES A CONNECTIVITY PLATFORM THAT ENABLES PORTS TO MANAGE AND SECURE ALL THEIR IOT AND CONNECTIVITY-DEPENDENT TECHNOLOGIES ON A SINGLE WIRELESS NETWORK."

## WHEN AND HOW ORGANISATIONS USE PRIVATE CELLULAR

The benefits of private LTE and private 5G are capturing the interest of ports and other organisations that have large areas filled with lots of moving devices and applications that must be connected at all times without exception. These situations often involve the gathering and sharing of sensitive data between devices and servers. When Wi-Fi or public cellular are less than ideal or even possible, a private cellular network can address needs in several key areas:

### Vast areas with complex networking needs

In large spaces with extensive network requirements and hundreds of users and devices, private cellular networks help prevent congestion and are much less expensive to set-up and maintain compared to Wi-Fi.

### High-bandwidth traffic within budgetary limitations

Organisations looking to connect many video surveillance cameras could use public LTE or 5G, but associated data usage would likely be cost-prohibitive. Private cellular can offer a much more cost-effective option.

### Remote locations lacking wireless infrastructure

In places where carriers have yet to establish wireless infrastructure, organisations can easily set up a private cellular network to use as their wireless LAN.

### Constant connectivity for applications on the go

Mobile use cases, such as connected workers, AGV, asset monitoring, and more, require a connection that can move with them. Private cellular networks give users control over connectivity and Quality of Service (QoS), virtually eliminating client stickiness that can cause interruptions and even downtime.

### Critical information

In certain scenarios, the transmission and storage of highly sensitive information are unavoidable, making them attractive targets for hackers.

Ports can keep business-critical information on-site via a private cellular network, which enables additional layers of security beyond what Wi-Fi alone can provide. With private 5G, it's possible to prioritise network segments dedicated to serving critical or highly sensitive processes, to avoid interference or varying network availability even during peak network usage.

Given the ubiquity of IoT and connectivity-dependent technologies, private LTE and private 5G are relevant solutions in most industries. The ability to set up a wireless LAN that is significantly higher performing, more reliable, flexible, cost-effective, and secure than Wi-Fi or public cellular alone meets the specific needs encountered in many use cases.

### COMMON USE CASES FOR PRIVATE CELLULAR NETWORKS IN PORT AND TERMINAL OPERATIONS:

- High-definition surveillance cameras
- Predictive maintenance
- Automated guided vehicles (AGVs)
- Automated mobile robots (AMRs)
- Asset management
- Crime and environmental monitoring
- Video surveillance

### REALISING THE VALUE OF PRIVATE CELLULAR NETWORKING

Interest in private LTE and 5G is growing, as global ports see a rapid increase in the volume of devices, technologies, and workers that require reliable connectivity for optimal productivity, along with an increasingly critical need to keep their data and digital infrastructure secure.

At Ericsson, we have taken our extensive portfolio and experience with cellular service providers and built a compact, easy-to-manage private network solution for industries including transportation and maritime ports. We can connect the smallest to the most advanced use case, by bringing niche cases to our extensive partnership table and determining how to execute different collaborations successfully. Our ecosystem includes a wide range of industrial partners, enabling us to address our customers' unique issues.

Discover how we are helping ports overcome connectivity challenges with private network solutions using LTE and 5G at www.ericsson.com/ports.

Explore private cellular network solutions across industries undergoing digital transformation at www.ericsson. com/en/private-networks

### ABOUT ERICSSON:

Ericsson enables communications service providers and enterprises to capture the full value of connectivity. The company's portfolio spans Networks, Cloud Software and Services, Enterprise Wireless Solutions, Global Communications Platform, and Technologies and New Businesses and is designed to help our customers go digital, increase efficiency and find new revenue streams. Ericsson's investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.

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