Private LTE/5G Networks: Unlocking Value for the Future

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INTRODUCTION

5G is one of the most widely discussed topic these days. Many countries in the Europe and the US have already rolled out 5G at various scales which is the new global wireless standard after 1G, 2G, 3G, and 4G networks. It is the first mobile technology designed to help establish a communication network between machines, systems, objects, and devices in addition to people. Given this scenario, 5G enabled networks need to be designed from an end-to-end perspective to ensure that they are nimble yet resilient enough to handle seamless machine to machine interaction beyond conventional mobile services.

5G's quantum leap in connectivity not only opens up a plethora of new opportunities especially for the industrial sector but also sets the stage for large-scale disruption. Industries such as manufacturing, automobile, healthcare, and constructions are already adopting technologies such as IoT, AI, and ML in their pursuit to facilitate increased connectivity. All these industries could experience a transformative impact of 5G for two main reasons besides enhanced broadband connectivity that the technology promises:

- **Massive machine-type communications (mMTC):** 5G has the potential to support high connection densities and in the process make industrial-scale IoT a reality. With this capability, 5G will be able to foster communication between millions of IoT sensors and devices within a square kilometer area.
- **Ultra-reliable low-latency communication (uRLLC):** With the help of uRLLC, 5G will be able to facilitate a low-latency and reliable communication network between sensors, switches, actuators, and controllers.

From an industry and enterprise standpoint, capitalizing on 5G technology is not just about leveraging publicly available 5G connection like regular consumers. Rather, companies need to focus on building custom-designed 5G networks that can successfully underpin the concept of 'smart factory' or Industry 4.0 and bring it to life.

Private mobile network is not particularly a new concept as industries such as defense, mining and emergency services started using Private 4G LTE networks in some countries. These networks have been around for years. However, their widespread application across other sectors have still been a distant reality. 5G's proliferation is expected to change this status quo. The network's low latency, high-throughput capabilities is expected to drive its case towards greater acceptability and adoption.

WHAT IS A PRIVATE LTE/5G NETWORK?

Private LTE/5G networks are essentially enterprise-grade cellular mobile networks are engineered specifically to support core enterprise processes. These networks are often deployed on a single site like a port or a plant. The following are the common deployment models:

- **Dedicated Private Network:** In this model, a company deploys a dedicated, on premises network which include radio access, core edge computing assets and an MEC application for single enterprise usage.
- **Hybrid Private Network:** This deployment model is based on a combination of public mobile network components and dedicated on-premises elements.

WHY SHOULD ENTERPRISES USE PRIVATE LTE/5G NETWORKS?

- **Limitations in Wi-Fi:** 5G has the potential to mitigate several challenges associated with Wi-Fi deployments and establish a secure and reliable connectivity framework.
- **Data privacy:** Private networks can help enterprises overcome data privacy concerns since they offer more control and visibility of mission-critical data.
- **Operational efficiency:** The demand for Private LTE/5G networks is growing because large-scale digital transformation projects within organizations are well underway. Enterprises are in the process of digitizing their data to drive processes and create new digital products and services.

HOW BIG IS THE PRIVATE LTE/5G NETWORK OPPORTUNITY?

The global 5G market is predicted to reach USD 14.28 billion by 2028, growing at a phenomenal CAGR of 39.7% from 2021 to 2028. This growth can be attributed to several factors such as the increasing demand for reliable low-latency network connectivity and enhanced security for critical applications used in areas like public safety. Additionally, several industries such as manufacturing, oil and gas, mining, and energy and utility, are expected to aggressively invest in 5G network deployments to drive productivity and operational efficiency. This will further propel the market growth of 5G in the forecast period.

Private networks open up endless possibilities for CSP's, governments and industry. For service providers, it promises new business opportunities, new ways to generate revenue and potential new customers. It provides a great chance for governments to invest in the most advanced wireless technology ecosystem and upgrade their critical infrastructures ensuring increased safety and wellbeing for their citizens. For industries on the other hand, 5G is a necessity which will simplify their journey towards greater and more widespread digitalization, helping them reduce operational inefficiencies and maximize business performance, thereby improving customer experience.

These are the key reasons that are expected to drive 5G network adoption across sectors. The following are some of the most notable use cases that the technology is poised to deliver:

Manufacturing: 5G networking technology is fast gaining traction within the manufacturing sector, as companies focus on deploying secure and resilient networks that can guide their Industry 4.0 initiatives to the next level. The industry was already a frontrunner when it comes to implementing technologies like IoT and AI to enhance data collection practices, drive productivity gains, and create effective predictive analytics capabilities.

With 5G, manufacturers now have the opportunity to devise more effective ways to collate and transmit data while implementing more sensors and connected devices within the factory floors.

Automotive: The global automotive sector is another area where 5G networks are expected to play a critical role, especially for the commercialization of autonomous vehicles and associated technologies. In order to make a driverless world a reality, technologies such as AI, edge computing and "Vehicle to X" (V2X) communications will have to work in unison to deliver zero error accuracy. 5G networks with their ultra-low latency capabilities can ensure that all these technologies are operating at their full potential.

Healthcare: Going forward, private networks are expected to witness greater adoption in the healthcare space as well. The COVID-19 pandemic has already dismantled the healthcare infrastructure of several countries, with demand for intensive care units skyrocketing. In such a scenario, healthcare providers are looking to modernize their facilities while revisiting the care delivery infrastructure that demands more agility. It is here where Private 5G networks can help suffice their need for greater connectivity within the healthcare value chain. 5G can also drive innovations across other key areas such as remote surgery by helping doctors deliver specialized and critical care services to patients across remote locations anywhere in the world.

Logistics: In the logistics sectors, where there is a constant inflow and outflow of goods between warehouses, ports, and distribution centers, 5G can help facilitate increased process transparency and supply chain visibility. The technology can allow companies to seamlessly track the movement of goods with the help of sensors embedded within packages, shipping containers. Heavy machinery and so on. This sector, is therefore going to be one of the first movers when it comes 5G network deployments.

Smart Facilities: Private 5G networks can deliver better mobile connectivity when compared to previous network generations. This makes it an ideal network option for workplaces, stadiums and airports that require a robust communication infrastructure. In the next few years, there will be an explosion in 5G private network adoption across industries. The technology has already shown tremendous promise and there are some amazing 5G use cases out there in the market. While it's still in the nascent stages of deployment with several of these use cases at the prototyping stage, the future potential of 5G technology cannot be understated.

WHO MANAGES LTE/5G PRIVATE NETWORKS?

Enterprise requirements differ by industry vertical and size, and many businesses need bespoke solutions. Private LTE/5G networks are complex to deploy and manage. It is very difficult for suppliers to address all requirements either through CSP's or OEMs. Although private networks are smaller than a typical CSP's public network, they are highly complex to operate due to business-critical requirements, the use cases it serves and strict service level agreements (SLAs).

CSP's will need to establish dedicated regional ('edge') network operations centers (NOCs) to manage new Private 5G networks. Hence there is a need for a partner ecosystem with system integrators who have deep expertise regarding industry vertical solutions and the necessary domain knowledge to manage the Private LTE/5G networks.

To address Private LTE/5G network operations and to meet critical SLA's, Digital Engineering and System Integrators have the opportunity to offer highly efficient private network operations through dedicated enterprise customer-centric edge network operating centers (NOC) driven by automation and AI/ML frameworks, data analytics, identity access management for security and provisions for easy scalability to support local and wide area private networks.

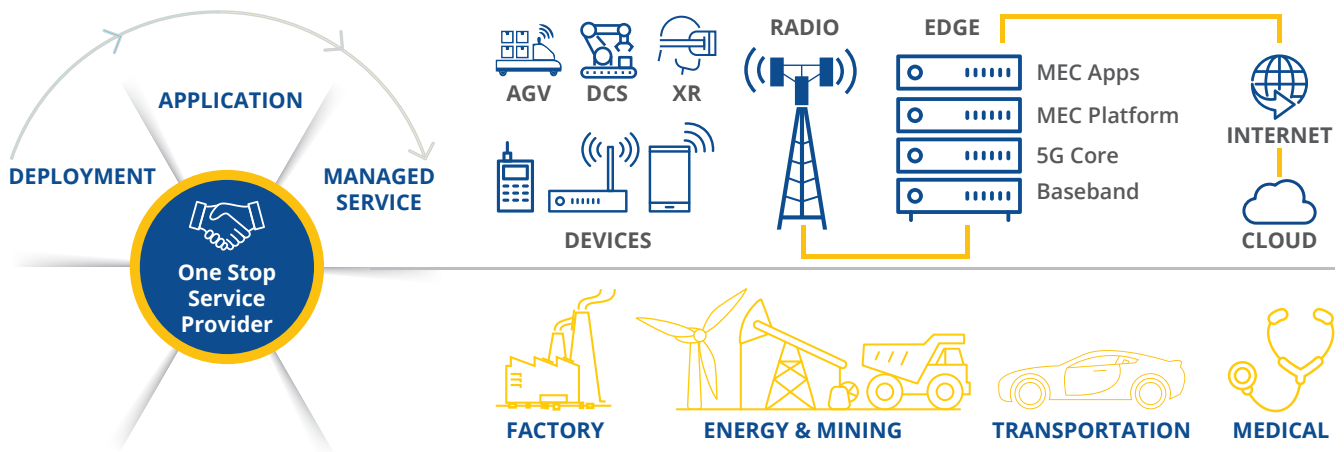# WHAT IS THE PURPOSE OF AN ENTERPRISE EDGE NOC FOR PRIVATE LTE/5G NETWORK?

Simply put, the goal of any NOC is to maintain optimal network performance and availability while ensuring continuous uptime. For this, the NOC team should have specialized expertise surrounding digital engineering, cloud, MEC Applications besides domain expertise pertaining to LTE/5G operations.

The digital engineering services partner has major role to play in Private LTE/5G Network Managed Services. Also, building a proper partner ecosystem is must in remote virtual NOC operations since it involves a host of critical activities, including:

- Monitoring the LTE/5G network for problems that require special attention, including those originating from sources.
- Edge servers, cloud servers, MEC applications, private and public network and IOT device management, including software installation, updates, troubleshooting and distribution across all devices.
- Incident response, including managing power failures and communication line issues.
- Security, including monitoring, threat analysis and tool deployment, in conjunction with security operations.
- Patch management, backup and storage and disaster recovery.
- Root cause analysis (RCA) and recommended actions.

THE LTTS EDGE: COMPREHENSIVE PRIVATE LTE/5G NETWORK SOLUTIONS AND SERVICES

LTTS' Industrial-grade private wireless solution is enabling Industry 4.0 focused digital transformation for a host of companies spanning manufacturing, transportation, healthcare, energy and mining. The team has a major role as a system integrator across industries in providing end to end private network solutions – from network planning, to design and deployment, to the seamless integration with partner ecosystems.

DEPLOYMENT	APPLICATIONS	MANAGED SERVICE
• Best-of-breed OEM Reference Architecture • Bill-of-Materials • Site Planning & Network Design Services • Quick Deployment Tool-kit • Sensorization • Installation & Commissioning	• Vertical-specific Applications Use Cases (e.g. Telematics) • Mobile Edge Compute (MEC) Application Architecture Blueprint • Application Development Services • Enterprise IT Application Integration Services	• L1/L2/L3 Network & Application Support • SLA Monitoring • Performance Optimization • Maintenance & Upgrades
TURNKEY, COST-EFFECTIVE DEPLOYMENT	**DEEP INDUSTRIAL ENTERPRISE EXPERTISE**	**PROVEN OPERATIONAL EXCELLENCE**

KEY DIFFERENTIATORS:

- Rich industrial engineering domain knowledge and multi-vertical experience
- Deep expertise across the managed services domain leveraging network operating centers
- Established tools and AI/ML-powered automation
- Readily deployable Private 5G MEC network applications
- Pre-integrated and tested partner solutions at LTTS 5G Experience Center

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