White Paper

Enterprise Customers
Manufacturing, Oil & Gas, Mining, Retail, Warehouses

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Tech Mahindra 5G4E Accelerates Private 5G-Based Digitalization

Tech Mahindra 5G for Enterprise (5G4E) offering includes edge solution packs that tailor the benefits of private 5G networks for a range of enterprises and are powered by 3rd Gen Intel® Xeon® Scalable processors

5G for Enterprise (5G4E) is a niche offering of private wireless networks that enable enterprises to monetize their networks through the adoption of technology innovations such as artificial intelligence (AI), machine learning (ML), robotics, augmented and virtual reality (AR/VR), and Internet of Things (IoT). All these technologies usher in next-generation digital transformation opportunities for organizations.

Across verticals and use cases, 5G4E enables enterprises to reach business goals ranging from innovation and competitive advantage to operational efficiency and customer satisfaction. Berg Insight forecasts a tenfold increase in 5G4E installations by 2026, growing from a niche to a mainstream solution.[1]

Tech Mahindra's end-to-end 5G4E integrated stack enables enhanced network connectivity and orchestration, integrating 5G, Wi-Fi 6, SD-WAN, perimeter security and multi-cloud connectivity, extending performance, function, and security to the network edge. Tech Mahindra leverages 3rd Gen Intel® Xeon® Scalable processors that deliver performance for cloud-optimized, 5G-ready networks, and next-generation virtual networks. Network-optimized 3rd Gen Intel Xeon Scalable processors (N SKUs) are designed for high-performance networking workloads. With a wide range of cores, frequencies, features, and power, these CPUs bring power to edge networking applications.

5G for Enterprise – Realizing Private Wireless Networks

Underpinning the 5G4E transition is the virtualization of network elements, that can build software-defined, agile, and scalable networks from the core to the edge, and the expansion of the cloud ecosystem. Today, over half of core network workloads are virtualized, and there is tremendous momentum behind virtualizing radio access network (RAN).[2]

The allocation of new spectrum dedicated to 5G4E, whether through fully private enterprise licenses, or a shared model utilizing dedicated spectrum from mobile network operators (MNOs), has ushered in this new era of mobile network computing. In the United States, Citizen Broadband Radio Service (CBRS) is a newly available radio frequency (RF) spectrum from 3.5 GHz to 3.75 GHz, specifically designated for dedicated high-speed 5G applications, including private wireless networks (PWNs). With speed, consistency of service, and latency lower than Wi-Fi, 5G can be used by enterprises to create highly customized PWNs with improved security. According to the Berg Insight report, "Spectrum availability is the most important enabling factor for the adoption of private [5G] networks."

Major RAN innovators, such as Tech Mahindra and Intel, are collaborating to provide 5G4E solutions that give enterprises the opportunity to roll out powerful 5G4E today.

5G4E Benefits

The Enterprise 5G Alliance promotes the following benefits of a 5G4E PWNs[3]:

- Controlled device access

- Controlled bandwidth per device

- Network resources shared by fewer devices, resulting in higher bandwidth

- Custom quality of service (QoS)

- Seamless mobility with mobile network operator (if needed)

- Roadmap for upgrades

- Large portfolio of devices

- Security and control

- Ability to control RAN coverage

- Integration with edge computing networks

Key Drivers to 5G4E Adoption

The interest and investments by enterprises in 5G4E are driven by its unique and powerful advantages:

Control and Performance

5G4E networks give enterprises ultimate control over their entire mobile infrastructure: control of RF coverage, allowed devices, dedicated bandwidth usage by device, use case, and application, network and WAN footprint, and data security. With its throughput, and ultra-low latency, 5G provides fiber-like performance throughout a facility, even in hard-to-reach places.

Cost Savings and Efficiency

Without the need to lay cables and costly dedicated hardware for vertical applications, 5G4E is a cost-effective solution right from the start. 5G's micro base stations have high density with small footprints, are fast and flexible to install, and deployment is controlled by the enterprise. The low cost and ease of installation also enables 'pop-up' and temporary spaces, such as tradeshow booths and remote testing sites, readily available.

Innovation and Competitive Advantage

With 5G's ultra-low latency (at 0.5 milliseconds it is 50 times lower than 4G), density (1MM devices per 2km versus 60,000 devices with 4G), high speed (at 20Gbps, 10 times faster than 4G), and reliability, as well as network slicing capabilities for bandwidth allocation, 5G4E PWNs make possible broad usage of innovative technologies such as AI/ML, VR/AR, and IoT – at scale, throughout the entire enterprise and expands the network edge to the WAN. This creates new possibilities for organizations to explore ways these technologies can be utilized to improve efficiency, lower costs, improve customer experiences, and attract new revenue opportunities.

Companies are Embracing 5G4E Innovation

While opportunities and innovations are emerging in virtually all enterprises and industries with low-latency and high throughput requirements, a few verticals are leading the adoption of 5G4E (See Figure 1).

Manufacturing

Manufacturing is undergoing a generational shift that promises to be transformational. Focused on increasing efficiency and productivity, and lowering waste and costs, the 4th industry revolution, Industry 4.0, ushers in digital technology to address several aspects of industrial production and logistics via high-speed, low-latency connectivity and infrastructure.

Most factories utilize Wi-Fi or unlicensed spectrum networks for highly reliable throughput and low-latency data communications. Furthermore, the unique physical environment of factory floors can be challenging for Wi-Fi and 4G radio frequency (RF) signals due to metal, concrete construction materials; electrical noise interference; dimensions, and distance.

Using technologies such as AR/VR, IoT, ML, robotics, and AI, Industry 4.0 is possible with the convergence of the flexibility and control that comes from the convergence of networks function virtualization (NFV), SD-WAN, and cloud computing, and the speed, improved security, and low-latency of 5G.

Manufacturing-related use cases for 5G4E include AR/VR-based remote maintenance, computer vision-based quality inspection, condition-based monitoring, autonomous guided vehicles (AGV) and digital twin modeling for predictive troubleshooting, forecasting, and maintenance.
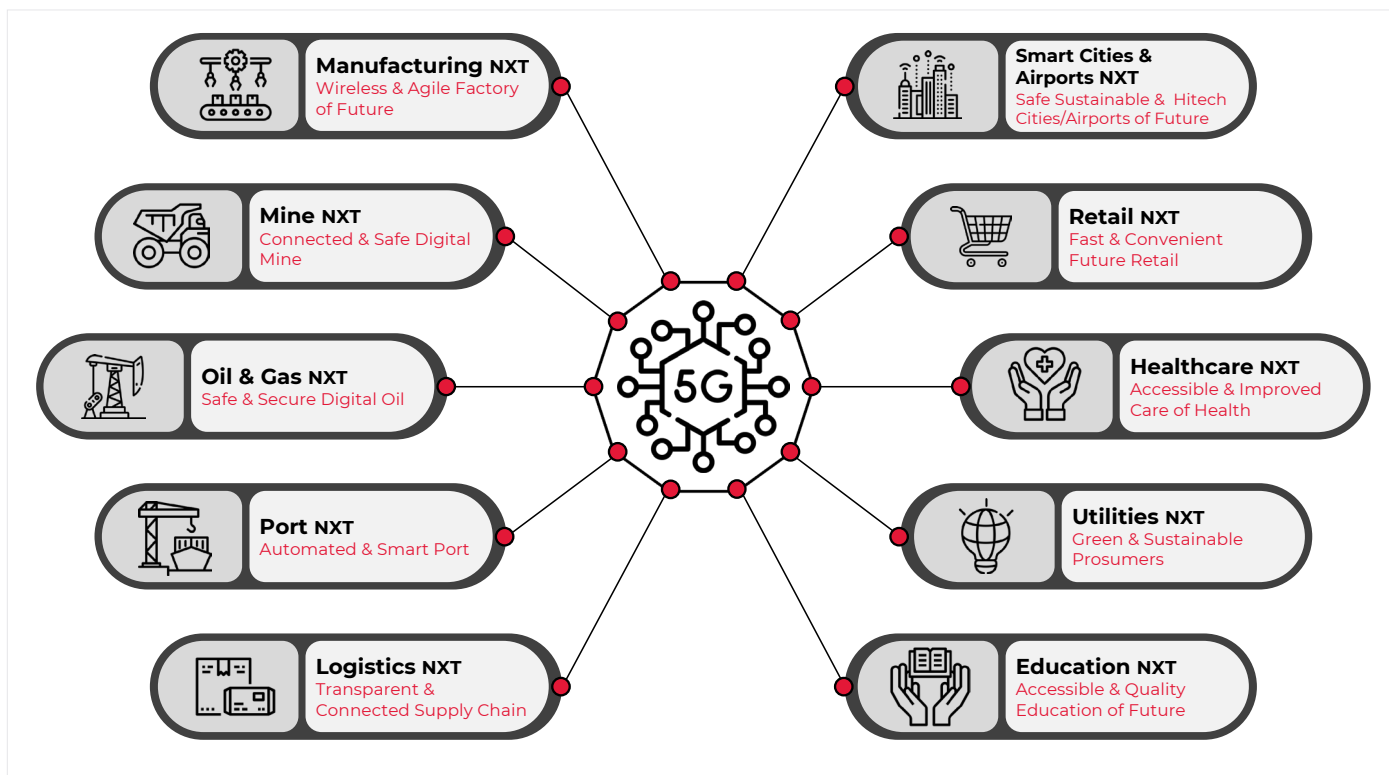
Figure 1. Vertical use cases using 5G4E for unique applications. Source: Tech Mahindra

Retail and Warehouse Logistics

Due to the competitive necessity of a hyper-focus on customer experience, and the increasing expectation and demand of customers to have seamless interactions, many retailers are adopting omnichannel strategies to create valuable customer experiences from whatever channel purchases are made, whether in-store or online, or increasingly via mobile devices. Furthermore, purchases and reward programs are often managed through retailers' custom mobile applications, which must apply at any point-of-purchase and provide real-time order and supply information with their storefronts and warehouses.

Adoption of 5G4E networks delivers end-to-end visibility to the retail supply chain via its support of massive numbers of IoT devices (1 device every 2 meters, or 1 million devices within 2 kilometers). IoT sensors can enable end-to-end tracking, shipping, and handling, theft mitigation, monitoring conditions inside containers, fleet management, materials handling, order fulfillment, inventory management, and supply and demand planning through computer-controlled robot (COBOT)-based material movement, and asset track-and-trace. AR can be used by warehouse workers to improve material handling accuracy, and by service teams to diagnose customer issues and troubleshoot resolutions more accurately.

Mining, Oil & Gas

With harsh environments and extreme safety hazards, both mining and oil and gas industries face similar challenges and present tremendous opportunities for safety and security improvement through technology advancements. Complex equipment and harrowing environments make both industries contribute to security and risk vulnerabilities. Whether facing deep narrow access-challenged mine tunnels, or wide expansive access-challenged oil and gas fields, connectivity options are limited. Wired, Wi-Fi, and public mobile services are limited in their effectiveness because of extreme environments.

With lower frequency rates than Wi-Fi (2.4 GHz and 5.8 GHz) 5G has stronger penetration capabilities to provide better underground coverage in drill sites and mines. With its high density, high capacity and ultra-low latency, massive numbers of sensors can be deployed across vast areas and used for mission-critical (99.999% uptime) applications.

Tech Mahindra Offers NXT.NOW™ Digital 5G4E Solutions

Tech Mahindra has distilled its expertise and experience in 5G4E into its NXT.NOW™ series of pre-integrated end-to-end enterprise digital solutions enabled by 5G and multi access edge compute. The company has developed a series of Edge Solution Packs for a variety of asset-intensive industries.

Tech Mahindra's NXT.NOW™ solutions are comprised of devices, platforms, and applications for industry verticals of any size. They are end-to-end integrated stacks incorporating a three-tier architecture that enables enhanced network connectivity for enterprises, powered by state-of-the-art technologies such as 5G, Wi-Fi 6, pLTE, SD-WAN, perimeter security and multi-cloud connectivity (see Figure 2).
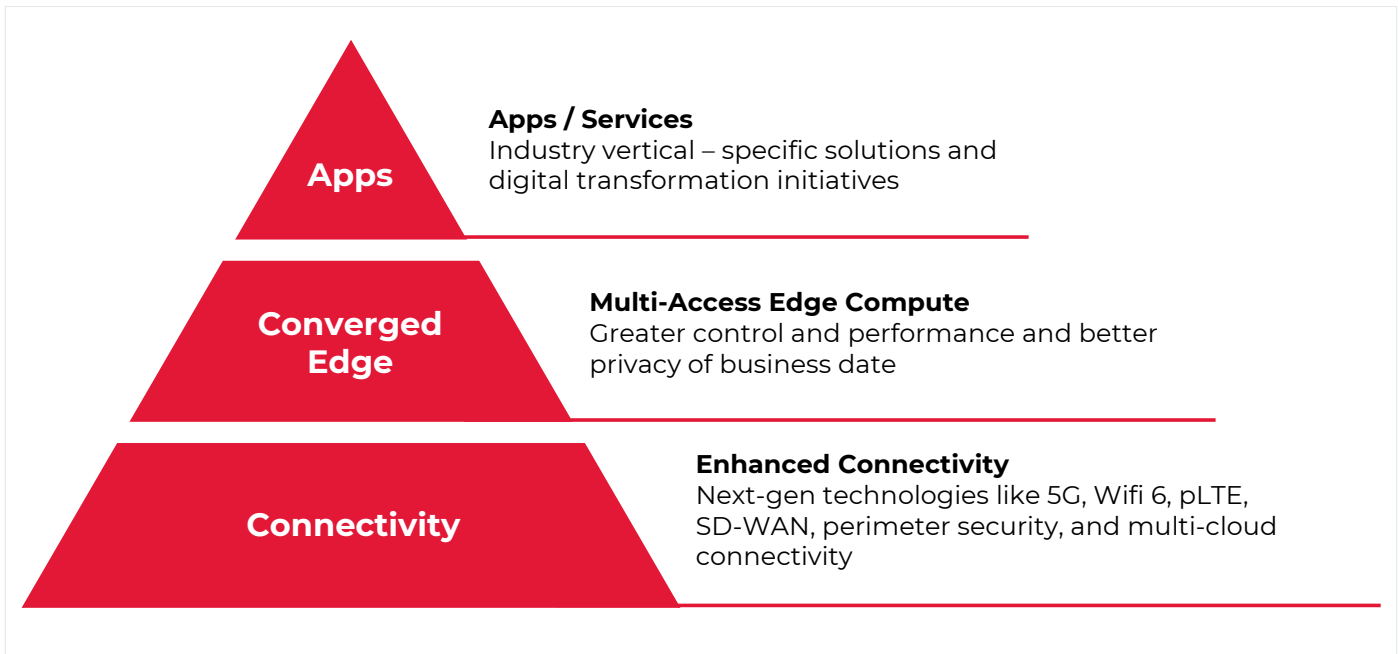
Apps / Services
Industry vertical – specific solutions and digital transformation initiatives

Multi-Access Edge Compute
Greater control and performance and better privacy of business date

Enhanced Connectivity
Next-gen technologies like 5G, Wifi 6, pLTE, SD-WAN, perimeter security, and multi-cloud connectivity

Apps

Converged Edge

Connectivity

Figure 2. Tech Mahindra 5G4E End-to-End Integrated Stack.

Tech Mahindra's network architecture facilitates multi-regional WAN connectivity for global enterprises through a carrier-neutral core enabling expedient multi-cloud connectivity. The underlying network connectivity augments the distribution of the network intelligence between multiple cloud options, shifting vital intelligence toward the edge. The converged-edge layer serves as a network bubble providing an edge cloud to host with the ability to scale multiple network functions and digital workloads.

The edge cloud can be deployed on premise or hosted at an MNO site. The fusion of the enhanced connectivity with converged edge prepares the network for industry-vertical specific applications that enable digital use-cases.

Tech Mahindra's 5G for Enterprise solutions are augmented by a comprehensive suite of services delivered as an end-to-end managed service, enabling all the benefits of 5G4E to enterprise customers.

3rd Gen Intel® Xeon® Scalable Processors Power 5G4E

At the heart of the Tech Mahindra 5G4E solution are servers powered by 3rd Gen Intel Xeon Scalable processors. These CPUs embed native support for the high speed, reliability and scalability that is required to roll out 5G4E private wireless networks.

Intel Xeon Scalable processors are optimized for multi-cloud environments with built-in acceleration and advanced security capabilities and are designed to serve many workloads from core to edge to cloud. The CPUs offer a balanced architecture that is:

- Optimized for specific customer workload types and performance levels, for cloud, enterprise, network, security, and IoT workloads with eight to 40 cores and a wide range of frequency, feature, and power levels.

- Infused with Intel® Crypto Acceleration, enhancing data protection and privacy by increasing the performance of encryption-intensive workloads including SSL web serving, 5G infrastructure, and VPN/firewalls, while reducing the performance impact of pervasive encryption.

- Built-in AI acceleration, end-to-end data science tools, and an ecosystem of smart solutions.

Intel offers a suite of software toolkits to support streamlined deployment of Tech Mahindra's 5G for Enterprise solution:

Intel® Smart Edge
Intel® Smart Edge is a turnkey software toolkit for building edge platforms, delivering advanced security and an easy-to-deploy-and-manage software stack. The toolkit enables faster development of edge solutions that host network functions alongside AI, media processing, and security workloads with reference solutions optimized for common use cases.

FlexRAN™ Reference Architecture for Wireless Access
This reference architecture is used with the Open vRAN ecosystem to build and deploy highly optimized 5G scalable cloud-native vRAN solutions on Intel® architecture processors.

Innovation begins today

5G can empower enterprises to create new innovations and experiences and solve costly long-standing problems. The rollout of 5G4E is possible now, with equipment and many mobile devices 5G ready. Research and Markets projects the global 5G enterprise market will reach $50.1 billion by 2027 (from $10.42 billion in 2021),[4] showing strong confidence in the potential outcomes realized by the technologies and solutions.

Tech Mahindra and Intel, leaders at the forefront of MNO transition and new service development, have commercial-ready solutions available today for enterprises to realize the power of 5G for enterprise.

Learn More

Tech Mahindra 5G for Enterprise

Tech Mahindra

3rd Gen Intel® Xeon® Scalable processors

Intel® Network Builders

Unlocking Enterprise Growth with 5G Webinar

Tech Mahindra Edge Packs

- Manufacturing NX Building a wireless and secure Factory-of-the-Future
- OnG NXt – Safe & Secure Digital Oil
- Port NXt – Automated & Smart Ports
- Smart Cities & Airports – Safe Sustainable & High tech Cities/Airports
- Healthcare NXt – Accessible & Improved Care of Health
- Education NXt – Accessible & Quality Education

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