

Private 5G and the Next Generation of Enterprise Automation

We live in a time of accelerating technology transformation and convergence. Innovations across diverse areas combine to reengineer industries such as transportation, manufacturing, healthcare, and utilities. The advent of AI and analytics extends the power of computer models to optimize even the most complex systems, while advancements in devices and interfaces associated with robotics, sensors, drones, autonomous vehicles, wearables, and batteries extend the reach of the digital landscape, converging it with the physical world. The merging of the physical and virtual worlds is a force multiplier in an enterprise’s quest for improved efficiency and productivity. The network is the fabric that connects devices, models, and processes, making this convergence possible. For an enterprise, the network technology best suited to deliver the security, mobility, and performance of emerging applications is Private 5G.

New challenges, new requirements

As enterprises embrace innovative digital technologies, they are presented with new challenges to connect emerging use cases. The network must support digital transformation applications by providing required throughput and latency with guaranteed availability to avoid disrupting business operations.

Key requirements for next-generation private networks include:

- **Privacy and security** to protect the business from a digital breach or a data leak which can have devastating effects
- **Latency predictability** to allow integrated systems to operate in a highly synchronized manner

- **High density** to connect the growing abundance of Industrial IoT (IIoT) sensors and controls
- **Mobility and wide area coverage** to enable autonomous vehicles and mobile robots, and track staff and goods—both indoors and outdoors
- **Quality of Service (QoS) assurance** to guarantee and control network performance, which business performance is increasingly dependent upon
- **Consistent evolution framework** to enable and support future use cases and applications

Private network evolution. New capabilities to support new requirements.

Initial private networks in the enterprise domain were wired, connecting static machines for basic automation functions. As applications required increased flexibility, wireless solutions were widely deployed. From use-case-specific radios to conventional WiFi, private wireless has simplified and accelerated the ongoing digitization transformation journey of enterprises.

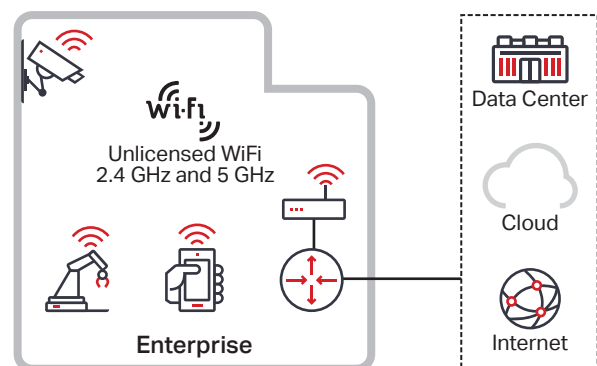


Figure 1. Former approach to private wireless focused on connecting people and things within confined areas, mostly based on unlicensed WiFi

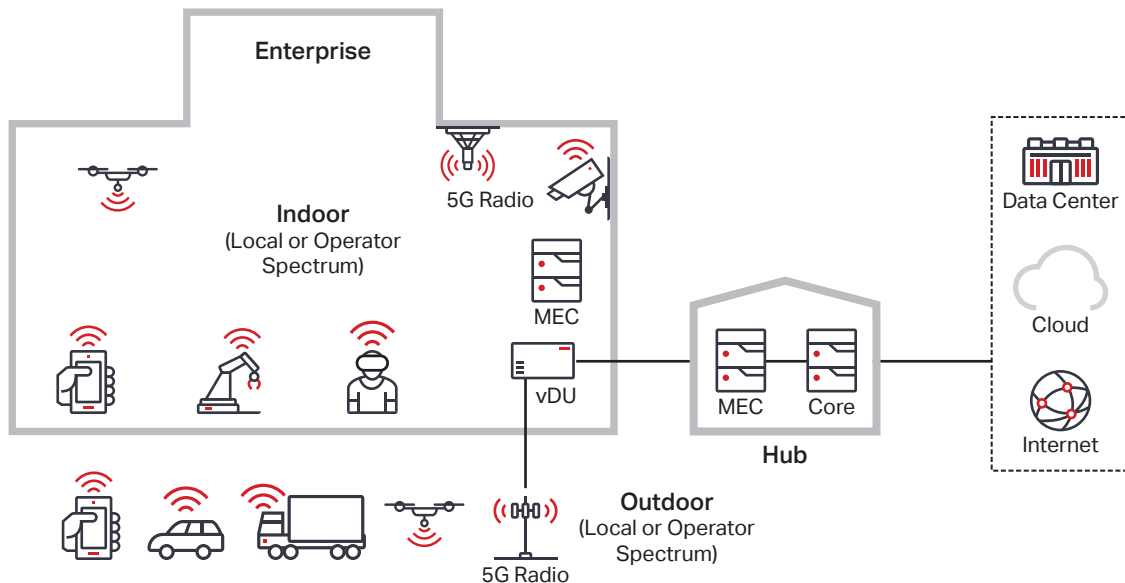


Figure 2. Next-generation private wireless will leverage 5G to deliver the security, mobility, and performance new applications require.

The original approach to private wireless focused on connecting people and things within confined areas. However, as applications evolve and become more dynamic and sophisticated, WiFi and other unlicensed radio technologies are simply unable to provide the necessary security, latency, mobility, coverage, scalability, and performance assurance.

Cellular network technologies, on the other hand, have evolved to efficiently address these stringent requirements. Seeking to benefit from the scalability, the native mobility, and the robust security framework of cellular networks, large enterprises have started to successfully implement 4G/LTE systems in a private context. With 5G specifications maturing and evolving to support critical applications with ultra-reliability, Private 5G networks are positioned to be the best fit to support the enterprise digitization journey. Analysts estimate that close to a thousand private 5G or 4G/LTE projects were in development in 2020.

Trends and challenges

The primary force driving the adoption of Private 5G is the industry's focus on leveraging digitization to improve process efficiency, business continuity and agility, operations safety, and sustainability. Yet other factors are also aligning to accelerate and enable the journey into the high-performance wireless realm.

Spectrum licensing has historically been an extremely expensive obstacle to deploying private wireless networks, hence the widespread adoption of natively unlicensed WiFi. Recently, however, regulators in multiple countries

have acknowledged the potential of Private 5G for industry progress and are making local or shared spectrum available for enterprise use—with encouraging economics.

Another considerable barrier for private cellular adoption has been its inherent complexity. Enterprises' IT staff typically lack the requisite understanding to design, deploy, and manage the myriad of complex 4G/LTE and 5G technologies, such as specialized Radio Area Network (RAN) elements. Fortunately for them, the 5G ecosystem is moving towards openness, disaggregation, and virtualization. Virtualized RAN elements and mobile core functions can be deployed in a 5G-in-a-box setup, substantially simplifying implementation and management. Converged xHaul (fronthaul, midhaul, backhaul) solutions further simplify an enterprise's journey by addressing multiple transport network requirements in a simple, cost-effective manner.

Ciena's 5168 Router
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Taking an Adaptive Network™ approach

Private 5G lays the foundation for an evolving enterprise automation journey toward improved business outcomes. New technologies, applications, and use cases will be introduced throughout this digitization path. To ensure today's investments yield returns into the future, the network must be adaptive to address inevitable changes and pressures as applications and use cases continue to evolve.

The key to a successful Private 5G network is taking the Adaptive Network approach. Programmable infrastructure—including converged 4G/LTE and 5G xHaul routers with support for hard and soft network slicing combined with the broader ecosystem of RAN technology partners—provides the flexibility needed to tackle the most diverse requirements of today and tomorrow. Intelligent, analytics-driven automation and orchestration simplify overall network management and reduce operational expenses. And to accelerate and de-risk the unique journey of any enterprise, a professional services

partner will be key to ensure the successful implementation of a Private 5G network. The Adaptive Network approach addresses all these key elements in any Private 5G deployment to effectively transform enterprises for the future.

5G Automation
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