HPE aruba networking

An introductory guide to enterprise private 5G

How to get started on your private cellular networking journey

HPE GreenLake

The future of enterprise connectivity

The future of the enterprise network is not either/or. Multiple different types of connectivity — Wi-Fi, wired, Bluetooth, Zigbee, private 5G, LoRa and others—are and will continue to be used in the enterprise to support a wide range of use cases. The focus will evolve from focusing on the specific type of network connectivity and devices to one that uses connectivity as a way to meet business outcomes.

"These technologies [private cellular and Wi-Fi], as distinct as they are, will coexist for the foreseeable future — and indeed complement each other in most scenarios,"[1] according to IDC.

Recent advancements in private cellular have opened the doors to enterprise use. In the past, private 5G was simply too difficult for enterprises to deploy on their own with their existing resources. However, the recent allocation of dynamic shared spectrum has eliminated the need for carrier spectrum in a growing number of countries. New solutions with built in automation are hiding the complexity that previously required extensive training or third-party expertise.

Regulatory advances have created a framework in which private shared spectrum and light licensing models are now becoming widely available for enterprise use and are outside of cellular network operator control. Citizens Broadband Radio Service (CBRS) in the U.S. is available in the 3.5 GHz band and in other countries such as the U.K., France, Japan, and Germany, lightly licensed models are available in local geographies. In addition, uniform allocation of radio frequency bands across a region (known as harmonization) is enabling equipment manufacturers to offer private cellular offerings that are aligned with the rest of their enterprise networking portfolios.

This guide is designed for networking professionals to gain a greater understanding of private 5G and its usage within enterprise environments alongside Wi-Fi, including:

- What is private 5G?
- The benefits to deploying private 5G to complement existing Wi-Fi
- Starting your private cellular journey

By the end of this guide, you will have a clear understanding of how deploying private 5G in your enterprise can help you better meet your connectivity needs and how best to craft a networking strategy that meets all the needs of the enterprise.

It's important to note that near term, enterprises will deploy either 4G or 5G technology depending on the availability of devices and spectrum and that the benefits of private cellular extend to both standards.

The driving forces behind private 5G in the enterprise

There is no one driver behind the growing interest in private 5G. Industry 4.0 has generated a manufacturing process that is more connected and more intelligent, relying on technologies such as Industrial Internet of Things (IIoT), cloud connectivity, AI, and machine learning. Post pandemic, there has been a permanent shift towards cashless transactions and greater automation to address labor shortages, both of which require additional low-latency, high-reliability connectivity. Private cellular technology itself has also matured, making it easier and faster to implement, manage, and meet the connectivity needs for wide area coverage, segmentation of traffic, deterministic network access, high-speed mobility, and coverage of indoor cellular gaps.

[1] IDC, *HPE Acquires Athonet for Private 5G Creating an Opportunity to Integrate Cellular and Wi-Fi Management via an Enterprise Network as a Service*, March 2023

What is private 5G?

Private 5G allows enterprises to deploy dedicated cellular resources based on the latest 3rd Generation Partnership Project (3GPP) standards, which cover all types of cellular communication technologies, including radio access, core network, and service capabilities. Private 5G leverages dedicated resources to support demanding use cases.

Compared to 4G (also known as LTE), 5G is based on the latest 3GPP standards and features lower latency, higher capacity, and increased bandwidth.

Private 5G offers the following:

- Separation from public network
- Fine-grained, predictable QoS
- Spectrum protected from wireless interference
- SIM-based device identity
- Ability to cover larger areas than Wi-Fi per radio
- Improved handover with support for high mobility

A private cellular network consists of the following:

- **4G/5G core** software provides the management and control layers including mobility control, subscriber management, and traffic routing. It can be deployed in the cloud, on prem, or in a hybrid architecture. To simplify the upgrade process to 5G, organizations can begin with 4G (often to support existing client types) and then migrate to 5G using a combination 4G/5G core.
- **Cellular radio access network** (RAN), also known as a 5G radio, can be thought of as an access point for private cellular. Some solutions include a purpose-built radio while others offer the flexibility of deploying a choice of RAN to meet specific use case requirements. For lightly licensed spectrum like CBRS, the private cellular network will also include a Spectrum Access System (SAS) to protect incumbent use.
- **SIM/eSIM client devices** must support the 3GPP standard for 4G or 5G. Supported devices include a wide range of tablets, handhelds, and IoT devices and are frequently owned or managed by the enterprise.

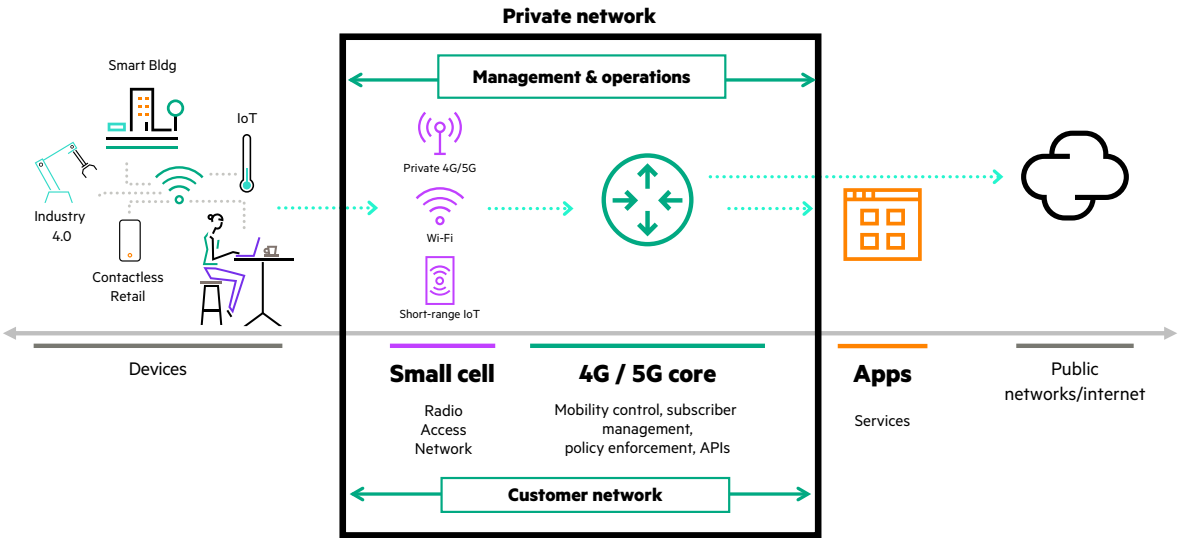

Figure 1. Key components of a private 4G/5G cellular network.

$9B

market expected for private 5G by 2028[2]

In the future, the private 5G network will be more incorporated into other network functions. The first step is to integrate management across wired, Wi-Fi, WAN, and cellular with capabilities such as unified identity and policy management. The vision is to streamline both the management as well as provide mobility across private 5G and Wi-Fi with integrated data paths.

The advantages of private cellular networks for the enterprise

Enterprises are adopting private 5G for many reasons, including its strengths in the following areas:

- **Segmentation of mission-critical traffic.** Some enterprises are looking to deploy a separate network for business-critical applications that operates over relatively clean spectrum alongside existing Wi-Fi networks. For example, a large public venue might deploy private cellular for back-office applications like mobile ticket scanning and reserve the Wi-Fi network for guest use.
- **Wider area coverage.** Due to higher power limits, and higher radio receiver sensitivity, private 4G/5G can cover more area per access point (albeit at a lower per AP throughput). Less cabling is needed which lowers costs, minimizes the impact on landscaping, and makes it easier to connect hard-to-reach areas like mines.
- **Deterministic network access.** The private 4G/5G infrastructure coordinates the resources of each forwarding node to guarantee priority, latency, and bandwidth per application per device. To illustrate how this works in practice, consider a busy conference room. In private 5G, the moderator ensures that each attendee gets their turn to speak and that no one talks over another person.
- **High-speed mobility.** Industry 4.0 requires high-speed mobility without any loss of connectivity in order to avoid costly work stoppages. In private cellular, hand-off decisions are controlled by the network and benefit from the wider area coverage that requires fewer handoffs. Private cellular's capabilities are ideal for robotics, autonomous vehicles, and warehouse operations.
- **Seamless indoor cellular coverage.** Today using Passpoint®, indoor cellular data can be offloaded to Wi-Fi, but dial tone coverage requires the user to manually activate Wi-Fi calling. In the future, private 5G will enable cellular devices to leverage shared spectrum (like CBRS in the United States) and provide 5G coverage to subscribers of any mobile network operator as if the subscriber were within its operator's own coverage area. This configuration will provide a low-cost alternative to today's small cell deployments to ensure dial tone coverage and complement existing Wi-Fi infrastructure.

Vertical examples

Vertical	Sample private 5G use cases
Manufacturing/ warehousing	Industrial automation, automated material handling, connected worker, product line inspection
Large public venues	Contactless ticketing and retail, crowd management
Healthcare	Clinical communications, diagnostic imaging
Education	Massive data backhaul from security cameras, wide area outdoor coverage, large venues (see above)
Transportation	Connected vehicles, fleet management, logistic optimization, real-time traffic planning
Energy	Remote monitoring, digital oil fields, grid monitoring, mines
Government	Public safety, connected transportation

[2]Analysys Mason, *Telecoms capex: worldwide trends and forecasts 2018–2028*, 2024

How to start deploying private change to cellular networks

Deploying private cellular networks may seem challenging for internal IT teams, but it doesn't have to be. With the right solution, enterprises can provide private cellular network connectivity to complement their existing wireless footprint.

There are five basic steps that organizations typically follow:

- **Step 1: Clearly define your use case.** Private 5G deployments are tied to specific use cases such as wide area backhaul for security footage at a university or deterministic coverage in a warehouse for automated vehicles.
- **Step 2: Select your deployment model and choose your vendor.** Whether you choose to manage the enterprise deployment yourself or partner with an experienced system integrator or mobile network operator, the vendor you select should have experience implementing private cellular in enterprise environments. The technology should be battle-tested, simple enough to manage using existing resources, and allow you to choose when you push upgrade.
- **Step 3: Design and develop your plan.** Your private cellular architecture should be designed to meet your SLAs for performance, reliability, and deterministic coverage. Challenging environments like underground mines may require more customized solutions.
- **Step 4: Deploy a prototype.** For your prototype, it is important to determine whether users will need to move and roam between private cellular and Wi-Fi and what that integration looks like from an implementation and security standpoint. Areas of integration may include network security and dynamic segmentation of traffic, identity management, and device management.
- **Step 5: Operationalize and explore new use cases.** Incorporate private 5G into your management and orchestration framework to drive greater operational efficiency. Create a single pane of glass and shared services across all types of connectivity. After you have successfully designed your prototype and rolled out the solution, consider addressing other challenges such as new mission-critical applications that require additional bandwidth.

A seamless private 4G/5G experience designed for enterprises

If you are looking for a private 4G or 5G experience that delivers carrier-grade connectivity and enterprise-grade simplicity, HPE Aruba Networking Enterprise Private 5G fills that need.

Our solution is based on industry-leading, proven technology from Athonet, a Hewlett Packard Enterprise acquisition. More than 500 enterprises and 25 communications service providers rely on the Athonet mobile core for performance, reliability, and scalability.

HPE Aruba Networking Enterprise Private 5G masks the complexity inherent in private cellular network deployments. To make it easier for enterprises to purchase, deploy, and manage private cellular networks, our solution includes everything needed: cloud-based core and radio management, core software and HPE server(s), indoor and outdoor small cell radio options, and SIMs or eSIMs.

For U.S. markets, the offering also includes a Spectrum Access System (SAS) to enable use of shared spectrum in the 3.5 GHz band known as Citizen's Broadband Radio Service (CBRS), thereby eliminating the need to acquire spectrum from mobile operators.

Unlike other private 5G offerings, we are taking a unified approach to management across wired, Wi-Fi, private 5G, and SD-WAN to drive greater operational efficiencies and will deliver integration with HPE Aruba Networking Central in the future.

What's next for private 5G in the enterprise?

Organizations are looking to unify their approach to connectivity and integrate private 5G into their overall wired and wireless networking strategy. As part of this, the management of private 5G is becoming more automated and streamlined so that it can be run by internal IT teams in much the same way that they manage Wi-Fi.

As a practical matter, this unification will lead to a single pane of glass for management and orchestration as well as shared identity and policy services. The goal is to streamline IT processes across wired and wireless — including private 5G. Ultimately, the specific way that users and devices connect will become less important as the focus shifts to connectivity as a way to meet business outcomes.

"Enterprises are not interested in deploying both 5G and Wi-Fi networks in separate silos, there is interest in a combined solution that can help tackle the integration and management issues from a single pane."[4] IDC

HPE Aruba Networking is committed to this journey. To succeed, all these capabilities need to be presented in a way that is familiar to infrastructure teams and we are working to make this happen. We believe that Wi-Fi and private 5G will be complementary to each and that devices will traverse them seamlessly. This will drive the most value to our enterprise customers enabling them to meet all their connectivity requirements and deliver on better business outcomes. Visit https://www.arubanetworks.com/faq/what-is-private-5g/ to learn more.

About HPE

Hewlett Packard Enterprise (NYSE: HPE) is the global edge-to-cloud company that helps organizations accelerate outcomes by unlocking value from all of their data, everywhere. Built on decades of reimagining the future and innovating to advance the way people live and work, HPE delivers unique, open and intelligent technology solutions as a service. With offerings spanning Cloud Services, Compute, High Performance Computing & AI, Intelligent Edge, Software, and Storage, HPE provides a consistent experience across all clouds and edges, helping customers develop new business models, engage in new ways, and increase operational performance. For more information, visit: www.hpe.com.

Visit **ArubaNetworks.com**

[4] IDC, *HPE Acquires Athonet for Private 5G Creating an Opportunity to Integrate Cellular and Wi-Fi Management via Network as a Service*, March 2023

Make the right purchase decision. Contact our presales specialists.

Contact us

Hewlett Packard Enterprise

SO_Enterprise-Private-5G_A4_RB_052224 a00140724enw