



Solution overview

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. 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 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. These two factors are driving innovation that will deliver common tools and control systems for the deployment and day-to-day management of combined Wi-Fi and private cellular networks.

This guide is designed for networking professional to gain a greater understanding of private 5G and its usage within enterprise environments, 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.

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



\$1.6B

market expected for private 5G by 2026²

75%

Although LTE is currently the majority, 5G will become dominant, accounting for 75% of RAN in 2026³

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 and 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.

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

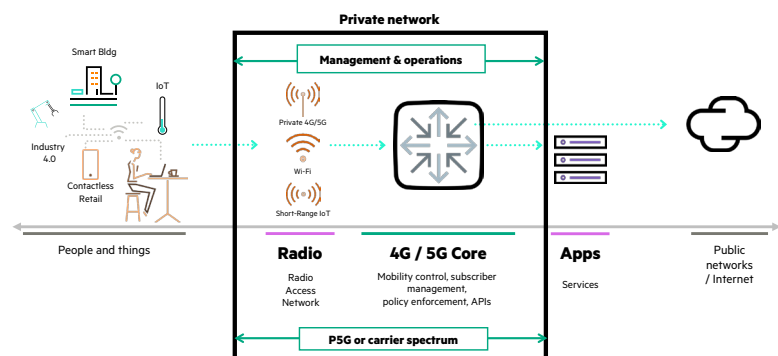


Figure 1. Key components of a private 4G/5G cellular network.

² IDC, Worldwide Private LTE/5G Wireless Infrastructure Forecast, 2022–2026, March 2022

³ 650 Group, 3Q23 Market and Forecast



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.
- **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.

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:

- **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 fiber cabling is needed which lowers cabling costs, minimizes the impact on landscaping, and makes it easier to connect hard-to-reach areas like mines.
- **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.
- **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, handoff 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

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 partner and a clear roadmap, 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, be the point of contact to source additional components if needed, and offer deployment options for cloud, on-prem, or hybrid deployments. The technology should be battle-tested and allow you to choose when you push upgrade.

Select your deployment model

	Cloud	On Prem	Hybrid
Description	All components are located in the cloud	All components are within the organization's physical control	4G/5G core in cloud and RAN on premises
Scalability	√ √ √	√ requires additional hardware purchase to scale	√ √
Cost effective	√ √ √	√ higher upfront and maintenance	√ √
Rapid deployment	√ √ √	√	√ √
Low latency	√ Dependent on point of presence	√ √ √ Minimal latency due to physical proximity	√ √ √ Lower latency because user plane is deployed onsite
Security	√ Dependent on cloud provider	√ √ √ Full control over data and infrastructure	√ √ Some infrastructure control



- **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 or transportation hubs may require specific radio components. You will also need to determine whether to use shared dynamic spectrum, if available in region, or licensed spectrum delivered by a mobile network operator.
- **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 deploying indoor private cellular to eliminate indoor coverage gaps for dial tone connectivity.

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, Athonet, a Hewlett Packard acquisition, fills that need.

Athonet, founded in 2005 in Italy, is a proven solution deployed in more than 400 enterprise customer environments and winner of 5 industry awards at MWC. Its 4G/5G technology is widely used across companies of all sizes, all industries, and geographies and can be deployed in the cloud, on premises, or in a hybrid mode for greater flexibility. For resource-constrained organizations, Athonet is also available as a managed services offering. Unlike other solutions, Athonet has been created with the enterprise in mind and offers carrier-grade services with simplified 5G orchestration and zero-touch automation.

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 will need to become 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

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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

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