

Intro guide to Wi-Fi 7 and private 5G

How Wi-Fi and private cellular work
together to deliver pervasive wireless

Get started →

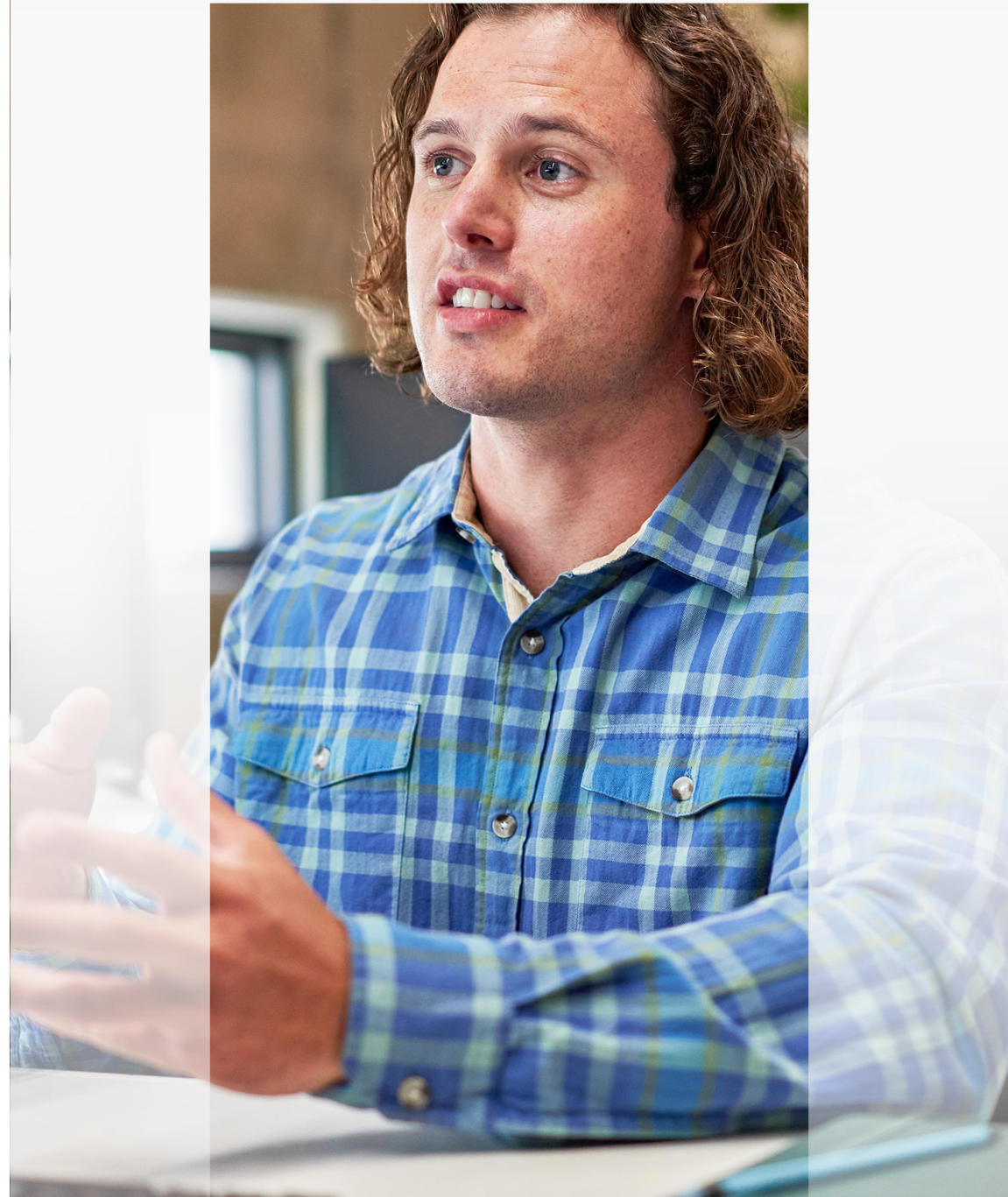


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Overview

Organizations across all industries and all sizes are using digital tools and services to modernize operations and experiences. From industrial manufacturing to solar farms to public venues, high-performing secure wireless connectivity is essential to delivering business outcomes. Using Wi-Fi alone supports many of these use cases but there are many specialized situations where private 5G can complement it to meet the needs for pervasive connectivity.



A need for both Wi-Fi and Private 5G



Introduction

Wi-Fi is a well-understood technology that is ideal for high-density indoor environments. Each release delivers more and more functionality and the latest standard, Wi-Fi 7, is no exception. With Wi-Fi 7, enterprises and industrial environments can benefit from higher throughput, enhanced efficiency, and increased reliability — without increasing power consumption demands. As applications have changed to be more immersive, more real-time, and more high definition, Wi-Fi 7 has evolved to meet these needs.

Private 5G allows enterprises to deploy dedicated cellular resources based on the latest 3GPP standards for mobile networks. It complements Wi-Fi to provide a customized experience under enterprise control and is well-suited for specific industry use cases that require link reliability, guaranteed access for prioritized traffic, wide area coverage, high-speed mobility, and additional dedicated capacity. Private 5G represents the evolution of cellular technology that offers faster speeds and lower latency than private LTE with a more flexible, scalable architecture.

To better understand how the two work together, take the example of the 2023 Ryder Cup. The Roman venue presented several challenges: existing connectivity was challenging, and the archeological importance of the site made cabling difficult. During the event, Wi-Fi connected thousands of fans, enabling them to share video and communicate without interruption. To complement Wi-Fi, private 5G provided dedicated wide area coverage to remote parts of the course and connected critical applications such as security, stewarding, ticketing, and weather monitoring. The high power and receive sensitivity with private 5G meant that fewer small cell radios and associated cabling were needed.



Wi-Fi 7 — the new Wi-Fi standard



Today's Wi-Fi networks are limited by the available spectrum. As organizations increase their use of high-definition video streaming, onboard increasing numbers of client and IoT devices, and continue transitioning to cloud services, Wi-Fi congestion increases, and user experience suffers.

The Wi-Fi 6E standard opened the 6 GHz band, resulting in tremendous wireless capacity gains of up to 1200 MHz of additional spectrum and increasing Wi-Fi capacity by up to 3x. The new Wi-Fi 7 standard (IEEE 802.11be) builds on the capacity gains of this clean spectrum and introduces improvements to support increased density, provide extremely reliable low-latency connectivity, and deliver the highest performance Wi-Fi available, for:

— **More data** and many more simultaneous transmissions at faster speeds with 320 MHz channels that are 2 times the width of Wi-Fi 6.

- **Improved load balancing** and higher throughput with multi-link operation (MLO) that enables Wi-Fi 7 devices to connect on different channels across frequency bands at the same time. Or both bands can be used concurrently to share redundant data for improved reliability with ultra-low and precise latencies.
- **Higher peak data rates** with 4K QAM that more densely packs data into each signal with 20% higher transmission rates than Wi-Fi 6 for faster, low latency Wi-Fi.
- **Improved usage** of wide channels by accommodating interference with spectrum puncturing.



Maximizing 5 GHz and 6 GHz band capacity

While the capacity advantages of the 6 GHz band are clear, the gap between the adjacent 5 GHz and 6 GHz channels is very narrow, which can cause interference, constrain usage, and degrade overall Wi-Fi performance if not properly managed. To avoid interference, enterprises typically sacrifice the upper 5 GHz channels and/or the lower 6 GHz channels — reducing the capacity benefit of the 6 GHz band in Wi-Fi 6E and Wi-Fi 7 deployments.

HPE Aruba Networking has solved this adjacent multi-band interference challenge with patented ultra tri-band filtering that enables enterprises to take full advantage of the lowest available 6 GHz channel and highest available 5 GHz channel — without interference or sacrificing channels. Ultra tri-band filtering takes advantage of all the new channels available in the 6 GHz band to support growing demands due to more devices, more cloud services, and accelerated digital transformation initiatives.



Wi-Fi 7 APs as a secure IoT platform

The benefits of Wi-Fi 7

As organizations plan upgrades and refreshes of their wireless infrastructure, requirements for future capacity, performance, and connectivity should be considered. Wi-Fi 7 is designed to deliver seamless wireless experiences so it is ideal for emerging use cases that demand high bandwidth, low latency, and extremely reliable Wi-Fi connectivity. Backward compatibility ensures that previous generations of devices will be able to connect.

Wireless access points were developed to securely connect mobile devices. However, with the expected growth in number and density of IoT devices, the need to securely connect, manage, and control IoT devices brings a transformative opportunity for access points.

HPE Aruba Networking has designed IoT-ready Wi-Fi 7 access points, with built-in connectivity, security, and manageability to securely and efficiently onboard IoT devices and keep control once they're connected. Our Wi-Fi access points offer:

- **AI-powered IoT operations** with Wi-Fi 7 APs that have dedicated Bluetooth and Zigbee radios and USB ports and are designed with additional compute power to run containerized applications for IoT.
- **IoT visibility and security inspection** with HPE Aruba Networking Central Client Insights and IoT dashboard.
- **Enhanced security** with link level encryption (MACsec) for wired data protection to the edge and dynamic segmentation for automated role-based access for users and IoT.
- **Accurate indoor location measurements** for enhanced location-based services with built-in GPS receivers, barometric pressure sensors, and intelligent software to enable APs to self-locate and act as reference points.



Private 5G as a complement to Wi-Fi 7

Wi-Fi excels for cost-effective, high-density indoor coverage. Yet, there are use cases that require greater link reliability, wide area coverage, high speed mobility, and dedicated bandwidth — where private cellular is very effective in complementing the Wi-Fi footprint.

What exactly is private 5G (P5G)?

Private 5G uses dedicated 5G technology based on the 3GPP industry standard to provide wireless connectivity. Embedded SIM or eSIM cards provide device-level security. Unlike Wi-Fi, private 5G is not backward compatible, requiring devices to be 5G enabled to use private 5G networks. The key components of a private 5G network are SIM/eSIM enabled devices, small cell radios, mobile core software deployed either on-prem or in the cloud, and a management dashboard for subscriber management and monitoring.

Many 5G technologies have been built by and for communications service providers and are costly and difficult for the non-cellular expert to deploy and manage. Deployments have also been highly customized, which makes it difficult to drive market adoption and generate value quickly.

The benefits of P5G

Private 5G can support use cases that are difficult today to cover with Wi-Fi, such as outdoor coverage of large sites where Wi-Fi may not be cost-effective, autonomous vehicles and robotics where high-speed mobility and deterministic coverage are required, and indoor sites such as factories and public venues where dedicated spectrum can perform better than Wi-Fi in noisy RF environments.

Enterprise-ready private 5G

In the past, enterprises relied entirely on communication services providers (Telcos) to provide the technology, spectrum, and expertise to deploy private mobile networks. Yet today, IT operations teams are looking to manage private 5G the same way that they manage Wi-Fi and do not want to become experts in cellular technology to deploy, configure, and manage the network. Simplicity is key.

HPE Aruba Networking is looking to simplify how enterprises purchase, deploy, configure, and manage private 5G networks so that the barrier to entry is significantly lowered. We leverage award-winning mobile core technology from Athonet, a Hewlett Packard Enterprise acquisition, and high performing, reliable hardware from HPE's ProLiant server line to deliver a complete solution that meets enterprise needs and delivers fast time to value. Because the mobile core supports both 4G and 5G services, enterprises can start with 4G and move to 5G once the device ecosystem has shifted to the newer standard. The mobile core technology is expressly designed for the enterprise — not a scaled-down version of a public 5G core stack — and includes a natural language, AI interface for ease of management. Deep cellular expertise is not required.

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Use cases: Wi-Fi and private 5G

Wi-Fi and private 5G can and indeed do work together across all industries. Here's how private 5G can complement Wi-Fi 7:



— **Retailers** can operate mobile point-of-sale terminals and inventory scanners using private 5G, leaving Wi-Fi 7 available for guest use, customer analytics, and IoT support. They can feed ruggedized tablets on forklifts and power robotic warehouse systems in locations using private 5G since each small cell can cover more area than Wi-Fi 7 and ensure consistent QoS.



— **Manufacturers** can use Wi-Fi 7 for industrial IoT applications and supply chain tracking, and reserve private 5G for use with wirelessly-enabled power tools to record every aspect of a product's creation as it moves down the line — applying machine vision systems for automated quality inspection and high-speed automated mobile robotics.



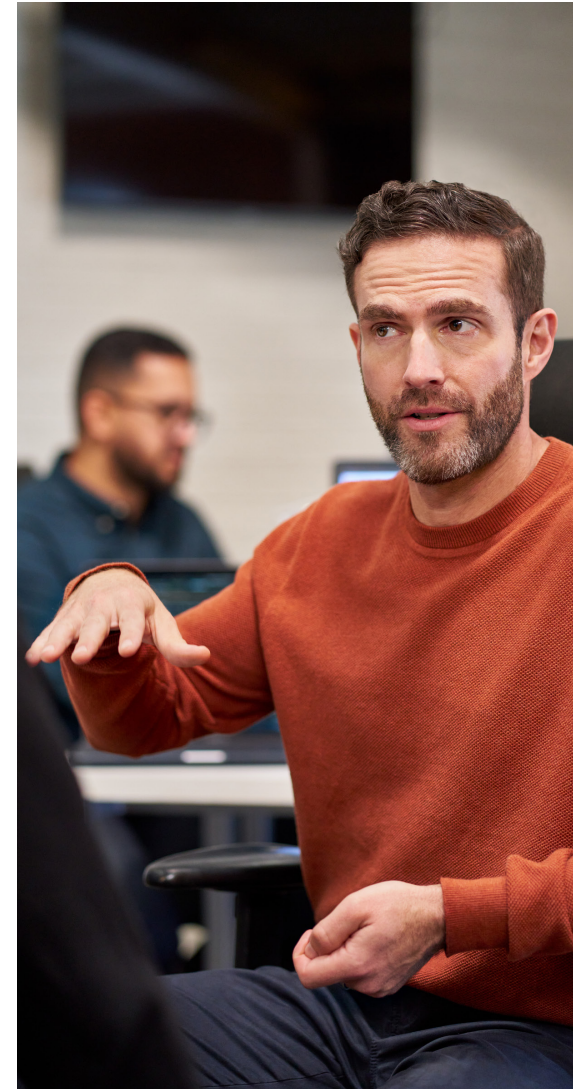
— **Public venues** reserve Wi-Fi 7 for guest and visitor use and for IoT devices. They can use private 5G to perform ticket scanning, enable push-to-talk (PTT) voice communication between staff members, and provide secure sideline data for real time decision-making.



— **Hospitals** use Wi-Fi 7 throughout the hospital for connectivity, patient health record access, IoT device connectivity and tracking, and patient and visitor use. They can add private 5G for additional capacity and extremely low latency applications such as sending medical telemetry to nursing stations and electronic medical record servers and providing PTT voice communication for clinical staff.



— **Higher education** can use Wi-Fi 7 for classroom and dormitory use, including AR/VR and immersive 3D training. Private 5G can complement Wi-Fi 7 for security camera data backhaul (latency-sensitivity) and wide outdoor area coverage, for example for outdoor graduation spaces.



Getting started with HPE Aruba Networking

HPE Aruba Networking has a track record of innovation and has been a leader in the Gartner Magic Quadrant for 18 consecutive times. Our work with industry standards bodies has contributed to the use of the 6 GHz band globally as well as Open Locate in support of accurate, location-aware services.

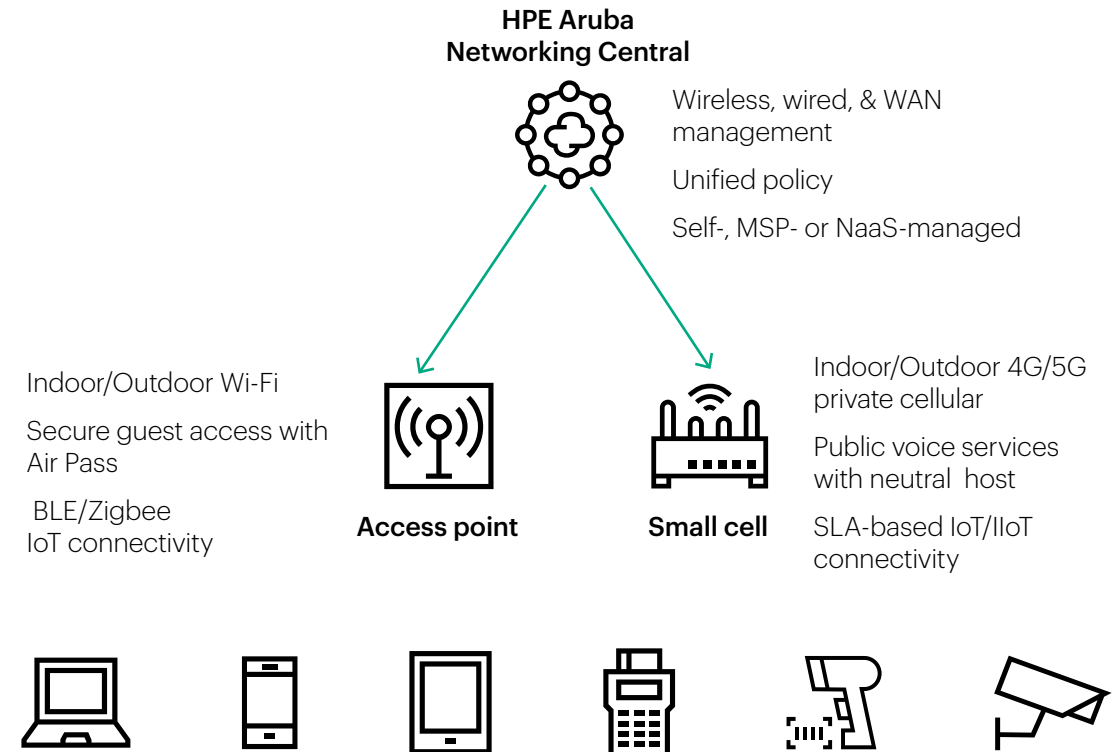
HPE Aruba Networking Wi-Fi 7 access points go beyond the latest standard to strengthen enterprise network security, enhance location-based services, and act as a secure IoT platform to enable organizations to maximize the value of their wireless investment and unleash operational efficiencies, while future-proofing for tomorrow.

Our private 5G offering is designed to be simple enough for enterprises to adopt as a complement to their existing Wi-Fi networks. Built on mobile core technology from Athonet, a Hewlett Packard Enterprise acquisition, it scales from 50 to 50,000 devices and has been recognized with a record seven GLOMO awards at Mobile World Congress. Most importantly, it can be managed using a simplified dashboard for subscriber management and monitoring that is extensible through open APIs.

We are leveraging HPE Aruba Networking Central for AI-powered, secure management and orchestration and extending it to Wi-Fi 7 and private 5G. This combination will drive greater operational efficiencies and decrease the learning curve for private 5G adoption enabling pervasive wireless across Wi-Fi 7 and P5G.

Our private 5G offering is designed to be simple enough for enterprises to adopt as a complement to their existing Wi-Fi networks.

HPE Aruba Networking vision for integrated wireless connectivity



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