

Realizing the Promise of Private 5G in 2024

Observations from the Frontlines

RESEARCH BRIEF

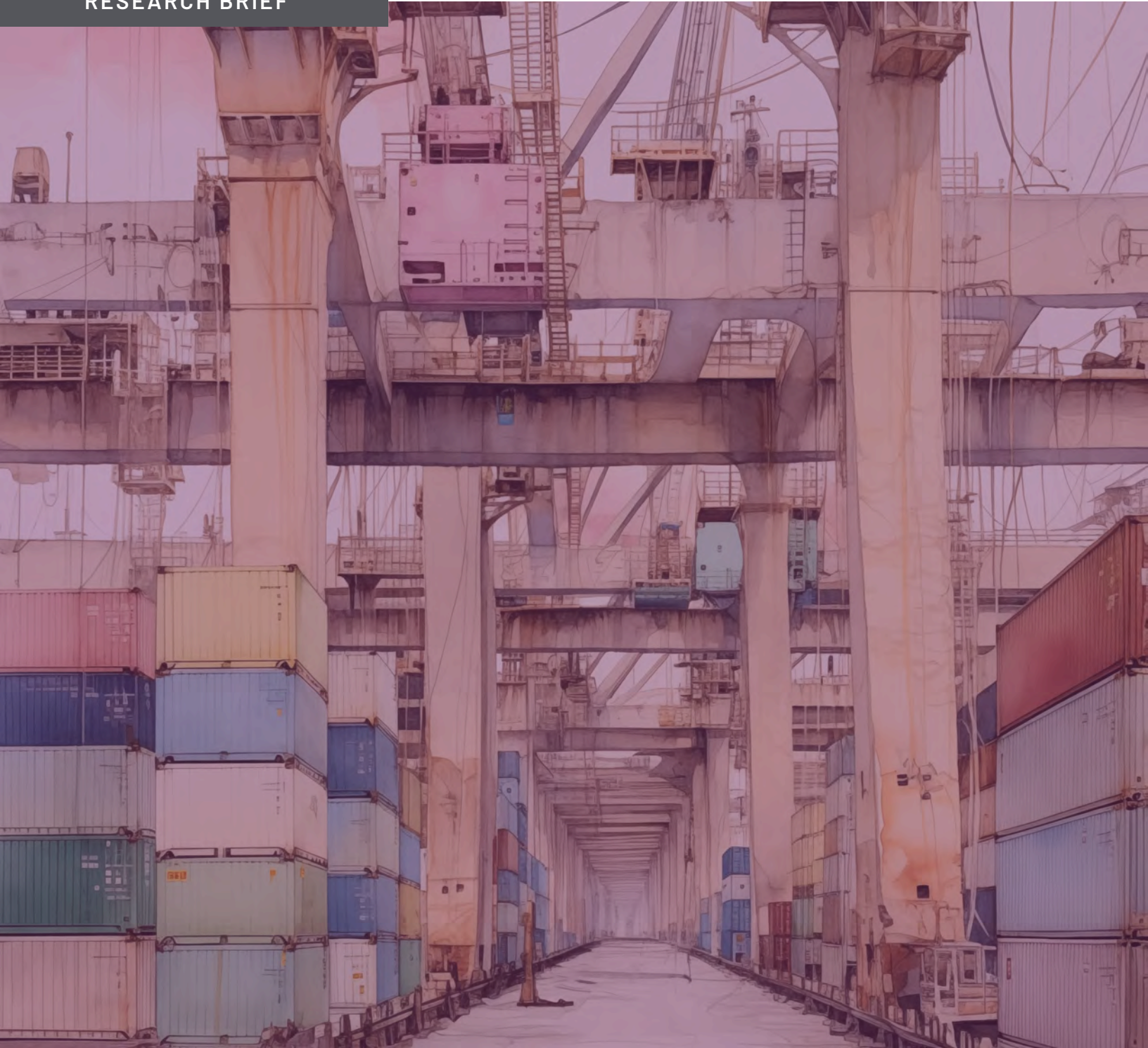


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Deploy and Manage Private 5G

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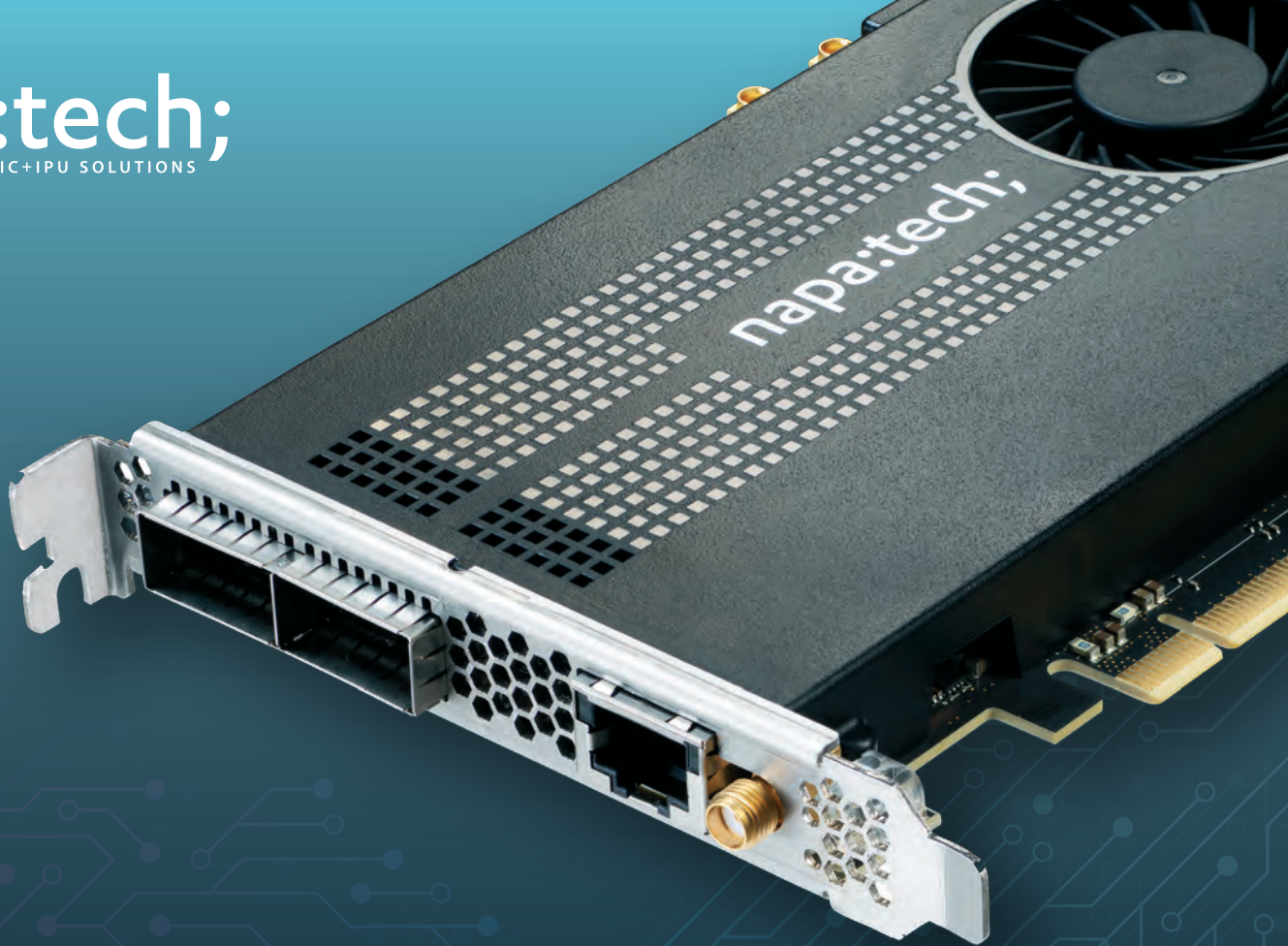
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5G Standalone or Stand Alone.

5G Core is here.
Will you embrace it
or be left behind?

A silhouette of a person stands on a long wooden pier extending into a body of water. In the background, a city skyline is visible under a hazy, sunset sky. A large, white, stylized '5G' graphic is superimposed on the right side of the image, partially overlapping the person and the skyline.

5G

PowerEdge XR8000

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With network modernization in full swing, Communications Service Providers (CSPs) need technology that's built to last, is upgradable, and cost-effective.

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Realizing the Promise of Private 5G in 2024

Observations from the Frontlines

Introduction – Tempered Optimism for a Private Wireless Future

Whether labeled private mobile networks (PMNs), mobile private networks (MPN), private wireless, private 5G, or non-public networks (NPNs) in 3GPP terminology, private wireless networks based on cellular technology have received keen interest from both communication service providers (CSPs) and enterprises over the last few years.

We first covered private wireless in our **2021 report**, introducing readers to the technology, deployment architecture, and early use cases. That report addressed early market concerns, including enterprise unfamiliarity with private wireless and spectrum implications, misdirected competition with WiFi, unavailability of equipment, and lack of clarity about business benefits.

Since then, private wireless has experienced the undulations of a hype curve similar to public 5G – the private wireless market is currently undergoing a period of tempered expectations. Nonetheless, despite reduced market size estimates and lowered growth forecasts from analysts over the past year, there remains strong interest in the technology from enterprises and CSPs.

In this AvidThink research brief update, we parse through current information gathered from working with enterprises, vendors, hyperscalers, and CSPs on private 5G and provide readers with updated guidance on what to expect in the private wireless market over the next 12-18 months.

Primer on Private Wireless Networks

Our **2021 report** provides a more detailed description of private wireless networks and is available as an ungated download. For busy readers, here's a quick overview of private wireless and the benefits for enterprise customers.

Rise of Private Wireless

Previously, cellular coverage in private or semi-public venues required collaboration with a mobile network operator (MNO). They, with a viable business case, would invest in distributed antenna systems (DAS) or small cells to extend coverage into various venues. However, these networks operated on MNOs' spectrum licenses, requiring enterprises to negotiate for private or priority access.

Private wireless networks offer an alternative, gaining traction with 5G's emergence, though most private wireless networks today are 4G LTE. They provide dedicated connectivity for users and IoT devices with enhanced quality of service (QoS) capabilities compared to WiFi. Private 5G can support high bandwidth, massive machine-type communication, and ultra-reliable low-latency communication – ideal for large-scale enterprise IoT deployments.

Private wireless networks are either standalone (Standalone-NPN) or public network integrated (PNI-NPN). Standalone networks operate independently of public mobile networks, often with enterprise IT, system integrators, or hyperscale cloud providers managing them. Conversely, public network-integrated networks are deployed with public mobile network support, often managed by or in partnership with MNOs. For example, in China, with arguably the largest number of private 5G networks (**5000+ claimed by China's Ministry of Industry and IT** in 2022), most are managed by and integrated with public operator networks due to spectrum licenses being issued only to MNOs (with limited exceptions).

Radio access network (RAN) variations exist within private networks with dedicated or shared RAN infrastructure. Today, most private wireless deployments outside China are standalone networks.

Benefits of Private Wireless

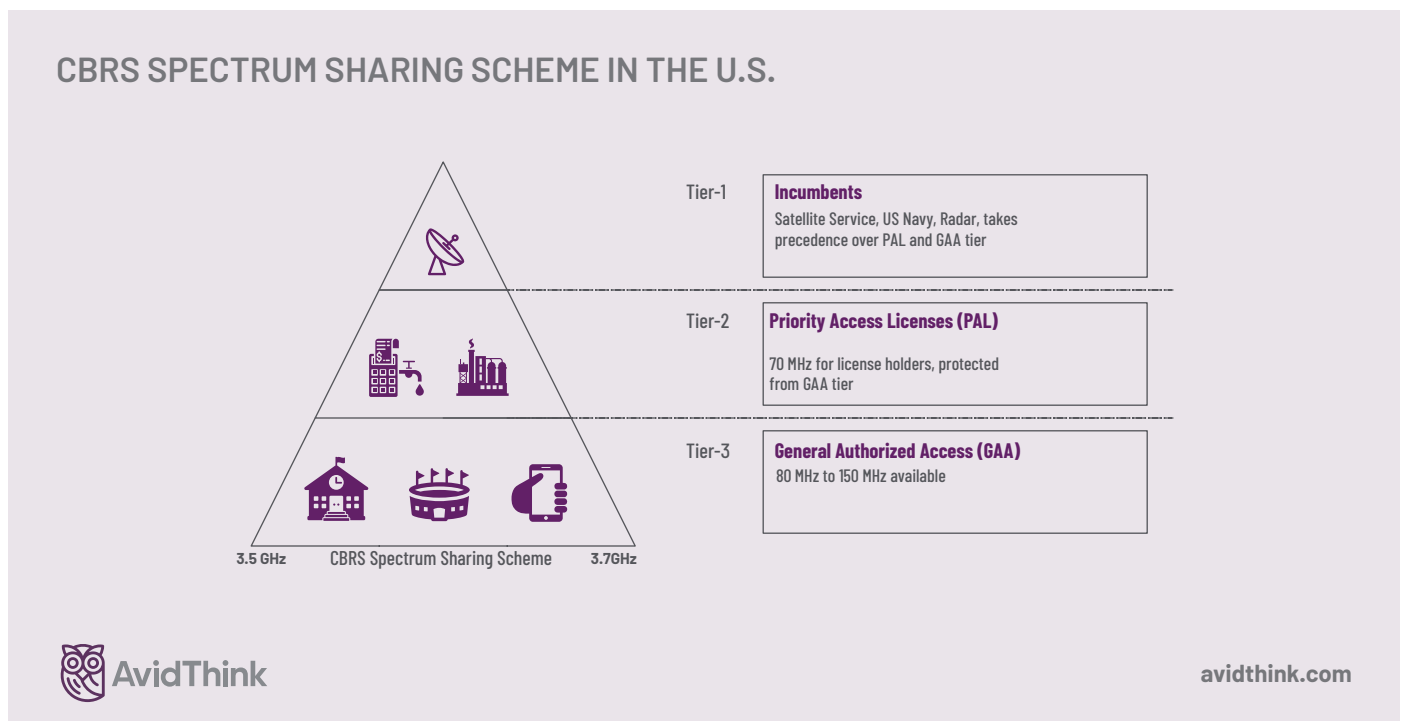
Private wireless aims to complement, not replace, WiFi and offers the following advantages:

- **Reliable Coverage:** Broader indoor and outdoor range compared to WiFi, performing better in industrial environments and managing handover events for continuous coverage.
- **Performance Certainty:** Control over spectrum resource allocation and traffic prioritization, ensuring service quality for various devices and applications.
- **Deterministic Latency and Capacity:** Ensures consistent latency for critical workloads and can handle extensive capacity, scheduling transmission across many IoT devices.
- **Security and Privacy:** Defaults to a secure mode using physical or eSIMs for identification, with traffic encrypted by default.
- **Resiliency:** Can fall back to a public cellular network when needed.
- **Public-Private Mobility:** Transition seamlessly between private and public networks if supported by an MNO.
- **Lower Total Cost of Ownership (TCO):** Fewer radios can reduce capital, installation, and operational costs compared to WiFi.

Nevertheless, compared to enterprise WiFi, private wireless has challenges we'll discuss later.

Private Wireless – Spectrum Considerations

Unlike WiFi, enterprises looking to deploy private wireless must consider their spectrum needs. In the United States, the availability of citizens broadband radio service (CBRS) simplifies this. Enterprises can access 150 MHz of shared spectrum (3550 MHz to 3700 MHz) comprised of a general authorized access (GAA) tier, available to all, plus a priority access license (PAL) tier that provides protected licensed access. Private wireless vendors supporting CBRS offer radio frequency (RF) planning and management services, hiding CBRS spectrum access system (SAS) interaction complexity from end-users.



Enterprise spectrum policies differ across regions and countries. On the unlicensed front, 5G NR-U (5G new radio unlicensed spectrum) in the 5GHz, 6GHz, and eventually 60GHz bands will become more widespread, replacing current unlicensed options LTE-U/LAA/MulteFire¹, which never saw significant uptake.

Some countries provide easier enterprise access to spectrum licenses, including Germany, the UK, Switzerland, Finland, Sweden, Norway, Japan, South Korea, and Taiwan. In countries like China that have seen solid private wireless uptake hosted and managed by MNOs (spectrum license holders), there are indications more enterprise-friendly licensing is on the horizon.

During this early market stage, vendors target the spectrum bands (shared license, enterprise licensed, unlicensed) in regions where they expect to see early adoption of private wireless. Bands commonly supported by initial private 5G equipment include n48² (US CBRS), n38 (France), n77/78 (Germany, UK), n79 (China and Japan), and n96 (unlicensed overlapping with WiFi 6E).

Complementary Technologies – WiFi and Private Wireless

While there was contention in the early stage of the private wireless market, today's ecosystem views private 5G and WiFi as complementary (aside from budget allocation). Nevertheless, WiFi will evolve rapidly with new standards like WiFi 6E and 7, borrowing performance-enhancing techniques from mobile technologies. Even as WiFi attempts to close the performance gap, private 5G solutions will improve by simplifying management, improving deployability, and reducing the cost of ownership.

Most implementors expect coexistence between WiFi and private 5G, with WiFi used for general access and private 5G employed for critical communications and industrial use cases. We'll touch on this when we discuss trends in the field today.

Private Wireless Market – Headwinds to Overcome

CSPs, global system integrators (GSI), networking vendors, and hyperscalers were bullish about private wireless (both 4G/LTE and 5G) in the 2020/2021 timeframe. However, a host of factors have added friction and slowed down deployments outside of China. Our conversations and research with those in the private 5G ecosystem point to the following factors:

- **Enterprise unfamiliarity** with private wireless lengthened the sales cycle and extended proof-of-concept periods for private wireless vendors. In the US, the OnGo Alliance (formerly CBRS Alliance), an industry group, aims to help promote CBRS solutions by developing certification programs similar to what the WiFi Alliance has done for WiFi, providing education and reducing friction and uncertainty via their certification programs.
- **Ecosystem confusion** with MNOs, GSIs, networking equipment providers (NEPs), and hyperscalers jockeying for position as the preferred provider of private wireless slowed down enterprise decision-making.
- **Supply chain delays** in obtaining private 4G/LTE and, subsequently, private 5G equipment delayed early pilots and slowed down the learning process for new entrants to the market.
- **Device readiness and fit** for industrial deployment in uncarpeted and office applications in carpeted locations added friction. Even as new devices that supported private wireless (e.g., CBRS in the US) became available, the lack of consistency and flexibility in their attachment policies limited use to dedicated industrial use cases (single SIM, one PLMN ID), and soured enterprises on the unrealized promise of seamless mobility between WiFi, private, and public 5G networks.
- **Complexity in deployment and operation** was evident in many early POCs. Many private wireless solutions from the prominent incumbent vendors showed vestiges of their public wireless roots; even though they promised streamlined offerings, the adaption to enterprise user interfaces was slow. Enterprise IT teams, familiar with simple UIs from HPE Aruba, Cisco Meraki, or Juniper Mist, were baffled by early private wireless solutions and fell back to familiar WiFi products.
- **Poor integration with enterprise IT systems** stymied deployment, especially in carpeted environments with private wireless solutions that didn't integrate or understand enterprise directories and had no flexibility with local breakout topologies that mimicked WiFi. Newer entrants like Celona aimed to address many of these challenges but represented a smaller voice against larger incumbents, less aligned with enterprise IT, favored by large CSPs.

¹ LTE-U - LTE-Unlicensed is extension of LTE standard for carrier offload by accessing unlicensed bands. LAA - License Assisted Access is a standardized variant of LTE-U. MulteFire is another proposal for standalone unlicensed LTE in small cells now developed by the MuLTEfire Alliance.

² The band numbers in the form nXX refer to specific spectrum bands. Details on frequency ranges and bandwidth available [here](#).

- **High cost of private wireless deployments** compared to WiFi added friction to business cases. Even though the improved 5-6 times indoor coverage area per radio (compared to WiFi) and more than ten times outdoor coverage means fewer cable pulls and radio installs, side-by-side deployment still meant installing new cable, which added to the cost of installation versus upgrading existing WiFi APs in-situ. High prices from incumbent vendors who hadn't yet adapted to the enterprise market did not help. Newer entrants have more competitive pricing, but for many indoor deployments, private wireless only makes sense for critical and performance-sensitive workloads or outdoor use cases.
- **Skills deficit in enterprises** for private wireless will take time to resolve. There are armies of WiFi-trained and certified networking specialists working in enterprise IT and supporting VARs and consulting organizations. Cellular technology experts are far fewer, and only a few are familiar with private wireless deployments.
- **Limited momentum in related open source projects** like **Magma**, **Free5GC**, **NextEPC**, **OpenAirInterface**, and **Aether** made it harder for OEM and ODM hardware manufacturers to promote their solutions directly without a software stack. In particular, a few SIs and manufacturers have shared that Meta's withdrawal of funding for Magma and the delay of Magma's 5G codebase negatively impacted the open ecosystem for private 5G. They contrast this with other open-source projects like SONiC for switching, which has continued to gain traction. Newer projects like **Open5GS** are showing some traction (more active contributions), but it's unclear if it gain wider adoption.


These challenges are usual in any new market or technology – WiFi experienced similar issues in its early days. The arrival of the pandemic, almost in concert with initial CBRS interest, delayed uptake. With manufacturing back, the supply chain unclogged, and return-to-office mandates, connectivity has again become necessary, and there's renewed interest in using private wireless to upgrade enterprise connectivity.

Adjustments in Private 5G Market Size

As a result, we're moderating our earlier high-growth predictions. Our 2021 private wireless report took measured views of \$5-12B revenue estimates for 2027, with 17-37% CAGRs. We'll be revising this downwards.

For context, leading vendor **Nokia's reported growth in private wireless customer count** slowed from 62% YoY in 2021 to 33% YoY in 2022. Meanwhile, Nokia's 5% Q2 to Q3 2023 enterprise revenue increase indicates initial deployments are not expanding rapidly. These public numbers, along with our knowledge that upstart private wireless vendors aren't yet experiencing significant growth, leads to the conclusion that, outside of China, the private wireless market has not reached inflection point on the market/technology adoption S-curve.

NOKIA'S REPORTED PRIVATE WIRELESS CUSTOMER COUNT												
Period	04 2020	01 2021	02 2021	03 2021	04 2021	01 2022	02 2022	03 2022	04 2022	01 2023	02 2023	03 2023
Private Wireless Customers	260	290	340	380	420	450	485	515	560	595	635	675
Q/Q Increase		12%	17%	12%	11%	7%	8%	6%	9%	6%	7%	6%
Y/Y Increase					62%				33%			


Source: Nokia
avidthink.com

Recent conservative projections include Dell'Oro's **\$1B+ private RAN market estimate for 2027**, a 24% CAGR. Analysys Mason predicts more optimistic **48% CAGR from 2021-2027 to \$7.7B** for the full private wireless stack. And IDC anticipates a **21% CAGR to \$5.2B in 2027**. For comparison, IDC valued **enterprise WLAN at \$10B in 2022**, up 31.4% YoY driven by WiFi 6/6E adoption, while DAS market size estimates range from \$8-13B and Industrial Ethernet comes in at the same \$8-13B range and 7-10% CAGR.

Even at a lowered 20-30% CAGR, private wireless will steadily expand into enterprises, excelling where WiFi cannot and providing greater flexibility than wired Ethernet.

Realizing the Promise of Private Wireless – Lessons Learned

AvidThink expects ongoing traction of private wireless in enterprises despite initial teething issues. Our research and engagements with tier-1 operators, global systems integrators (GSIs), networking vendors, and hyperscalers indicate continued interest and a commitment to the technology and architecture.

Diverse Market Segments for Private Wireless

There are now multiple successful deployments across the following industries for private wireless. As we have advised over the last few years, private wireless adoption, unlike WiFi, is driven by vertical applications, not a general need for connectivity.

These vertical enterprise applications have industry-specific needs for increased reliability, coverage, isolation, performance, and security. For these industries, IoT and industrial IoT (IIoT) technologies (including video surveillance) underpin their digital transformation, and reliable connectivity is critical to moving data between devices and applications onsite or in the cloud.

Whether autonomous guided vehicles (AGVs), autonomous mobile robots (AMRs), or surveillance cameras, in many locations, WiFi has proven unreliable, with downtimes exceeding more than 5% of the time and brownouts even more often. Private wireless vendors have shared with us that in any total cost of ownership (TCO) calculation, once the cost of downtime or network instability is factored in, private wireless deployment emerges as the clear winner.

Industries that continue to post successful deployments in private wireless include:

- **Manufacturing:** Improves factory floor connectivity and supports AGVs and AMRs. Lowers costs through reduced downtime and fewer access points. Allows use of reliable video streams for remote monitoring and surveillance
- **Transportation:** Enhances coverage and reliability at ports and airports versus WiFi. Requires fewer access points, lowering deployment costs.
- **Utilities:** Provides reliable coverage for critical infrastructure across power plants, substations, solar and wind farms (on and off-shore), and across wide area regional and local networks. Uses licensed low bands for coverage and penetration.
- **Healthcare:** Securely connects medical devices (internet of medical things or IoMT) and allows remote device management. Doesn't impact patient/visitor WiFi. Improves compliance with HIPAA.
- **Retail:** Provides faster, more reliable connections for point-of-sale (POS) systems and inventory management. Improves security with PCI compliance and use of AI/ML-powered monitoring of video surveillance feeds.
- **Agriculture:** Extends farm equipment connectivity with 10x more coverage per access point than Wi-Fi. Enables better data collection.
- **Oil and gas:** Provides coverage where public mobile network operators (MNOs) have no incentive to build out. The extensive coverage area of outdoor private wireless radios makes deployment feasible compared to WiFi.
- **Mining:** Remoteness of locations requires a private network, and private wireless transmission characteristics beat WiFi in reliability and coverage in both open areas and mine shafts. Transmission of sensor data, voice communications, and video monitoring are more reliable over private wireless than alternatives.

TOP VERTICALS FOR PRIVATE WIRELESS

The infographic displays 11 industry verticals, each with a purple icon and a label below it. The verticals are arranged in two rows. The first row includes Manufacturing (factory with robot arm), Transportation (airplane on a runway), Utilities (lightbulb), Healthcare (stethoscope), and Retail (storefront). The second row includes Agriculture (tractor), Oil and Gas (oil rig), Mining (mine cart), Defense (military helmet), State and Local Government (government building), and Education (graduation cap). The AvidThink logo and website URL are at the bottom.

Manufacturing Transportation Utilities Healthcare Retail

Agriculture Oil and Gas Mining Defense State and Local Government Education

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- **Defense:** Private wireless has been deployed on military bases and in warehouses for logistics support, and it is being considered for other use cases like tracking, vehicle maintenance, and support military missions.
- **State and Local Government:** State and cities are deploying private wireless networks across municipalities to support city and emergency operations, as well as support community services.
- **Education:** Higher education and K-12 school systems are trialing private wireless to augment WiFi networks, enabling coverage of larger areas (including outdoor sites on campus) and bringing reliable connectivity to buildings that WiFi cannot adequately service. Likewise, private wireless is preferred for safety and surveillance, facility, and smart building services that require reliable and isolated connectivity.

Another use case of note is the use of private wireless for the broadcasting of 4-5Mbps 4K video streams at major events (such as **UK's Coronation of King Charles III**), leveraging private 5G's isolation and dedicated capacity. Event and locale-specific instant secure networks work equally well for broadcasters and for emergency operations.

What's clear from the past few years of experience is that no single player has the clout, reach, and capability to drive success in private 5G on their own

With ongoing deployments across diverse market verticals, private wireless, once it resolves early issues, can bring value to wide swaths of industry. Our exchanges with end-users across these verticals have shown us that there is clear value and ROI for specific use cases. However, the wide rollout or use of private 5G for general connectivity isn't yet financially feasible.

Private Wireless Ecosystem Player Update

The private wireless ecosystem is quite diverse, ranging from the MNOs holding spectrum licenses and running large 4G/5G public networks to the network equipment vendors, hyperscalers, server vendors, and the GSIs looking to pull together end-to-end solutions for enterprises. What's clear from the past few years of experience is that no single player has the clout, reach, and capability to drive success in private 5G on their own.

Communication Service Providers

MNOs assert that they have a play in private wireless and argue that their familiarity with 3GPP technologies and spectrum holders gives them an edge. Globally, MNOs continue to roll out private 4G and 5G solutions for enterprises either on their own or, more commonly, with partners like GSIs, networking vendors, server vendors, and hyperscalers. Forward-thinking MNOs recognize the importance of a vertical-based, business-first approach and understand that partnerships are critical to success. Nevertheless, outside China, a majority of private wireless trials and deployments (particularly in the US) are run without MNO participation.

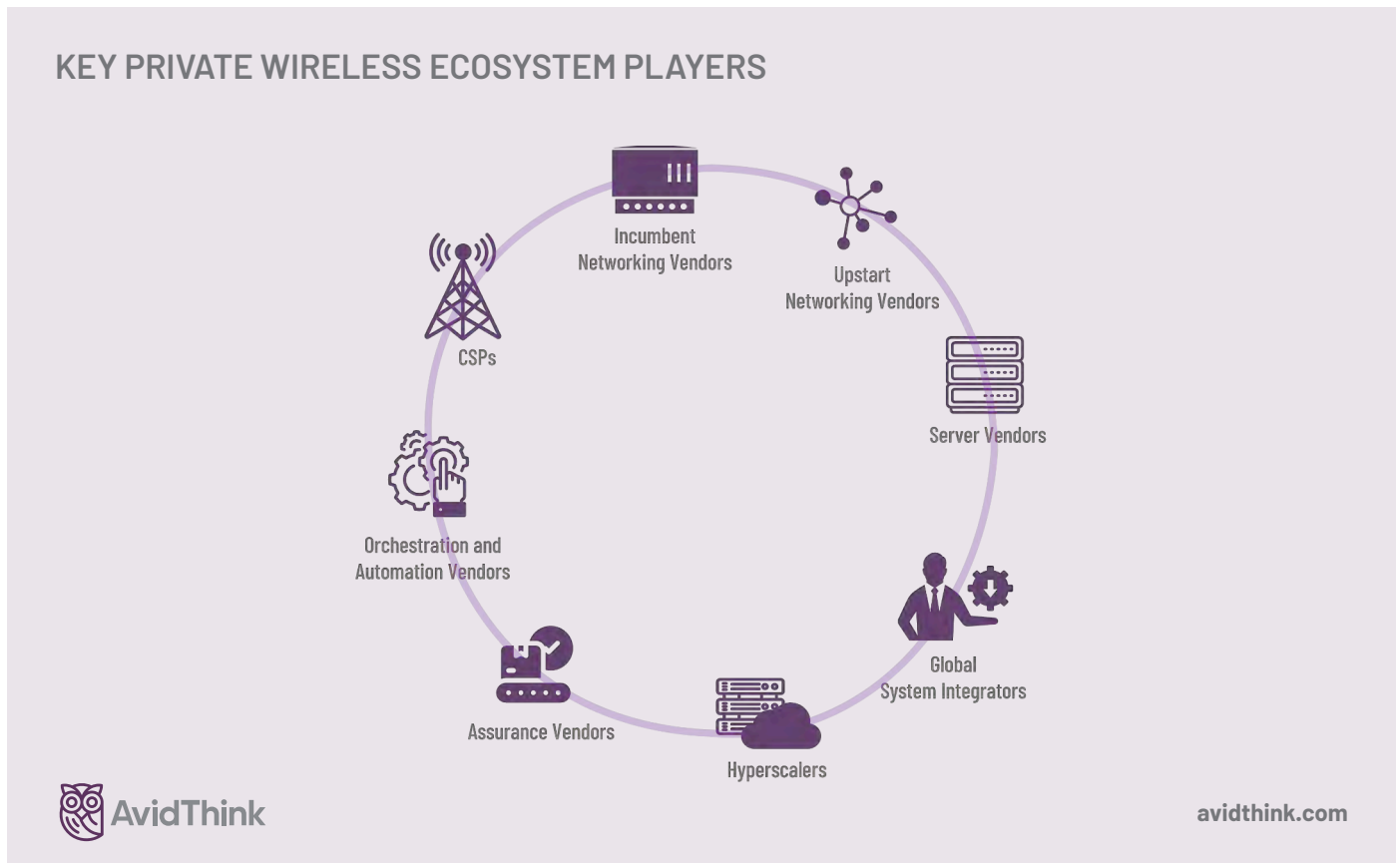
Incumbent Networking Vendors

The private wireless market continues to be led by typical incumbents like Ericsson, Huawei, and Nokia. Large network equipment manufacturers like Fujitsu, Samsung, and NEC have entered the private radio access network (RAN) market. Despite **downsizing its RAN team** after facing go-to-market challenges with open RAN, NEC remains committed to private wireless. Nokia remains committed to the market, and Cradlepoint (subsidiary of Ericsson) expanded its product line with enterprise-focused subscription-based private wireless products (NetCloud Private Networks) powered by Ericsson’s technologies.

Upstart Networking Vendors

Challenger companies are attacking the market from various angles. Celona aims to bring an Aruba/Meraki-like experience to enterprise 4G/5G. Federated Wireless contributes deep spectrum management expertise. Ramen Networks blends WiFi and private 4G/5G into a managed network-as-a-service (NaaS) package. Players like Expeto Networks, JMA Wireless, Mavenir, QCT, and Sercom have found early traction via niche use cases while pacing investments until demand accelerates.

Meanwhile, 4G/5G core providers with a focus on private wireless, such as Druid (which features in many public trials and POCs), and other newcomers, including A5G (with a 4G/5G core focused on industrial workloads), are forming partnerships and looking to be included in blueprints from popular GSIs or other solution vendors.



Hyperscale Cloud Providers

Hyperscalers like Amazon Web Services (AWS), Microsoft Azure, and Google Cloud offer private 5G platforms through partnerships with mobile network operators (MNOs) and global system integrators (GSIs). Hyperscalers aim to ingest network data into their clouds for analytics and machine learning. AWS also sells private 5G directly to enterprises.

Global System Integrators

Meanwhile, GSIs like Accenture, Capgemini, Cognizant, HCL, NTT (services), and Tata Consultancy Services market, sell and customize private wireless solutions. They provide end-to-end solutions tailored to verticals like manufacturing, logistics, and healthcare. In markets with enterprise spectrum, GSIs can sell directly to businesses without involving telcos.

Server Vendors

Server manufacturers like Dell, HPE, and Lenovo target public and private 5G. While pushing open, virtualized RAN in public networks, they aim to expand in enterprise 5G. **HPE acquired private 4G/5G core provider Athonet** and now offers it under its Aruba brand. **Dell partnered with Marvell**, and **HPE with Qualcomm**, on SmartNICs for open RAN in public and private networks. Server vendors tout integrated edge cloud and private 5G for vertical solutions — evidenced at MWC Americas 2023 with **private 5G demonstrations from Dell** and partners Druid (private 5G core)/DISH Wireless (MNO). Another use of SmartNICs is to accelerate the User Plane Function (UPF) of the 5G packet core (e.g., **as demonstrated by Intel and Napatech**). By offloading the data plane to a SmartNIC, server vendors can preserve more of the CPU resources for application computing and increase energy efficiency while lowering CapEx at edge locations. A key advantage for server manufacturers is their enterprise go-to-market expertise that helps them sell full-stack solutions.

Orchestration, Automation, and Assurance

As with any new technology, orchestration, automation, and assurance are crucial to realizing the value of private wireless. Private networks often involve multiple components beyond connectivity, like applications and cloud analytics. Orchestration ensures smooth deployment and management of these multi-component solutions. Assurance solutions ensure full-stack applications running these networks perform as required end to end.

Vendors like Aarna Networks, Amdocs, and Netcracker offer orchestration capabilities to deploy and manage private wireless stacks. Aarna, in particular, is looking to leverage the Nephio open-source project to bring together all the key components of an end-to-end enterprise application sitting on private wireless connectivity. Assurance vendors like Keysight, Spirent, and Viavi provide testing tools to ensure private networks are compliant and scalable, and more critically, meet any stringent performance criteria for industrial workloads.

Evolving Business Models

We expect private wireless business models to remain varied in 2024 but see a shift from upfront capital expenditures and installation fees to subscription models—these network-as-a-service (NaaS) options bundle hardware, software, and management for a monthly fee.

NaaS offerings come in different flavors—some charge per radio or square footage, factoring in device density. More advanced options provide performance SLAs and per-user pricing.

In buildings like malls and office towers, owners are experimenting with private networks for tenants. These multi-tenant networks can leverage network slicing to provide segmented access with different service levels. They can also allow carriers to leverage their private networks to extend coverage indoors. Airports are also building private wireless networks and charging airlines, retailers, and other onsite businesses.

For MNOs, private wireless business models are still developing. Carriers can pay to access shared infrastructure for in-building coverage rather than build their own distributed antenna systems. However, options for MNOs to sell public 5G network slices as private wireless remain limited. Most MNO deployments are custom-built networks for large enterprises using a mix of licensed, shared, and unlicensed spectrum. These bespoke solutions aren't yet repeatable NaaS offerings that can easily scale in their go-to-market efforts.

Expectations for Private Wireless in 2024

As we wrap up 2023 and plan for 2024, we remain optimistic about continued growth and maturity in the private wireless market, albeit at a more moderate pace. Offering reliable connectivity and granular control over performance metrics—such as latency, bandwidth, and device density—private wireless fills gaps that WiFi technology cannot address.

Tempered Growth

In light of decelerating carrier 5G rollouts and economic headwinds affecting the technology sector, we align with other industry analysts in predicting a moderate 20-30% growth rate for the private wireless market in 2024. Notable events, such as **Nokia's layoff of 14,000 employees** and Ericsson's warning of reduced earnings, underscore this cautious outlook.

Focused Markets and Use Cases

Smaller players and startups are also feeling the squeeze. Federated Wireless, for instance, is **narrowing its market focus after downsizing its workforce**. Our discussions with various private wireless providers reveal a consistent theme: they will exercise fiscal prudence while remaining bullish on the technology's long-term value proposition. Key industries covered earlier will continue seeing deployments, but we don't expect significant new sectors next year, given vendors' increased focus.

Private 4G LTE vs. 5G

In 2023, private 4G LTE accounted for an estimated 60-80% of operational private wireless networks outside of China. However, the advent of 5G radios and vendors offering converged 4G/5G cores indicate a shift toward increased 5G adoption—particularly for bandwidth-intensive applications like 4K video for monitoring, remote operations, and surveillance.

In light of decelerating carrier 5G rollouts and economic headwinds affecting the technology sector, we align with other industry analysts in predicting a moderate 20-30% growth rate for the private wireless market in 2024.

Outcome-Based Blueprints and Pilots

Both private wireless vendors and Global Systems Integrators (GSIs) plan to invest in developing 5G solution blueprints for various industry verticals in 2024, albeit cautiously. These blueprints serve as educational and operational guides, helping vendors refine their solutions and facilitating pilot programs. Just as Dell demonstrated at MWC Americas 2023, many of these blueprints will focus on a business outcome and comprise multiple components, including edge computing stacks that host vertical applications along with private 5G RAN and core stacks.

Partnerships and Ecosystem Growth

Related to blueprints, we expect to see more partnership-driven solution building than acquisitions for vertical integration in 2024. While HPE-Aruba purchased Athonet this year, we expect other vendors (including hyperscalers) to partner as a more cost-effective way to probe the market and watch for signs of acceleration before making major moves.

Neutral Host as Viable Path

The neutral host model is a promising avenue for expanding private wireless adoption. This model involves a neutral host operator deploying private 5G infrastructure and collaborating with enterprises and carriers for network access. Federated Wireless, for example, has rolled out a **Neutral Host 2.0 option in 2023**, enriching their managed private wireless offering.

The angle of using private wireless to provide emergency E911 services (which **Cal Poly demonstrated on their network with T-Mobile**) has the potential to help make the business case for enabling the neutral host option on private wireless networks and several higher education campuses are considering that as additional justification for building out private 5G in parallel with their existing WiFi networks.

Cost Improvements to Private 5G

Private wireless struggles to compete on cost with WiFi upgrades. For example, even after vendor discounts, a major retailer indicated to us that for indoor coverage, private 5G represented a 50-100+% premium over upgrading existing access points to WiFi 6E/7. But once reliability, uptime, mobility, and digitization benefits are factored in, the business case favors private 5G. TCO and ROI calculations commonly include returns from reduced downtime, improved operations, better worker safety, and new capabilities from digitization.

Over the next year, we expect costs will decrease as deployments scale, and supply/demand for private wireless equipment grows, expanding viable use cases.

Device Maturity

Device compatibility has become increasingly less problematic, with manufacturers like Zebra, Cradlepoint, Digi, Inseego, and Sierra Wireless/Semtech expanding their 5G offerings. Operating systems like Android and iOS have enhanced support for private wireless bands, contributing to the ecosystem's maturity. For example, with the release of Apple iOS 17 this year, Apple phones and tablets can be configured via mobile device management software to favor private wireless over WiFi. They can roam between private and public 5G networks as needed, with geofencing support.

NaaS Wave

Emerging NaaS providers like Ramen Networks are alleviating some of the complexities and costs of private wireless deployment. AWS Private 5G, for instance, offers a fully managed service that, while premium-priced, suits critical use cases and small-scale deployments (with an option to transition to an AWS partner-powered Integrated Private Wireless offering).

Open RAN Innovation

Despite a slow uptake, Open RAN innovations continue to capture attention, particularly with Celona's introduction of an enterprise RAN intelligent controller (ERIC). It remains to be seen whether this architecture will foster a more open ecosystem.

Wrapping Up

While we have adjusted growth estimates for private wireless/5G downwards, the technology continues to garner interest across important verticals—manufacturing, healthcare, retail, and more. To achieve success, private wireless vendors will need to remove the friction points we've covered in the report; most importantly, improve ease-of-use and manageability, total cost of ownership, and generate and communicate a clear understanding of the target use cases. Cautious optimism is warranted, but the long-term trajectory remains favorable, making private 5G an integral part of the enterprise IT landscape.



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