XCOM RAN™ by Globalstar

EBOOK

Breaking the Connectivity Bottleneck

Why Private 5G is Replacing Wi-Fi in Mission-Critical Environments

The Connectivity Cliff

Connectivity has evolved from an IT utility to the backbone of modern industrial and enterprise transformation. Automation, artificial intelligence, and edge computing are redefining how work gets done, enabling machines to make split-second decisions, data to be processed where it's generated, and operations to run with unprecedented efficiency.

But the reality is, most existing networks were never built to support these applications. They were designed for office productivity, web browsing, and email, not orchestrating fleets of autonomous robots, running AI-driven quality inspections, or streaming sensor data from thousands of devices in real time.

This challenge is only accelerating. The explosion of IoT devices and robotics in the enterprise is multiplying connection points, data streams, and latency-sensitive applications. Warehouses, factories, ports, and energy sites are pushing networks harder than before. The result? Existing infrastructure is straining under the load – struggling to deliver the low latency, high bandwidth, and unwavering reliability that automation and AI require.

A convergence point has been reached where the pace of innovation in automation and IoT is outstripping the capacity of traditional networks. To fully realize the promise of these technologies, enterprises need a new approach to connectivity, one that's purpose-built for real-time performance, massive device density, and secure, on-premise control.

That's where private 5G comes in, and why the evolution of radio access technology is opening the door for scalable, cost-effective adoption like never before.

Why Wi-Fi is No Longer Enough

For decades, Wi-Fi has been the default choice for enterprise connectivity. It's familiar, fast to deploy, and cost-effective for offices and general business use. But as industries evolve, embracing automation, edge intelligence, and data-driven operations, many are finding that Wi-Fi simply wasn't designed for the environments they now operate in.

And it's starting to show.

The Growing Demands on Enterprise Networks

Today's industrial and mission-critical operations require more from their networks than ever before:

- Massive device density across robots, sensors, and mobile assets
- Ultra-low latency for real-time control and responsiveness
- High reliability and uptime in harsh, interference-prone settings
- Scalable coverage for large or dynamic physical footprints

Wi-Fi, as a shared and unlicensed technology, is beginning to hit its limits under these pressures.

The Hidden Costs of ‘Good Enough’

In warehouses, manufacturing plants, logistics hubs, and campus environments, Wi-Fi can struggle with:

- Frequent device handoffs between access points (APs), leading to dropped connections
- Signal degradation due to interference, obstructions, or poor spectrum management
- Network sprawl, as more APs are deployed in an attempt to patch coverage gaps
- Latency instability, which can affect everything from machine control to location accuracy

Each workaround adds cost and complexity. Over time, what seemed like a cheap option starts to become operationally expensive – in downtime, in IT overhead, and in missed opportunities to automate.

Not Designed for Industrial-Scale Operations

Wi-Fi was designed for convenience, not determinism. It works well in consumer and office environments where performance tolerances are loose and disruption isn’t mission-critical. But in the environments powering the global supply chain, that fragility becomes a liability.

When the success of a process depends on a sensor trigger in real time, or a robot navigating without interruption, the risks of an unpredictable wireless connection become unacceptable.

Crack in the Foundation

Companies at the forefront of digitization are already seeing the cracks:

- In warehouses where autonomous mobile robots (AMRs) freeze mid-aisle due to handoff lag
- In ports where IoT devices time out from interference
- In factories where predictive maintenance data is incomplete due to packet loss

These aren’t just connectivity issues; they are business continuity issues, and highlight a foundation truth:

Wi-Fi is no longer sufficient as the foundation for modern industrial connectivity.

The Rise of Private 5G

In the wake of Wi-Fi's limitations in high-demand, mission-critical environments, enterprises have been searching for a wireless technology that can deliver both the flexibility of wireless and the dependability of wired infrastructure. That search has led to the rapid rise of private 5G.

Private 5G offers all the strength of public 5G: low latency, high throughput, dense device and dense device support, but with the control, security, and customization that come from owning and operating your own network.

Purpose-Built for Industrial Transformation

Unlike Wi-Fi, which was designed for consumer and office environments, private 5G is engineered for:

- Deterministic performance, delivering predictable, consistent throughput even under heavy load
- Ultra-low latency to enable real-time control for automation, robotics, and industrial processes
- Massive device density to support thousands of sensors, machines, and mobile assets within a single coverage area
- Strong security and isolation so data stays on-premises, with full enterprise control over encryption, authentication, and traffic routing

The Licensed Spectrum Advantage

One of private 5G's features is its use of licensed or interference-free spectrum. This ensures:

- Freedom from congestion, so there is no competing with neighbors or public users
- Better range and coverage than unlicensed spectrum can typically provide
- Greater reliability for applications where downtime is not an option
- Security advantages through controlled access and regulated operation

Spectrum bands like Band n53 open new possibilities for global deployments, offering mid-band coverage that balances range and performance while maintaining protection from interference.

Unlocking New Use Cases

Private 5G makes previously impractical use cases not only possible, but scalable:

Warehousing and logistics

Fleets of AMRs, real-time location tracking, and automated inventory systems that depend on uninterrupted, low-latency connections.

Manufacturing and industrial automation

Precision control of robotic arms, predictive maintenance analytics, and AI-powered quality inspection systems – all operating on a secure, dedicated network.

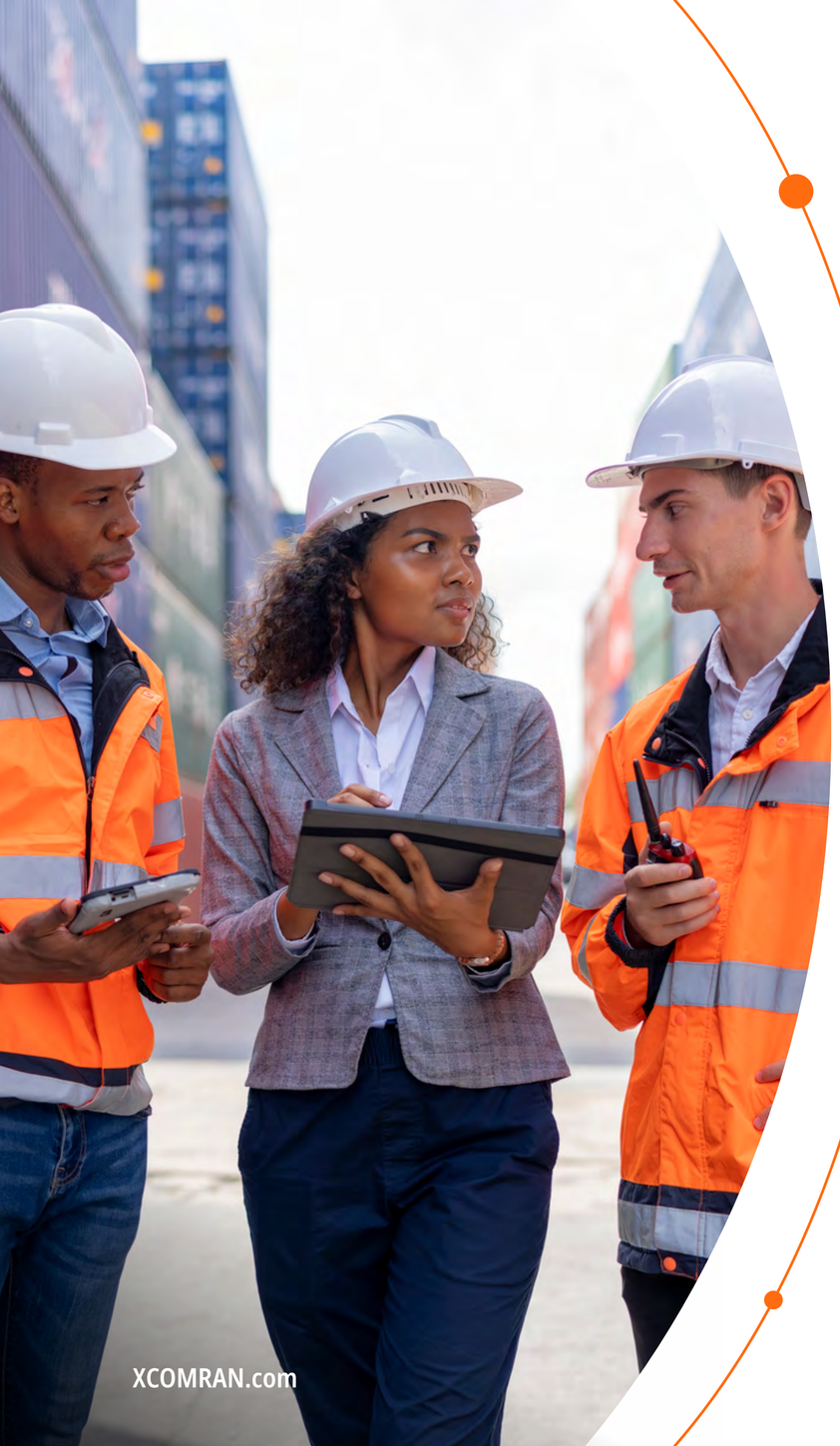
Ports, campuses, and energy sites

Large-scale outdoor connectivity with seamless handoffs, critical communications for safety and security, and the capacity to connect everything from surveillance cameras to IoT sensors.

Scalable, Future-Ready Infrastructure

Private 5G is not just a replacement for Wi-Fi but an investment in infrastructure that can grow with the enterprise. Because it's based on global 3GPP standards, private 5G can evolve alongside new device capabilities, emerging industrial protocols, and advanced features like network slicing and RedCap device support.

Private 5G is here, and it's already proving to be a transformative enabler for organizations across industries.



Why Some Enterprises Still Hesitate and How XCOM RAN™ Changes the Equation

For all its promise, private 5G has not been universally adopted. Many enterprises recognize its potential but remain cautious, citing familiar challenges: higher upfront costs, spectrum access, operational complexity, and a fast-changing technology landscape.

The reality is, these concerns are rooted in traditional deployment models; approaches that required significant infrastructure, deep in-house expertise, and months of planning before the first device connected.

But that dynamic is shifting with emerging technologies like XCOM RAN by Globalstar – a next-generation software-defined radio access system. Here's how XCOM RAN addresses each of the traditional hurdles that have slowed private network adoption.

Small Footprint, Better Return on Investment

In the past, the capital cost of deploying a private cellular network, especially compared to Wi-Fi, made some enterprises hesitate. XCOM RAN changes that equation by delivering greater throughput and coverage per radio, reducing the number of radios required, simplifying site planning, and lowering installation and maintenance costs while increasing efficiency of operations.

When paired with licensed mid-band spectrum, this efficiency translates into dependable, high-performance coverage without the unpredictability of shared or unlicensed bands.

Smarter Coordination in Challenging Environments

Warehouses, factories, ports, and industrial sites are rife with interference sources, mobile assets, and physical obstructions. Traditional networks often struggle in these conditions. XCOM RAN uses coordinated multipoint transmission and real-time radio optimization to minimize interference, boost spectral efficiency, and deliver consistent performance, even in the most demanding radio-frequency environments.

Simplified Scaling for Enterprise IT

Private 5G planning, deployment, and lifecycle management can be complex, particularly for IT teams without cellular expertise. XCOM RAN abstracts this complexity with software-defined orchestration and dynamic network intelligence, enabling rapid deployment and simple day-to-day operations without the need for specialized telecom skills.

Spectrum Agnostic

Spectrum access can be a stumbling block, but XCOM RAN is spectrum-agnostic and in addition to supporting shared spectrum bands like Band n48 (CBRS), it thrives on clean, interference-free licensed bands like Band n53. Licensed mid-band spectrum delivers predictable performance, stronger security, and minimal interference, ensuring mission-critical operations run without disruption, which is a distinct advantage over Wi-Fi or shared spectrum options.

Future-Ready and Standards-Aligned

In a fast-moving industry, the fear of obsolescence is real. XCOM RAN's software-defined architecture is designed to evolve alongside new 3GPP standards, device classes, and industrial protocols. Features like RedCap support ensure that enterprises can adopt new capabilities without overhauling existing infrastructure.

From Hesitation to Action

Private 5G adoption no longer needs to be a leap of faith. With technologies like XCOM RAN reducing complexity, and risk – and with licensed spectrum enabling secure, interference-free performance – enterprises can deploy with confidence, scale with ease, and adapt as needs evolve.

Private 5G no longer asks enterprises to compromise, and with XCOM RAN, it no longer asks them to wait.

Built for Industrial Environments

Private 5G isn't just a better network, it's a better fit.

Across industrial sectors, where performance, reliability, and real-time control are non-negotiable, private 5G is solving long-standing connectivity challenges that Wi-Fi and public networks were never designed to handle.

With the right architecture in place, these environments are no longer limited by coverage gaps, latency spikes, or device overload. They can now move faster, operate more safely, and make smarter decisions at the edge.

Warehousing and Logistics: Always Connected, Always Moving

Today's distribution centers are automated, more data-driven, and more dependent on real-time visibility than ever. But they're also high-interference environments filled with metal shelving, moving forklifts, and thousands of SKUs in motion.

XCOM RAN, paired with licensed mid-band spectrum, provides uninterrupted wireless coverage across the entire warehouse footprint. That means:

- AMRs don't freeze during handoffs
- Real-time inventory systems maintain constant location accuracy
- Operators gain precise coordination across loading docks, packing lines, and yards

By eliminating Wi-Fi's instability and extending reliable connectivity to every corner of the facility, private 5G transforms logistics from reactive to real-time.

Manufacturing: Powering the Precision Edge

In factories, timing is everything. Machines must talk to each other with microsecond precision. Predictive maintenance relies on high-fidelity telemetry. Vision systems need low-latency video for instant defect detection.

XCOM RAN's deterministic performance ensures:

- Streamlined machine-to-machine (M2M) communication
- Support for IIoT sensors and actuators
- Seamless integration with edge AI systems for closed-loop control

With a private 5G foundation, manufacturers can enable smarter production lines, reduce unplanned downtime, and accelerate continuous improvement without worrying about connectivity bottlenecks.

Energy and Utilities: Remote, Rugged, and Reliable

From offshore platforms to remote solar farms, energy infrastructure often operates far from traditional coverage zones. These environments demand low-power, long-range, secure connectivity with minimal human intervention.

With Globalstar's LEO satellite coverage and XCOM RAN-powered terrestrial networks, utilities can:

- Track high-value assets and equipment across vast areas
- Monitor pipeline sensors or grid stability with high reliability
- Enable secure field communications in disconnected regions

Private networks bring command-and-control functionality all the way to the edge, where decisions must be made fast and autonomously.

Ports, Campuses, and Mining: Wide-Area Control Without Interruption

Sprawling outdoor environments like ports, industrial campuses, and mining operations require seamless handoffs across large coverage areas, something traditional networks struggle to achieve.

With XCOM RAN's coordinated multipoint technology and small-footprint deployment model, enterprises can:

- Maintain control over moving vehicles and vessels
- Extend surveillance and safety systems across physical boundaries
- Provide staff and equipment with uninterrupted communication, even while in motion

What was once a patchwork of access points and dead zones becomes a unified, high-performance private network.

Built for Environments that Can't Afford Downtime

Whether it's automating a factory floor or managing an autonomous vehicle fleet across a mine, private 5G isn't just meeting modern demands; it's unlocking entirely new levels of performance, reliability, and safety.

And with XCOM RAN at the core, those gains are no longer reserved for the future.

Optimized private 5G is deployable today in the real world, under real conditions, where it matters most.

Private Wireless as a Strategic Differentiator

For years, enterprise connectivity has been viewed as an operational concern, something the IT department manages behind the scenes. But in today's economy, where digital transformation defines competitive advantage, connectivity is no longer a background system.

It's a strategic asset.

Private 5G, especially when enabled through high-performance solutions like XCOM RAN, doesn't just improve the reliability of communications; it empowers entirely new ways of working, optimizing, and scaling. It's not just about faster networks; it's about faster growth, smarter operations, and lower risk.

Enabling the Next Phase of Digital Transformation

Modern enterprises are investing in automation, AI, edge computing, robotics, and real-time analytics. But without a reliable, secure, and scalable network foundation, these investments struggle to deliver full ROI.

Private 5G fills that gap by:

- Enabling deterministic performance for time-sensitive automation
- Supporting massive device density for granular operational visibility
- Allowing local data control for privacy, compliance, and sovereignty
- Creating a foundation for modular, scalable infrastructure that grows with demand

This moves connectivity from being a cost center to a force multiplier.

Reducing Operational Risk

Connectivity failures aren't just frustrating; they're expensive. Downtime in a warehouse can cost thousands per minute. Communication blackouts in energy or manufacturing environments can pose real safety threats.

By operating on licensed, interference-free spectrum and using a software-defined RAN like XCOM RAN, private 5G minimizes these risks by delivering:

- Predictable network behavior, even under heavy load
- Isolation from public networks, reducing cyberattack vectors
- Seamless mobility for dynamic environments
- High availability without complex, overlapping Wi-Fi architectures

Future Proofing the Business Model

With the pace of innovation accelerating, companies need infrastructure that evolves with them, not systems that require forklift upgrades every few years. XCOM RAN's software-defined architecture and support for global standards make it inherently flexible and upgradeable.

Whether it's adapting to RedCap devices, integrating new IoT platforms, or expanding into new regions, the private network becomes a growth enabler, not a constraint.

Aligning with Strategic Objectives

Private wireless aligns with executive priorities that go beyond IT:

Sustainability goals

Reduce energy consumption by replacing cabling and optimizing fleet and facility operations through better data.

ESG compliance

Secure private networks allow for safe workforce digitization and improved working conditions.

Global expansion

Licensed spectrum plus a flexible RAN creates easier replication of infrastructure across borders and business units.

Innovation leadership

Owning your network stack gives you first-mover advantage in deploying cutting-edge technologies from AI-driven logistics to autonomous operations.

Private Wireless Without Compromise

From the limitations of Wi-Fi to the transformative potential of private 5G, the path forward for mission-critical connectivity is clear. Enterprises no longer have to choose between performance, security, and scalability; with licensed spectrum and XCOM RAN's software-defined architecture, they can have it all.

Across industries and environments, XCOM RAN removes the traditional barriers to private network adoption. It delivers the low latency, high throughput, and seamless mobility needed for automation, AI, and real-time decision-making, all within a secure, adaptable, and cost-efficient footprint.

The Result

A network that's not only ready for today's challenges but it's also built to evolve with tomorrow's demand.

XCOM RAN™ by Globalstar

Now is the time to move beyond “good enough” connectivity. With XCOM RAN and licensed mid-band spectrum like Band n53, organizations can deploy a private network with confidence and without compromise.

Reach out to learn more.