



GMGCommunications

Enabling Industrial Autonomy

Connect, Manage, Secure

Connectivity for Industrial Applications

Networking is critical to Industrial applications

Most industrial sites have poor wireless connectivity

- Located in remote areas with no public network infrastructure
- Challenging Indoor industrial environments with heavy machinery that act like **faraday cages**
- Industrial sites often have a **high concentration of connected devices** all transmitting data simultaneously
- Many industrial applications, particularly those involving CAVs like automated forklifts or AGVs, require **ultra-low latency and high reliability** to function effectively



Fundamental Needs for Industrial Autonomy

Aspect	Private 5G	Existing Public 5G (MNO/MVNOs)	Existing WiFi Solutions
 Coverage	Wide, customizable to site needs, indoor and outdoor	Wide, but lacks coverage in industrial indoors and remote areas	Limited to facility boundaries, very low coverage range, very limited outdoor coverage
 Latency	Ultra-low latency, crucial for real-time control, less than 10ms	Highly variable, dependent on network congestion and quality	Higher latency, especially in congested environments
 Security	High, with full control over the network, data, access and flow	Moderate, relies on carrier for security	Moderate to low, vulnerable to local interference
 Scalability	Highly scalable for large, dense deployments - indoor and outdoor	Scalable, but highly dependent on MNOs	Limited scalability, requires multiple access points
 Reliability	High, dedicated resources ensure consistent performance	Variable, dependent on public network conditions	Lower reliability, interference from other devices possible
 Mobility	Seamless handoff across large areas, ideal for mobile connected autonomous vehicles	Good, but dependent on network handoff efficiency	Limited, handoffs between access points can cause interruptions
 Bandwidth	High Uplink Bandwidth - 800 Mbps	Limited uplink bandwidth in addition to limited	Heavily limited by access point capabilities

Performance that enables Industrial Applications



High Uplink Throughput

1.6Gbps on downlink and **800Mbps on uplink** with 100 MHz of bandwidth

Public 5G is primarily focused on downlink for video consumption applications, private 5G (GXC Onyx) is optimized for high uplink through frame structures in network stack



Ultra Low Latency

End device to application latency of **less than 10ms**, allowing for precise control - more on this in upcoming slides



Security

Isolated private network behind the enterprise's firewall allowing for full access, data, flow control **significantly reducing threat vectors** and enabling reliable communications

Difference Between Public vs. Private Cellular

Public

No ownership / Exposed



No control **over**
network settings



Vulnerable **to**
security breaches



Data over public
internet, requires
VPN



Cost **per user, per GB**



Optimized for
consumer **download**
consumption



Unreliable **coverage**

Private

Own / Control / Manage / QoS



Complete control **by**
the enterprise



Industry grade
security, compliance,
and certifications



Ownership **and**
control **of data**



Unlimited **users,**
unlimited **data**



Enables uplink
heavy **use cases**
like cameras,
robots



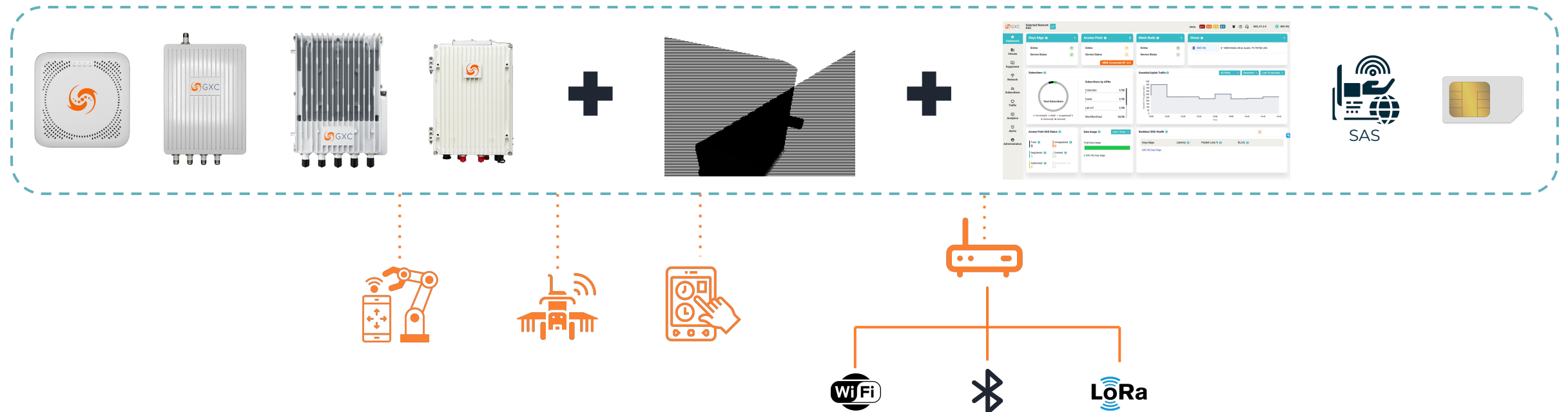
Seamless **coverage**
inside & out

How Works

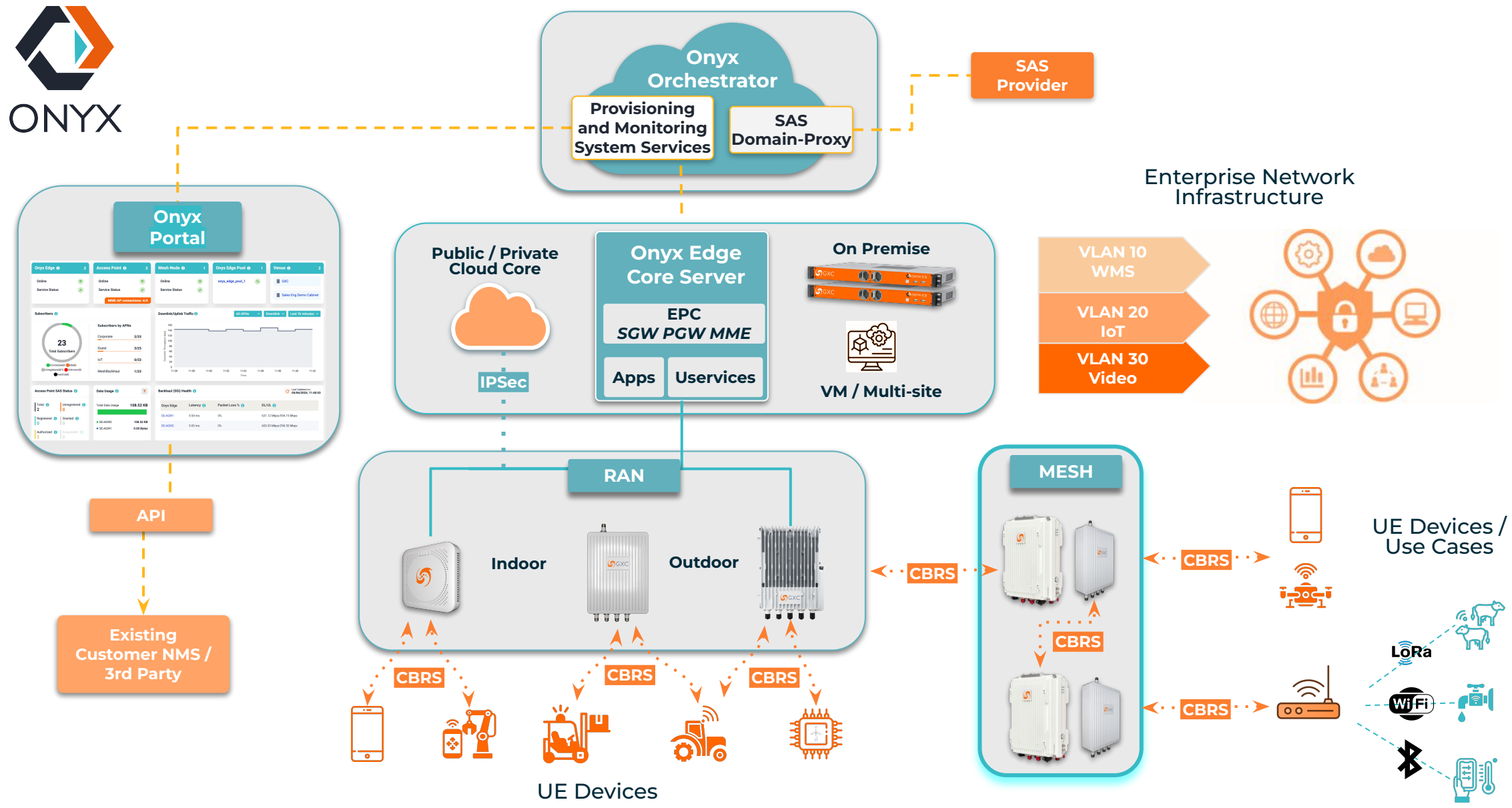
Indoor/Outdoor Radios for
Seamless Device Connectivity

Purpose-built Hardware
& Software
(Radios, Mesh Kit, Core, NMS)

Single-Pane-of-Glass
Management
(inclusive of SIM/eSIM & SAS)



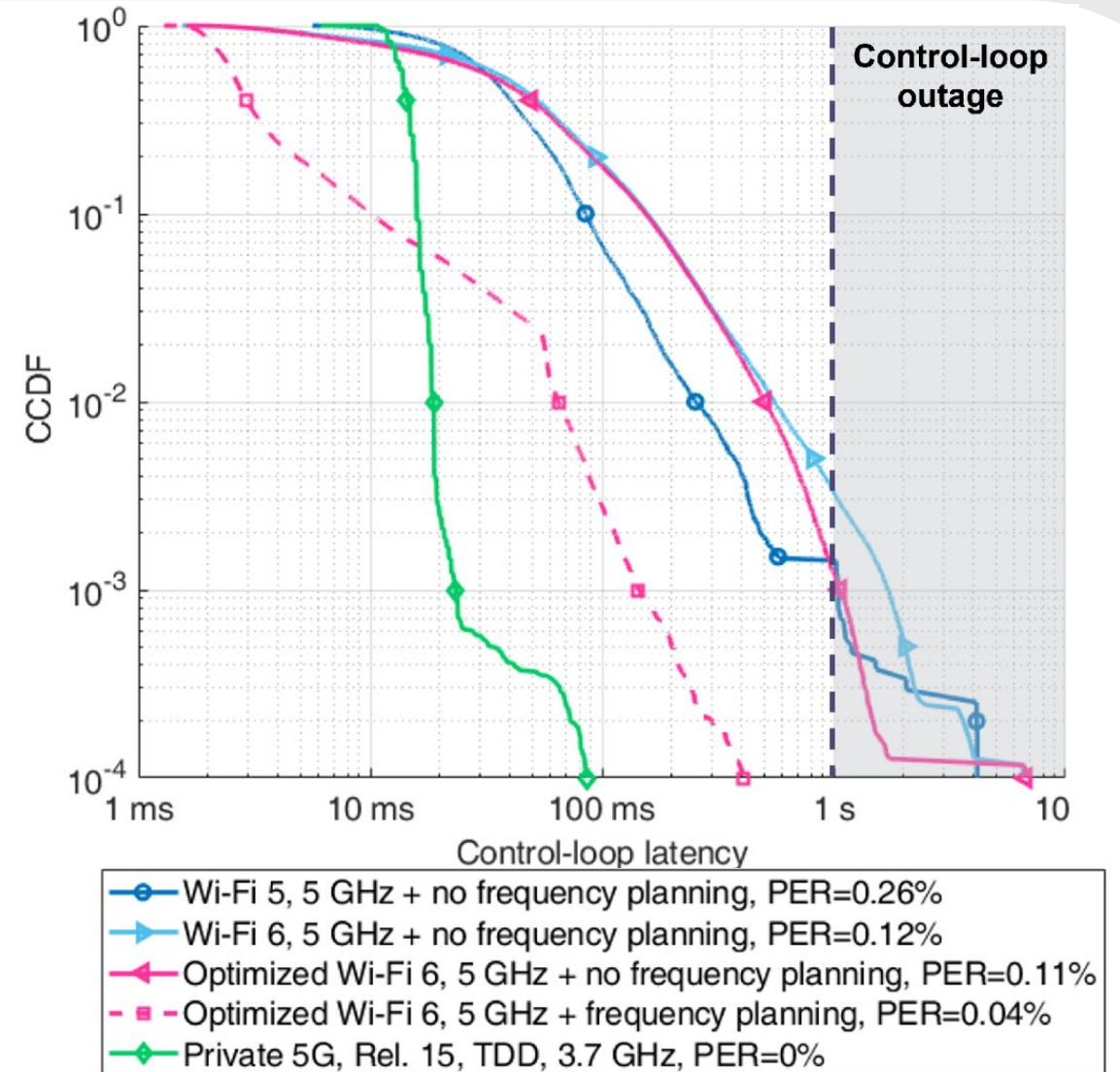
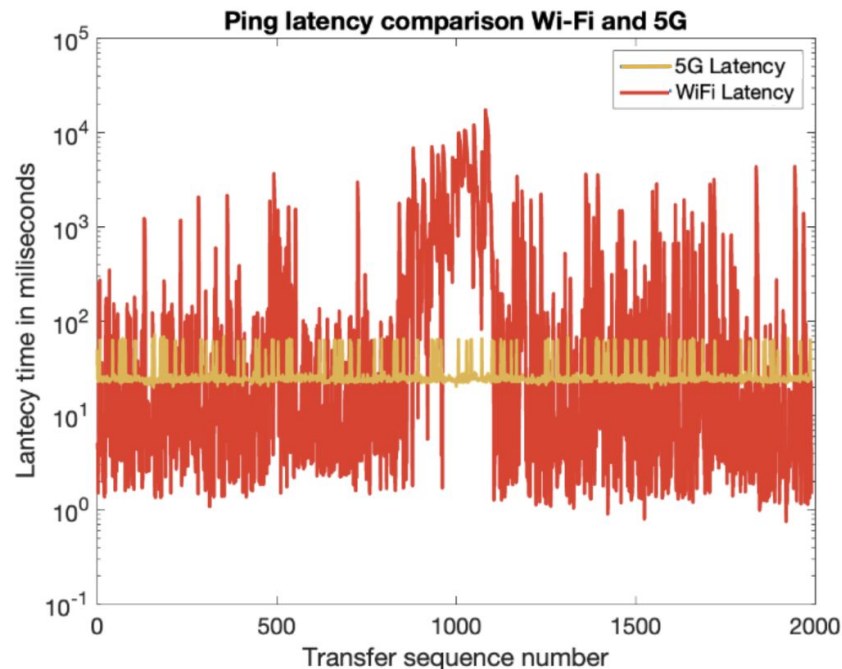
ARCHITECTURE



GMG provides the most reliable latency for industrial applications

Latency and jitter - both are critical for industrial applications.

Private 5G and in particular our solution far exceeds performance metrics when compared to WiFi, public 5G and other solutions.



Reference: <https://www.mdpi.com/1996-1073/14/15/4444>

Expanding Ecosystem - Many Industrial devices now compatible with Private 5G



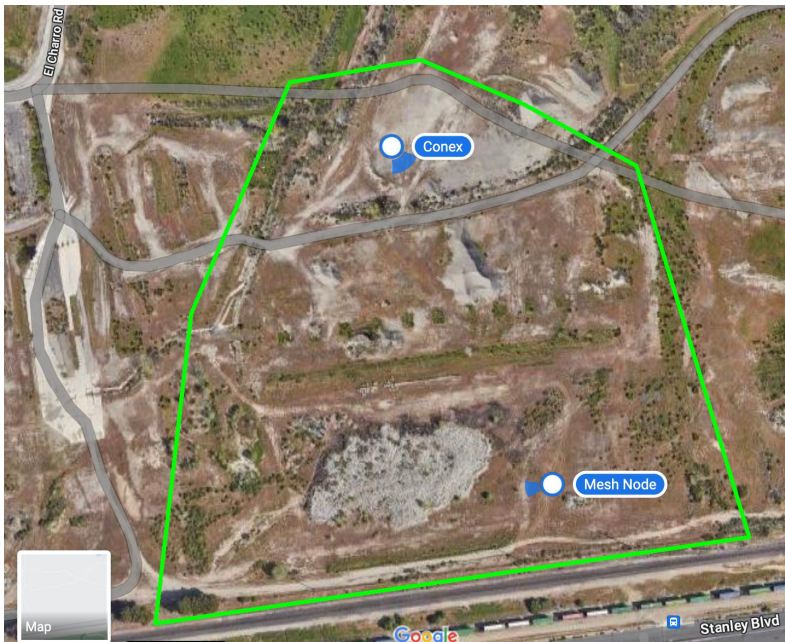
Device Type	Example Compatible Models
Robots	Boston Dynamics Spot, Omron LD Series Mobile Robots, KUKA Industrial Robots and many more.
AGVs	Fetch Robotics Freight Series, MiR (Mobile Industrial Robots) AMRs, Seegrid Palion AMRs and more.
Smartphones	Apple iPhone 12 series and up, Samsung Galaxy S21 series, Huawei P40 series, Xiaomi Mi 11 series, OnePlus 9 series, Google Pixel 5 series, and many others.
Tablets	Apple iPad Pro (2021) and up, Samsung Galaxy Tab S7, Huawei MatePad Pro 5G.
Mobile Hotspot	Netgear Nighthawk M5 5G Mobile Hotspot, Huawei 5G Mobile WiFi Pro.
IoT Devices	Cradlepoint R2100 Series, Zebra Scanner MC9400/MC9450
Cellular Routers / Gateway	MultiTech MultiConnect® rCell 700 Series router, Cradlepoint, Perle 5500, Telit FT980 Router
Laptops / Convertibles	Dell Rugged 7230, Zebra Rugged 2-in-1 ET80/ET85



GMG Customers using for Autonomy



- Multi square mile coverage site, challenging terrain
- Tried with 20 WiFi APs, failed to provide connectivity
- Full sitewide coverage with 2 Onyx APs
- Low latency and continuous high uplink throughput of 10-20 Mbps per vehicle



Click on image above to watch the video

Industrial AI use cases need reliable connectivity



<u>Sector</u>	<u>Industrial AI Use Case</u>	<u>Dependency on Network</u>
Construction	Autonomous Construction Vehicles	Requires low latency and reliable connectivity for real-time navigation and obstacle detection.
	AI-Driven Site Monitoring and Safety Systems	High bandwidth for continuous video feeds and real-time analytics for safety alerts.
	Remote-Controlled Heavy Machinery	Low latency for real-time control and precise operation of machinery from a distance.
Warehouses	Automated Guided Vehicles (AGVs) for Inventory Management	Seamless connectivity for real-time tracking, navigation, and coordination among vehicles.
	AI-Powered Sorting and Packing Robots	High reliability and low latency for efficient, real-time sorting and packing operations.
	Real-Time Inventory Tracking with IoT Sensors	Continuous data flow and low latency for up-to-date inventory management and analytics.

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Manufacturing	Real-Time Predictive Maintenance on Production Lines	Low latency and high bandwidth for instant data processing and proactive maintenance alerts.
	AI-Driven Quality Control with Computer Vision	High-resolution video and low latency for real-time defect detection and feedback.
	Collaborative Robots (Cobots) for Assembly Lines	Low latency for synchronized operations between robots and human workers to ensure safety and efficiency.
Healthcare	AI-Powered Diagnostics with Medical Imaging	High bandwidth for processing and transmitting high-resolution medical images for real-time diagnosis.
	Telemedicine with AI-Driven Decision Support	Reliable, low-latency connectivity for real-time consultations and AI-driven diagnostic assistance.
	AI-Enhanced Drug Discovery and Development	High-performance computing and high-bandwidth connectivity for processing large datasets and running simulations.

Onyx Bandwidth & Throughput Capabilities



We provide multiple flavors of private 5G depending on applications and use cases.

Features	Onyx 4G (20MHz)	Onyx 4G (40MHz CA*)	Onyx 5G (40MHz)	Onyx 5G (100MHz)
MIMO definition: multi-input, multi-output wireless technology that uses multiple transmitters and receivers to transfer more data at the same time	2x2	2x2	4x4 (8x8, 16x16)	4x4 (8x8, 16x16)
Peak Downlink Speed (Mbps)	110	220	440	1600
Peak Uplink Speed (Mbps)	28	56	112	400
One-way Latency (ms)	~40	~40	~10	~10
Number of Users per cell	200	200	1024	1024
Industrial Application Device Focuses and Use Cases	Scanners, IoT, Phones, Tablets, Laptops	Scanners, IoT, Phones, Tablets, Laptops, Edge AI Cameras	Scanners, IoT, Phones, Tablets, Laptops, Edge AI Cameras, Robotics	Scanners, IoT, Phones, Tablets, Laptops, Edge AI cameras, Robotics, Live 4K Cameras, AR/VR

*Carrier Aggregation

About GXC and GMG

Founded in 2016 and based on extensive research in interference technology from the University of Texas at Austin, GXC has grown to encompass a dedicated team of professionals across the United States and India. Our mission is to simplify enterprise connectivity solutions, making them accessible and efficient.

Achievements

- **Awarded the Frost & Sullivan 2022 North America Enabling Technology Leadership Award** for our innovations in 5G Private Networks.
- **Winner of the 2023 IoT Innovator Award** in Agriculture and Farming, recognizing our impact on technology-driven agricultural advancements.
- **Recipient of the 2023 IoT Evolution Award for Private Wireless Networks** and the **2023 IoT Evolution 5G Leadership Award**, highlighting our leadership in the evolution and implementation of IoT and 5G technologies.
- **2024 Compass Intel Award for Mobile, IoT, and Emerging Tech**, celebrating our cutting-edge contributions to mobile technologies and emerging sectors.

Patents and Intellectual Property

- To date, we have secured **31 filings**, including **17 utility grants**, and have made **6 new disclosures** and **3 provisional applications**, underscoring our commitment to technological advancement and innovation.

Investors

RAINE





THANK YOU



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