Smart Manufacturing Solution Brief

Executive Summary

Global manufacturing and supply chains have become increasingly interconnected in an effort to cut costs while improving production and delivery. But a global pandemic, geopolitical tensions, and greater product demands have revealed weaknesses in the global system. This led to a growing trend to reshore manufacturing back to the US.

According to ABI Research, the US added a total of over 224,000 jobs from abroad in 2021, 38% more than the 161,000 added in 2020 due to reshoring. This shift is expected to continue in 2022 and beyond.

To be competitive, US manufacturers must navigate labor shortage challenges and manage inflation costs all the while improving overall equipment efficiency (OEE) and maintaining a safe working environment. And like other mission critical industries, manufacturing is facing ever-present cyber threats that dictate a proactive cybersecurity strategy.

Some say automation is the answer. Innovative technologies can drive down costs, increase productivity, and improve quality, safety, and security. Yet none of it can be deployed without robust connectivity. Which technology will best enable the performance, flexibility, and reliability necessary for business-critical applications on the factory floor?

Connectivity Choices for Smart Manufacturing

Network technologies today include Ethernet, Zigbee, Bluetooth, and Low Power Wide Area (LPWA) to name a few. But when high-performance is the issue, like in manufacturing applications, we look to either Wi-Fi 6 or private wireless (4G or 5G) solutions.

Wi-Fi 6 provides high bandwidth for a limited number of devices, is cost effective, and is easy to access. However, Wi-Fi struggles when latency, mobility, coverage, and security are required (see Figure 1). For business-critical applications, Wi-Fi is not the best solution.

	Latency	Mobility	Outdoor Coverage	Indoor Coverage	Bandwidth/ Spectrum	Security	EUD Battery Life
Wi-Fi 6	●○○○ Several seconds	●○○○ Low	●○○○ 300ft	●●○○ 30ft	●●●● High/Shared	●○○○ Reasonably secure	●●○○ Med
Private 4G	●●●○ 20-40 milliseconds	●●●● High	●●●● 1.8 miles	●●●● 100ft	●●●○ Med High/ Dedicated	●●●● Fully managed security	●●●● High
Private 5G	●●●● <10 milliseconds	●●●● High	●●●● 1.8 miles	●●●● 100ft	●●●● High/ Dedicated	●●●● Fully managed security	●●●● High

Figure 1: When to consider Private 4G/5G

Private wireless networks, though new on the market and still evolving, are emerging as the enabler of advanced manufacturing automation.

In 2015 the US government set aside a big chunk of spectrum (radio waves) specifically for enterprises to use (in many cases without needing a license) in order to foster business innovation. This became the foundation for private 4G/5G.

The private wireless network can be set up exclusively within each enterprise, behind their private firewall, keeping access to the network and all their data secure. Parts of the network can be outdoors, but the location is specific to the enterprise. Bandwidth and latency issues are minimized without any external interference. So private 4G/5G networks leverage the advantages of wireless technology but in a controlled and secure environment that assures high reliability and low costs.

While private 5G networks will become essential for autonomous vehicles and sophisticated virtual reality applications, private 4G solutions can provide optimal value and performance for most of today's business-critical manufacturing applications. According to ABI Research, private 4G can support 85% of automation use cases in industrial manufacturing, offering the advantage of a large, well tested, and robust ecosystem for smartphones, tablets, laptops, cameras, and IoT devices.

Betacom Offers a Turnkey Private Wireless Service

Betacom 5G as a Service (5GaaS) is a turnkey managed service that provides manufacturers with a 4G/5G private wireless network to run critical manufacturing applications that cannot fail. It offers best-of-breed security, coverage, and high-bandwidth, low-latency performance. Betacom plans, designs, installs, and operates the network with proactive network and security monitoring (see Figure 2). Importantly, all data is managed on-premises and is owned and controlled by the manufacturer, behind their firewall. With Betacom 5GaaS, since the business owns their own data, there is no need to worry about variable rate data plans.

At the heart of 5GaaS is Betacom's Security and Service Operations Center (SSOC), a highly secure command center. It is equipped with the latest Artificial Intelligence tools that continuously monitor and improve network and security performance. The Betacom SSOC is staffed by US-based technical experts who proactively manage the private wireless network end-to-end.

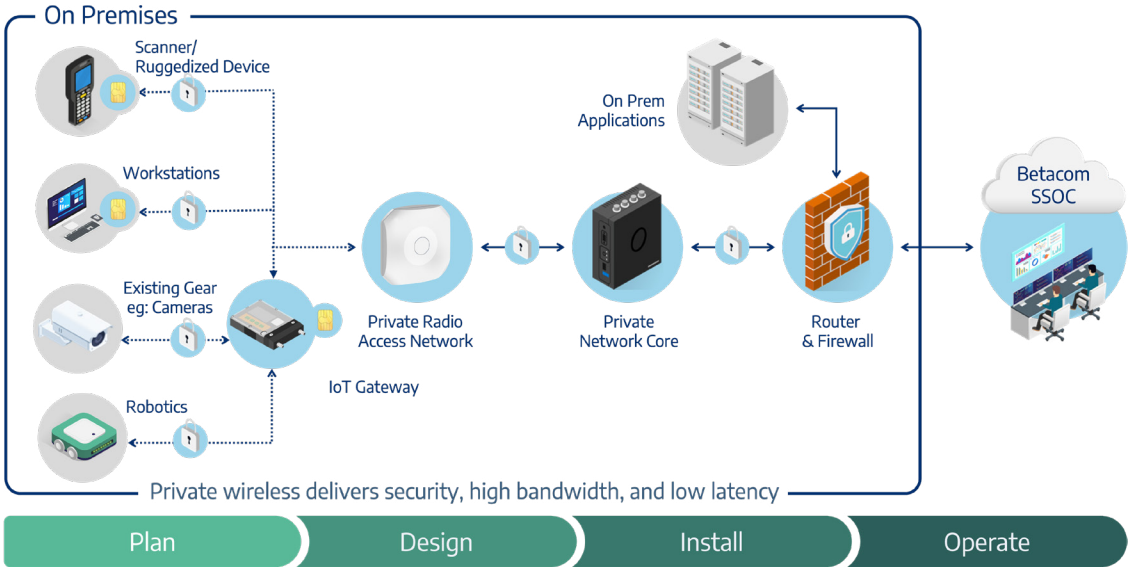## Betacom 5G as a Service Architecture

Figure 2: Betacom 5GaaS Architecture

Benefits of a Betacom Smart Manufacturing Solution

Private 5G wireless has the potential to radically change the manufacturing industry. These are some of the mission-critical applications Betacom 5GaaS can help manufacturers achieve.

Production

- **Flexible Line Configuration:** Wirelessly reconfigure manufacturing lines as products and processes change. Rewiring Ethernet connections can take days of planning and deployment versus minutes for a wireless network.

- **Asset Tracking:** Accurately track raw materials, work in progress and final products within and between facilities. Private wireless networks provide multiple options for automated asset tracking, including real-time location services.

- **Predictive Maintenance and Digital Twins:** Enable predictive monitoring and maintenance by connecting equipment sensors and IoT devices that provide real-time operational data to machine vision, data analytics, and digital twin systems, reducing downtime and improving OEE.

- **Quality Assurance:** Connect cameras and sensors in the production line to machine vision and AI systems that monitor quality assurance. Proactively identify slowdowns and potential failures before they occur to reduce costs for scrap and rework while improving productivity.

- **Industrial AR/VR Smart Glasses:** Use AR/VR powered by private 5G for troubleshooting, equipment set-up, training, expert-prompted task guidance (equipment repair, calibration, etc.), and interaction with digital twins.

Warehousing

- **Management Systems:** Connect people, equipment, and IoT devices to key warehousing systems like enterprise resource planning (ERP), warehouse management system (WMS), warehouse execution system (WES), and yard management. Connect on-premises or in the cloud.

- **Receiving, Picking, and Packing:** Achieve productivity gains on common tasks through automation. Scanners, connected workstations, hands-free voice and vision picking technologies, and mobile push-to-talk devices improve communications and team efficiency throughout the warehouse and factory.

- **Camera Solutions:** Improve security and safety with CCTV, cameras, access, and asset management tools. Use cameras for critical yard management, gate operations, dwell times, and regulatory compliance.

- **Robotics:** Safely and reliably connect automated guided vehicles (AGVs), autonomous mobile robots (AMRs), collaborative robots, and autonomous forklifts for operational efficiency and predictive maintenance objectives, while applying low latency where it's needed the most.

- **Warehousing Infrastructure:** Critical warehousing infrastructure such as automated storage and retrieval systems (AS/RS), conveyor and sortation systems, and overhead systems can achieve maximum efficiency.

Safety, Security, and Building Operations

- **Data Integrity:** Ensure that all highly sensitive data on manufacturing production assets remains on premises and is secure.

- **Safety:** Enable reliable mobile coverage for crew, security, and emergency response teams with push-to-talk (PTT) voice, text, and video devices that communicate alerts and messages anywhere in the building.

- **Security:** Wirelessly connect security cameras, CCTV, and access management systems to augment security throughout the facility.

- **Smart Building Operations:** Connect building management systems, HVAC, lighting, utility meters and equipment to optimize factory operations.

Betacom 5G as a Service Ticks all the Boxes

Betacom is an experienced provider of connectivity solutions for high-performance smart operations of all types. In fact, Betacom recently announced partnership with the Digital Manufacturing Institute and the National Center for Cybersecurity in Manufacturing (MxD), an incubator for digital manufacturing technologies. Betacom was selected to provide the organization's Chicago headquarters and Factory Floor Lab with a private 5G network and to collaborate with some of the largest manufacturers as they test their latest in Industry 4.0 factory automation hardware and software, using 5GaaS, for secure and uninterrupted connectivity.

Betacom's 5GaaS managed solution allows manufacturers to control the performance criteria, the data, and the network as a whole – while Betacom manages the network with full visibility and support. It checks all the boxes for a smart manufacturing solution that meets needs now and into the future:

- ✓ Private and highly secure connectivity.
- ✓ Enterprise owns and controls their data.
- ✓ Delivers high speeds and low latency performance.
- ✓ Cloud-based using wireless technology that can evolve to 5G.
- ✓ Flexible to accommodate discrete services and scale as needed.
- ✓ Best-in-class solution from a proven technology provider.
- ✓ Designed for business-critical demands.
- ✓ Private network without in-house staff or stress, installed and operated by Betacom.

Contact us to learn more:
www.betacom.com/contact-us

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