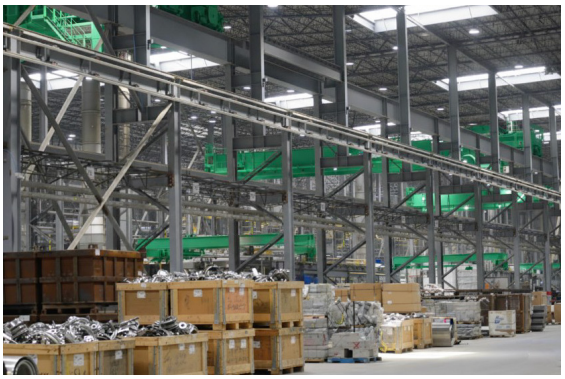


Private Cellular Unlocks Connectivity at a Massive Aluminum Plant

Enabling Real-Time Scanning and Video Surveillance for Zebra and Verkada Across 2 Million Sq. Ft. Indoors and Extensive Outdoor Operations.

Background



400,000 sq. ft. casting room showing recycled aluminum, and additive products with the furnaces in the background.

A leading Southeast manufacturer of aluminum flat-rolled products operates a massive 2 million sq. ft. facility situated on a 2,000-acre site that includes extensive indoor manufacturing space and outdoor distribution yards. The core operation requires continuous, real-time tracking of materials throughout the production lifecycle, starting with recycled aluminum products. These are cast into ingots, which are stored outside in 20-acre yards, and are hot-rolled, and then cold-rolled into massive aluminum coils.

This crucial Supply Chain Management (SCM) process requires reliable connectivity for mobile devices, such as Zebra scanners and tablets used by personnel across the entire property. Additionally, the manufacturer sought to deploy perimeter security monitoring using Verkada cameras at facility entrances and parking areas across the expansive outdoor grounds to enhance site security and operational oversight. The manufacturer engaged with GO2 Partners, its trusted technology partner, who brought the RippleLink Private Cellular solution to address these critical connectivity needs.

The Challenge

The manufacturer faced connectivity challenges in two distinct environments.

Indoors: The facility's immense 2 million sq. ft. scale combined with a high concentration of metal equipment (furnaces, large scrap piles and rolling mills — massive machines used to press the aluminum into coils) severely complicated wireless coverage. This metallic environment caused significant signal interference for traditional Wi-Fi, making it a less-than-optimal connectivity option.



Outdoor distribution yard showing stacks of aluminum ingots.

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Outdoors: Providing Wi-Fi coverage for the distribution yards was financially cost prohibitive. Outdoor Wi-Fi access points (APs) are not optimized for long-range coverage, offering a practical reach of less than an acre. Achieving full yard coverage over 20 acres would require extensive and costly trenching to lay fiber to mount Wi-Fi APs on light poles and integrate them with the internal network. Faced with a costly financial and operational challenge to deploy Wi-Fi, the manufacturer wanted to explore a new approach to provide connectivity in the distribution yards.

The manufacturer urgently needed a unified, high-performance, low-latency solution that could overcome the signal-scrambling metal indoors while simultaneously offering cost-effective, long-range outdoor coverage, without the massive infrastructure investment required by traditional methods. Overall, the solution needed to be cost-effective, and an easy-to-deploy solution that could provide high-performance, low-latency connectivity for two distinct use cases:

- **Supply Chain Management:** Enabling real-time scanning and inventory updates to the local SCM software via Zebra devices, both indoors and across the outdoor storage yard.
- **Security:** Providing dedicated connectivity for Verkada security cameras monitoring entrances and parking areas.

The Solution

Working alongside GO2 Partners, the manufacturer selected and deployed the RippleLink Private Cellular solution. CBRS Private Cellular technology was uniquely suited to overcome the scale and interference challenges of the site. Leveraging the superior range and signal propagation characteristics of Private Cellular, the RippleLink team was able to:

- **Provide broad coverage:** Just a few outdoor Private Cellular access points were strategically placed on the outside of the building to blanket the 20-acre outdoor distribution yards that are located on different sides of the main 2 million sq. ft. structure. The APs ensured continuous connectivity for Zebra scanners used to scan finished ingots stored outside for order fulfillment, or to be used later in the hot rolling process. Outdoor Private Cellular APs can operate at a much higher power level than traditional Wi-Fi APs, and a single AP can easily cover a 20-acre distribution yard. This eliminated the need for costly trenching and numerous Wi-Fi APs.
- **Enhance indoor performance:** The solution extended inside the facility to support the scanning of incoming recycled aluminum products, racking of additives mixed with the molten aluminum, and the casting process that creates ingots, which are then hot/cold rolled into massive coils. Private Cellular's non-line-of-sight, multipath capabilities in this metal-rich, high-density environment allowed high-throughput connectivity for the Zebra scanners, drastically improving inventory accuracy. A single indoor Private Cellular AP was able to cover over 100,000 sq. ft. inside the building, making it easy to cover the areas where scanning was needed inside the massive structure.
- **Integrate security systems:** The same Private Cellular infrastructure provided seamless, reliable backhaul connectivity for the Verkada cameras, which were monitoring facility entrances and parking lots. Each camera was connected to a Private Cellular "bridge" router that allowed the data from the camera to be sent wirelessly over the air to an AP. The solution provided high-quality, continuous video surveillance while eliminating the need for costly trenching and fiber installation.



RippleLink indoor AP mounted on a wall, providing over 100,000 sq. ft. of coverage

The Private Cellular network provided a simple, cost-effective deployment for both the outside distribution yards and complex indoor scanning coverage, leading to immediate operational efficiencies and reduced network implementation costs compared to traditional connectivity options like using public cellular, Wi-Fi, narrowband or point-to-point microwave solutions.

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Private Cellular in the Warehouse, Manufacturing Facility and Distribution Yard

The foundation for advanced industrial wireless connectivity was established in January 2020, when the Federal Communications Commission (FCC) authorized the Citizens Broadband Radio Service (CBRS) band, allocating 150 MHz of spectrum in the 3.55 to 3.7 GHz range for commercial applications.

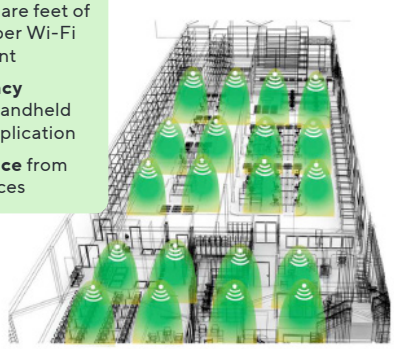
Industry leaders chose cellular technology (4G LTE or 5G NR) over Wi-Fi for this shared spectrum. This decision was based on cellular's inherent maturity, scalability, performance, security and interoperability. These characteristics make Private Cellular uniquely well-suited for diverse and demanding applications, especially mobile barcode scanning, in both indoor and outdoor industrial settings. Private Cellular significantly enhances the capability for mobile barcode scanning across facilities:

Indoor facilities (warehouse/manufacturing): The unique properties of cellular technology provide much greater coverage compared to traditional Wi-Fi. This increased range makes it a far more effective and reliable option for indoor barcode scanning coverage, ensuring seamless connectivity where Wi-Fi often struggles.

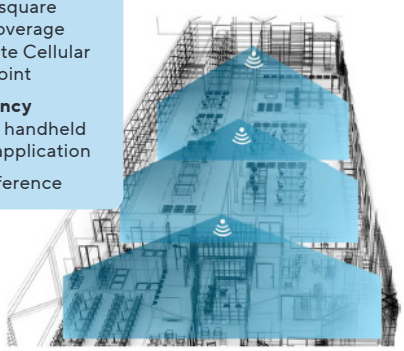
Outdoor facilities (distribution yard): Due to higher power capabilities, a single Private Cellular AP can provide extensive coverage for outdoor barcode scanning. This capability makes achieving wide-area connectivity for scanners across large distribution yards simple and easy, covering over 50 acres.

Private Cellular Indoor Coverage Capabilities

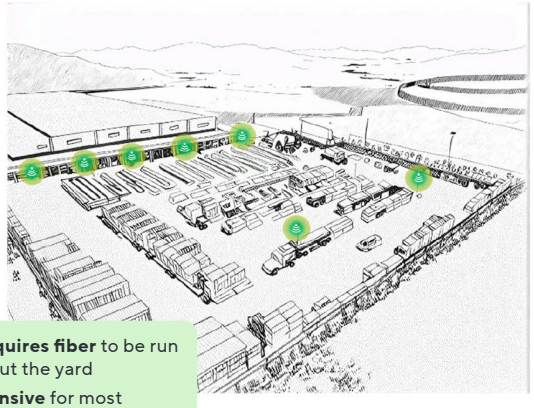
- **8,000** square feet of coverage per Wi-Fi access point
- **High latency** between handheld and the application
- **Interference** from other devices



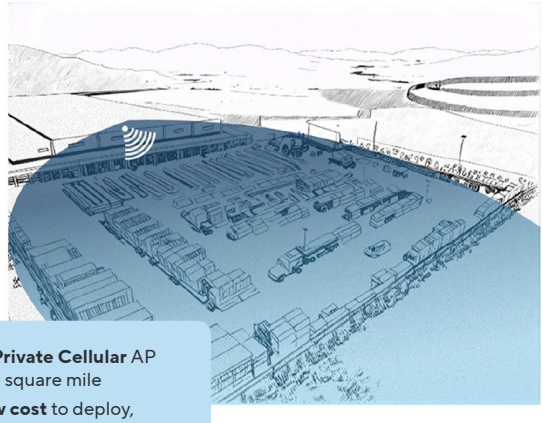
- **40,000** square feet of coverage per Private Cellular access point
- **Low latency** between handheld and the application
- **No** interference



Private Cellular Outdoor Coverage Capabilities



- **Wi-Fi requires fiber** to be run throughout the yard
- Too **expensive** for most companies
- **Limited coverage** and poor performance



- **Single Private Cellular** AP covers a square mile
- Very **low cost** to deploy, minimal cabling
- **Great coverage** & performance

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Enhancing Warehouse & Manufacturing Connectivity

The adoption of Private Cellular technology, specifically on the CBRS band, is revolutionizing warehouse and manufacturing facility connectivity. Leading manufacturers like Zebra now offer mobile scanners and tablets that leverage this advanced wireless capability.

What does this mean for your warehouse or manufacturing facility operation?

Expanded coverage, fewer access points and better performance: A single indoor Private Cellular access point in a warehouse or manufacturing facility can effectively cover an impressive area of 40,000+ sq. ft. Private Cellular offers a superior experience for workers using WMS applications on mobile scanners. Its lower latency compared to Wi-Fi ensures faster response times from the application server. This translates to a smoother user experience as workers enter data and navigate between screens.

Reduced infrastructure and installation costs: You'll need fewer access points, which in turn means less cabling and fewer network switches. When factoring in labor, materials and overall network connectivity expenses, the total installation cost for a Private Cellular solution will be a mere fraction of what's typically required for a comparable Wi-Fi setup.

Private Cellular technology also effectively addresses the connectivity needs of large **distribution yards**. The FCC's authorization of higher power levels (Category B devices up to 50W) for outdoor CBRS applications enables Private Cellular signals to transmit over several miles. This extended range allows a single access point to effectively cover expansive distribution yards (e.g. 50+ acres), even when stacks of goods obstruct the line-of-sight Private Cellular access point and mobile barcode scanners.



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About Us

For 30 years, we've built our business on service that puts customers first. Growing from our foundation as a print industry leader, our capabilities have expanded based on the needs of our clients and the industries we serve.

GO2 Partners now proudly offers a robust suite of products and services utilizing the latest technology to serve your marketing and operational needs. As an employee-owned company, we have a group of dedicated employee-owners ready to put their talents to work for you. We empower our employee-owners to invest in developing new ideas and skillsets, so we are always proactive with the best solutions for your business — now and in the future.

Ready to solve your toughest connectivity challenges?

Contact us today for a consultative assessment of your facility.

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