

celona

SOLUTION BRIEF

# Manufacturing





Industry 4.0. is shaping manufacturing across a variety of industries including automotive, petrochemical, farming equipment, semiconductor and others. Regardless of the industry, the manufacturers are looking for new technology to improve productivity through automation, to gain visibility to optimize inventory and supply chain to meet customer timelines and to manage labor shortages by increasing employee productivity and engagement.

A lot of these technologies involve enabling connected workers, connected assets and machines on the factory floor, workflow automation using computer vision and robotics, all of which requires highly reliable wireless connectivity.

Increasingly, private wireless networks are being called on to provide the level of reliable, interference-free wireless connectivity needed to power the smart factories of tomorrow.

## Manufacturing use cases and connectivity requirements

### Factory automation

Unlike one long assembly line at older factories, the modern factory has a reconfigurable assembly line, with the agility to be quickly retooled to manufacture different widgets. This in turn requires manufacturing equipment, raw materials, finished goods to be frequently moved around the factory. Legacy wired Profinet/ethernet connectivity solutions don't allow for location flexibility and increases re-tooling time. Reliable low latency wireless connectivity (< 20 msec) allows for reliable command and control of the machinery as well as for use with IoT sensing for predictive maintenance on the equipment..

### Connected worker

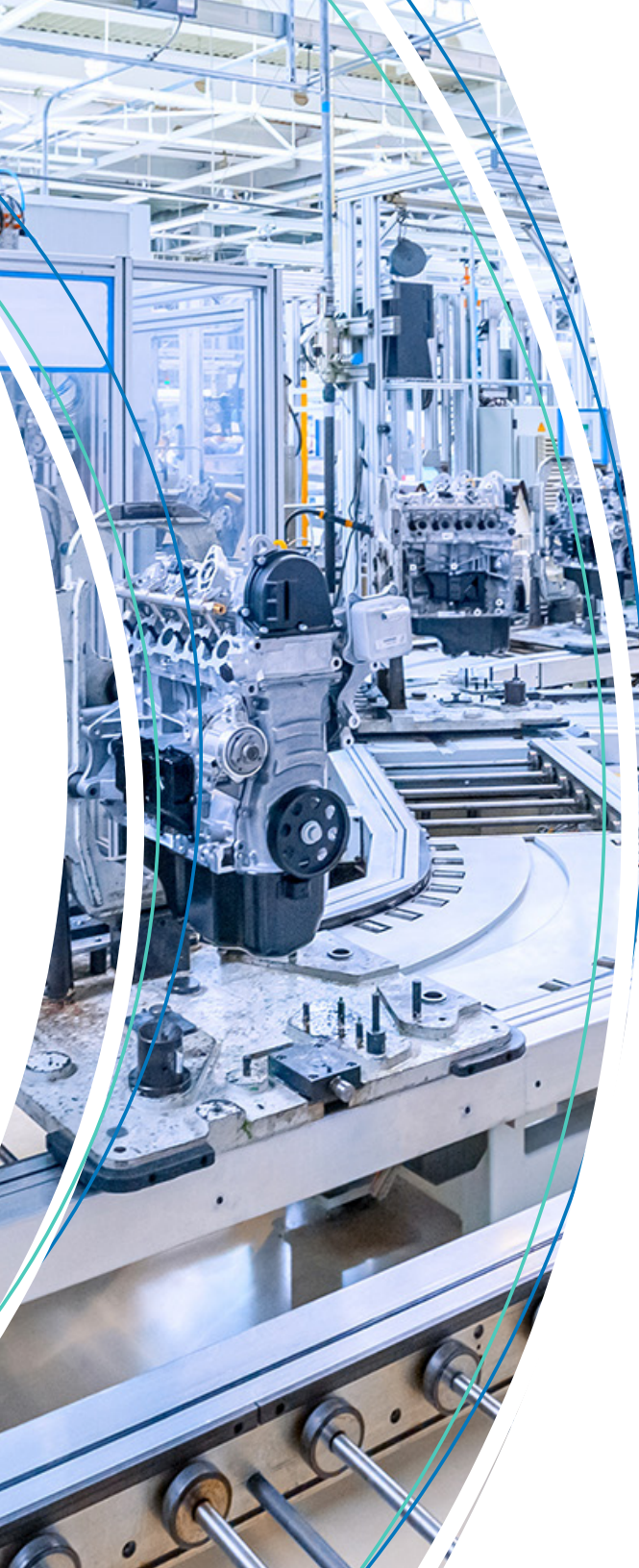
Workers on the factory floor, warehouse and storage yards are equipped with tablets, scanners, smart helmets and other devices for voice communication, and training. They require ubiquitous reliable wireless connectivity for workflow management and business critical applications.

### Autonomous Mobile robots (AMR), Autonomous guided vehicles (AGV)

Raw materials, intermediate goods and finished goods need to be hauled continuously from one station to another in a factory and between the warehouse and the factory floor. With the heightened shortage in labor and costs, companies are turning to AGVs and AMRs for this purpose. AGVs roam the factory floor often at speeds > 25 mph and require continuous connectivity as it traverses long distances. The vehicle can stall or operate in highly limited modes if connectivity is unavailable – thereby limiting the productivity significantly.

### High-definition Video cameras/analytics

HD Video cameras and video analytics are used for surveillance, video based product quality checks and monitoring employee safety. With reliable wireless technology, the cameras can be placed anywhere in the factory indoors/outdoors, without the need for expensive wiring or cabling.



## When Wi-Fi is no longer up to the task

Wi-Fi has been the conventional choice for wireless connectivity in manufacturing. While Wi-Fi is a great fit for home or office environments, it doesn't perform as well in vast outdoor/indoor areas like a manufacturing floor. Their large footprints and need for pervasive connectivity pose specific challenges for Wi-Fi:



### Spotty wireless coverage

Unreliable connectivity causes delays in gathering and transmitting data, often resulting in a loss of productivity. Wireless signal strength is often particularly patchy around temporary storage in the factory floor or parking lot.



### Unreliable Quality of Service (QoS)

Wi-Fi is unable to guarantee throughput and latency levels for mission-critical business applications.



### Mobility issues

The constant movement of personnel and equipment across a large area requires endpoints to move from one access point to another. As devices on the Wi-Fi network scan and connect to the nearest access point, connections often drop in motion. As a result, some applications constantly disconnect in this environment leading to a poor user experience and significant drops in productivity.



### Total cost of operations (TCO)

To cover the footprint of a manufacturing floor, Wi-Fi requires a large number of access points - especially in outdoor yards. Significant engineering resources are needed to undertake complex mesh deployments and install new cabling to connect the access points. Overall this leads to an extremely high total cost of ownership.

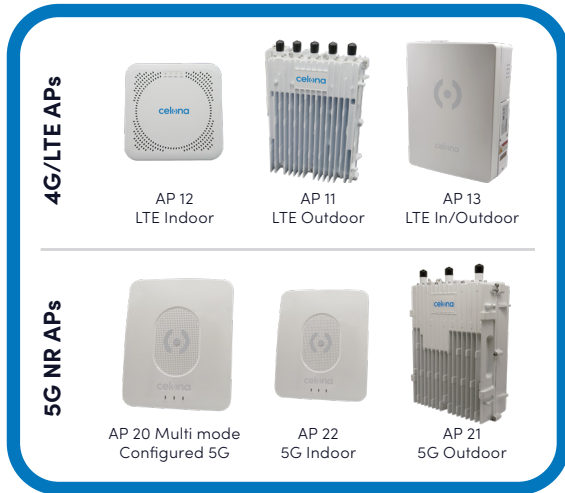


### Future applications

Applications such as autonomous guided vehicles (AGV), high-def video surveillance, and automated gate check-in/exit of vehicles all require a far more reliable and consistent wireless link than Wi-Fi can deliver.

## Celona Private wireless to the rescue

Private wireless offers a far better solution for dispersed industrial environments.



### Celona Access Points

Comprehensive 4G, 5G portfolio



### Celona Edge

Converged 4G & 5G core



Widely considered the most comprehensive private wireless solution for today's enterprise, Celona private wireless promises industrial strength wireless connectivity, performance, and mobility.

The turnkey solution includes LTE/5G access points, a converged LTE/5G network edge hardware/software, radio resource management software, and cloud-based orchestration tools.

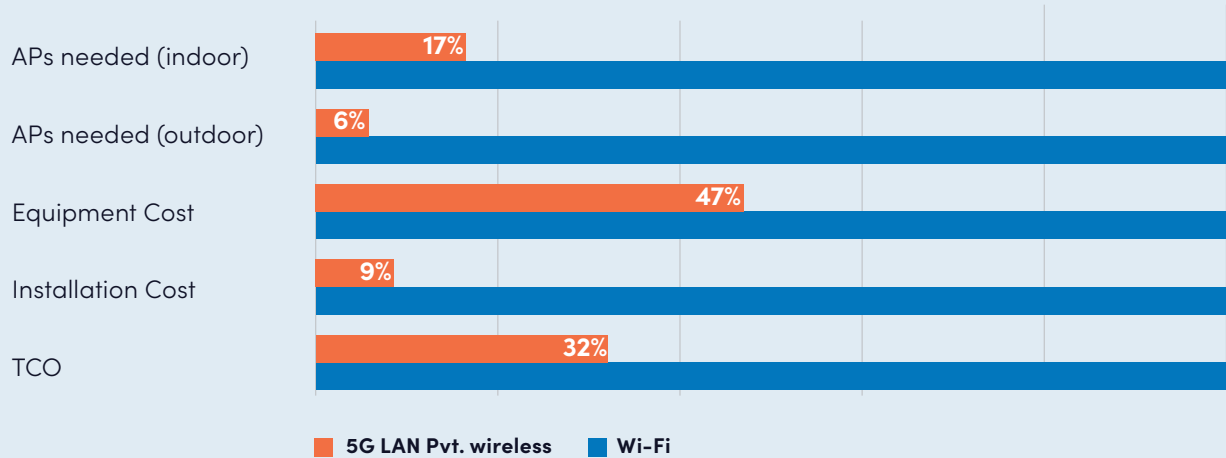
# Wi-Fi woes addressed by Celona Private wireless

	Wi-Fi technologies	Celona private wireless
<b>Coverage</b>	Poor network coverage due to lower transmit power and susceptibility to spectrum noise and co-channel interference.	More pervasive wireless due to higher transmit power, lower noise floor and low wireless interference spectrum.
<b>QoS</b>	No guarantee on throughput and latency since Wi-Fi does not support deterministic QoS with strict priority. While Wi-Fi 6/6E APs can use OFDMA to schedule packets to multiple mobile devices for download, APs still need to use contention-based (CSMA-CA) requiring devices to “fight” for access, making prioritizing challenging.	Guaranteed SLA for critical applications. 5G LAN features Microslicing™ technology that enables deterministic QoS with strict priority on a per device, per application basis. Guaranteed bit rate and guaranteed latency values can be configured for each device and application.
<b>Mobility</b>	Not designed for seamless mobility. Wi-Fi requires the client to perform off-channel scanning to connect to APs. The roaming decisions are controlled by the client rather than infrastructure.	Cellular networks are designed natively for seamless mobility. The network infrastructure controls handover decisions that are precisely timed.
<b>TCO</b>	More APs are required due to lower coverage range of Wi-Fi. Outdoor installs require expensive installation, trenching and cabling.	Fewer APs due to higher coverage range of Private Wireless. Outdoor APs can be roof mounted to provide very large outdoor coverage, avoiding cost of trenching, cabling etc.
<b>Security</b>	Many Wi-Fi networks utilize pre-shared keys and open SSIDs to allow for IoT and/or guest device connectivity – opening doors to additional risk factors for critical enterprise infrastructure.	End-end security for data in-flight and at rest secured using SIM/eSIM technology.

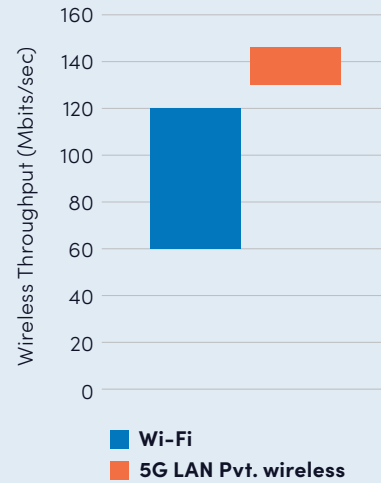
# Performance of private wireless vs. Wi-Fi

## Comparing Wi-Fi and Pvt. Cellular

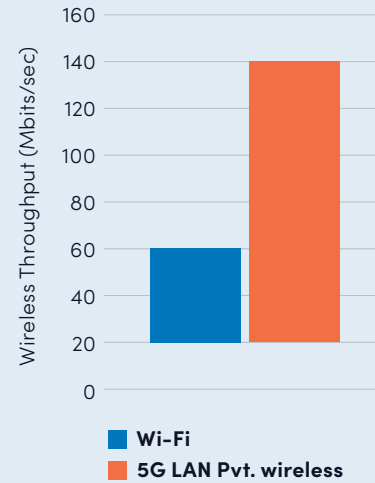
(Based on data from an actual distribution center.)



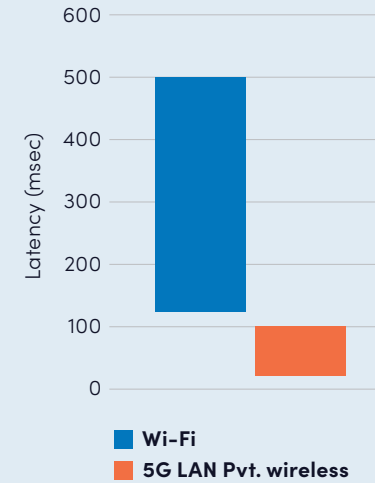
### Throughput in a Loaded network



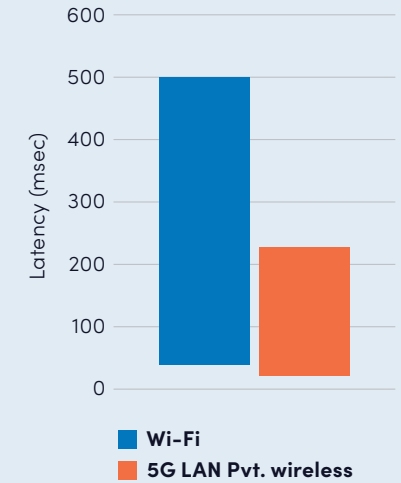
### Throughput in motion



### Latency in a Loaded network



### Latency in motion



## Why use Celona 5G LAN on manufacturing floors?

### The industry's only turnkey private wireless expressly engineered for the enterprise

Celona 5G LAN delivers an end-to-end solution from the radio, core, and spectrum management to network and subscriber management systems. It's built from the ground up to create the best possible Day 0, Day 1, and Day N experience for customers at a lower TCO.

[5GLAN ROUTING FEATURE BRIEF](#)

### Industrial strength private wireless designed for the most critical business apps

Business critical apps need deterministic performance from wireless, but the exact requirements vary from app to app. Celona 5G LAN features MicroSlicing technology for deterministic performance for all your mission critical applications.

[MICROSLICING FEATURE BRIEF](#)

### Tight integrations to secure all wireless communications

A business-critical wireless network requires enterprise grade security to protect against cybersecurity threats. The Celona 5G LAN solution extends the inherently strong security architecture of cellular networks, such as support for eSIM and IMEI lock, with a tight integration between existing enterprise security systems to safeguard the network from edge-to-cloud.

[5GLAN SECURITY WHITE PAPER](#)

### Enterprise friendly management and operations

Get unmatched simplicity and ease-of-use with Celona's cloud-based management system for deploying, configuring, and monitoring your private 5G network.

[ORCHESTRATOR BRIEF](#)

### Global spectrum model support

A wide range of spectrum bands for LTE and 5G ensure Celona is an ideal fit for global facilities looking for a common networking infrastructure.

[AP PRODUCT BRIEF](#)

### Device certification program eliminates guess work on compatibility

Many popular devices used on manufacturing floors are certified to work with Celona private wireless:

Zebra TC26, TC58, TC78	Digi: EX50, iX10
Zebra ET45, ET85	Sierra Wireless RV55
Zebra L10 Series tablet	Cradlepoint R500
Honeywell CT47	MultiTech MultiConnect
Getac: ZX10, F110G6	rCell 600

[SEE FULL LIST OF CERTIFIED DEVICES](#)



## Real-life case study: Celona in action

*"If I had to continue to deal with the Wi-Fi issues I have to deal with every day at the plant, I'd have to hire more people," said the head of IT operations for the U.S Steel Manufacturer. "And frankly that wouldn't even fix the technical challenges that I have with using Wi-Fi technology within our environment. With Celona's technology, all that goes away. The solution pays for itself."*

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