

celona

PRODUCT BRIEF

Celona 5G NR



Today, private wireless in the US has been primarily based on 4G LTE cellular technology making use of shared spectrum options such as CBRS. These private wireless networks are comprised of small cell access points, core software, client devices and a networking architecture tying it all together. Now, with the wireless industry in the US evolving to 5G New Radio (NR), private wireless is also making the switch. In many global markets, private wireless is only specified to work on 5G NR and does not support LTE—making the switch to 5G even more critical.

Private 5G NR networks support higher data rates, lower latencies, and longer-range connectivity than their legacy LTE predecessors. This opens the door to a new era of Industry 4.0 applications including, automated manufacturing within factories, real-time asset tracking and management

within warehousing environments and industrial robotics used in logistics, shipping ports, and oil and gas refineries.

At Celona, we have now extended our critically acclaimed 5G LAN portfolio to support 5G NR technology. Delivering the industry's most comprehensive private 5G NR end-end solution, Celona's 5G LAN system was designed to be easy to deploy and intuitive to manage for enterprise IT staff. Celona's 5G LAN directly integrates with existing enterprise L2/L3 networks in the US and global markets.



Performance improvements with 5G NR

The 5G NR specification defines how 5G edge devices - smartphones, embedded modules, routers and gateways - and 5G network infrastructure - base stations, small cells, and other Radio Access Network equipment - wirelessly transmit data. 5G NR new features include:

Beamforming to focus wireless signals, ensuring a stronger connection to client devices.

Selective Hybrid Automatic Repeat Request (HARQ) enables 5G NR to break large data blocks into smaller blocks. If an error occurs, the retransmission becomes smaller, resulting in higher data transfer speeds than LTE, which transfers data in larger blocks.

A new inactive state for devices to reduce the time needed for an edge device to move in and out of its connected state (the state used for transmission), further improving device responsiveness.

Faster Time Division Duplexing (TDD) enables 5G NR networks to switch between uplink and downlink faster, reducing latency.

Pre-emptive scheduling to lower latency by allowing higher-priority data to overwrite or pre-empt lower-priority data, even if the lower-priority data is already being transmitted. In addition, shorter scheduling units trim the minimum scheduling unit to just two symbols, improving latency.



The benefits of 5G NR include

Global reach

Private wireless deployments in the US support both LTE (b48) and 5G NR (n48) within the CBRS band. Many countries globally have already allocated or are currently testing n77, n78, and n79 bands for Private Wireless use, either as an unlicensed/shared spectrum or licensed from carriers who own them. The network specifications of these countries are solely 5G NR with no support for LTE. As a result, equipment manufacturers and technology providers now have their sights set on developing Private 5G NR equipment that can be deployed globally.

Higher Performance at range

Due to the improved spectral efficiency, 256 QAM with 5G in comparison to 128 QAM in LTE, 5G networks offer 3-4x higher aggregate throughput, 2-3x higher coverage than LTE. Plus, uplink speeds are 4x-10x higher with 5G.

Software defined RAN

5G NR's Software defined RAN allows radio functions implemented as micro-services. This enables intelligent, data-driven optimization and programmability.

Ultra-Low latency

With fast channel assignment, Short Transmission Time Interval (TTI) and link adaptation, private 5G offers one-way UE-Edge latency of less than 10 milliseconds along with low packet error rates for high reliability in transmission, compared to <20 msec in the case of LTE.

With mid band support from 3.3 to 4.9 GHz, Celona's 5G LANs can serve a vast

N48	N77	N78	N79
(3550-3700 MHz)	(3800-4200 MHz)	(3300-3800 MHz)	(4600-4900 MHz, planned 2H 2023)



Celona 5G NR solution

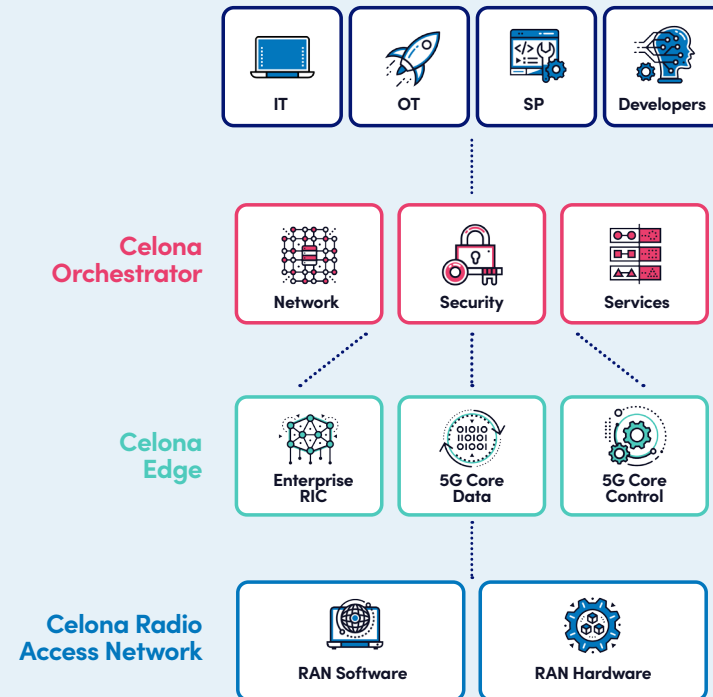
The Celona 5G RAN: All Celona's private 5G access points support 2x2 MIMO operation and channel bandwidths up to 100 MHz across the range of international 5G NR bands (n48, n77 and n78). New models include the industry's first fully integrated multi-mode (4G or 5G) indoor access point (AP 20), an integrated 5G only indoor access point (AP 22) and an industrial integrated 5G outdoor access point (AP 21).

Access Point Product Brief

The Celona Converged Edge OS: A scalable and resilient cloud-native network operating system that provides resolute data plane, control plane and spectrum management services for private wireless networks. Built with enterprise deployment use cases in mind, Edge OS delivers converged 4G/5G core services for cellular packet delivery combined with a full-function IP stack for seamless connectivity into enterprise LANs. The Celona Edge OS powers Edge Node appliances, which are combined into a three-node Edge Cluster for highly available and redundant private 5G network operations.

The Enterprise RAN Intelligent Controller (ERIC) is new functionality now supported by Celona's Edge O/S software. Like radio resource management functions used in the Wi-Fi world, Enterprise RIC is a software-defined, standards-based platform for intelligent, data-driven automation, optimization and programmability of Celona RAN functions such as channel, power, capacity, admission controls, and handover optimization.

Explore Celona Edge



The Celona Orchestrator: is a cloud-based network administration platform that centrally coordinates the deployment, management, and operation of a Celona 5G LAN. This includes configuration and optimization of network elements, subscriber management as well as defining and automating the enforcement of QoS policies for individual applications and devices. Celona's web-based orchestrator is built using RESTful APIs, making for a highly flexible system that can be integrated into any existing network infrastructure for simplified in-house or third-party Managed Service Provider (MSP) management.

See Orchestrator in action

New use cases enabled by 5G NR



Multinational companies with global facilities

With support for the new n77 and n78 bands, Celona 5G LAN solutions are based on a unique and turnkey 5G LAN architecture that can be deployed in multiple countries around the world. Manufacturing/warehousing customers with global facilities can now deploy a unified 5G LAN connectivity strategy across their geographic footprint, without experiencing the coverage gaps and reliability issues commonly associated with Wi-Fi or carrier macro networks.



Video and computer vision, AR/VR

With increased bandwidth and configurable channel width, a 5G NR solution allows for data-heavy applications, especially those with high uplink requirements. This includes video and computer vision applications such as security cameras, video analytics, broadcasting systems and inventory robots in retail. The higher bandwidth also supports augmented reality and virtual reality applications in manufacturing floors, sporting events, healthcare and retail.



Industrial control and smart manufacturing

The ultra-low latency of <10 milliseconds for 5G NR, combined with granular QoS enforcement mechanisms built into Celona 5G LANs deliver a significant advantage in industrial control and smart manufacturing. This class of ultra-low latency enables Wireless Programmable Logic Controllers (PLC) and supports latency-sensitive protocols such as PROFINET over 5G, as well as a wide range of applications in user safety, precision automated controls and more.

The Celona advantage



One network supports both 4G and 5G

Specific to Private LTE deployments in the US, the 5G radio and clients are NOT backwards compatible with 4G LTE. To complicate this problem further, the cost of 5G user equipment today is much higher, while the portfolio of available clients is significantly lower than LTE. This forces organizations to decide whether to stay with a device-rich LTE ecosystem or a higher performance 5G ecosystem.

Celona has a solution to address this conundrum. An enterprise using Celona's Private LTE today can simply update Celona Edge O/S software to support both LTE and 5G Radios running concurrently on the same network. And with the introduction of Celona's new AP-20 multimode radio, enterprises can now connect LTE or 5G devices using the same access point. Furthermore, since APs are included in the subscription price, customers have the option to upgrade their radios to 5G.

More 5G Device interoperability assurance with Celona 5G LAN certification

Celona's 5G LAN certification program is the only solution to give organizations a straightforward way to tap into a large, open ecosystem of compatible devices, matching clients to their unique use cases to assure a "plug-and-play" experience. Celona has already certified over a dozen third-party products, including industrial handhelds, tablets, smartphones, IoT gateways and CPE devices from leading device manufacturers, including Zebra Technologies, Apple, Samsung, Sierra Wireless, Inseego, MultiTech, Cradlepoint and Getac.

5G LAN Certified Devices

All the benefits of 5G LANs extend to 5G NR

Instead of force-fitting a traditional cellular wireless solution around enterprise environments and requirements, Celona's 5G LAN solution and go-to-market model have been designed with private enterprise use cases in mind. Mirroring the familiar Wi-Fi LAN deployment framework, Celona's all-inclusive 5G LAN solution delivers five to 10 times the coverage per AP, predictable performance and deterministic connectivity that is unmatched in the industry.

Key benefits of Celona 5G LAN



End to end turnkey - Designed for the enterprise

Unlike alternatives, Celona's 5G LAN is a fully integrated and turnkey solution that includes all the requisite components for building a robust end-to-end private wireless infrastructure. This includes everything from the radio, core, spectrum management to network and subscriber management systems. Best Day 0, Day 1 and Day N experience for customers and lower Total cost of Ownership over Wi-Fi and other Private Wireless solutions.

Some of the unique features include: Access Points working over existing cabling and IP network without any special requirements. End devices being part of the existing customer IP network with the 5G LAN routing capability

5G LAN Feature Brief



Global spectrum models

Supporting a wide range of spectrum bands in LTE and 5G enabling the use in most parts of the world.

AP Product Brief



Secure wireless communications

Running a business-critical wireless network requires the highest form of security. The Celona 5G LAN solution extends the inherently strong security architecture of cellular networks with a tight integration with existing enterprise firewalls and network access control (NAC) systems.

Security features enabling these capabilities include: integrated physical and eSIM based subscriber management, Granular policy controls tying SIM to specific hardware, security segmentation using MicroSlicing, maintaining per device visibility for existing enterprise firewalls using the 5G LAN intelligent routing.

5G LAN Security Feature Brief



Enterprise friendly management and operations

Comprehensive toolset for deploying, configuring and monitoring the private 5G network through an intuitive, easy-to-use cloud management system Celona Orchestrator offers comprehensive tools for network configuration, visibility and control of the network, alarms and notifications

Orchestrator Product Brief



Deterministic performance for your critical apps

Business critical apps need deterministic performance from wireless, but the exact requirements vary from application to application.

MicroSlicing™ is a patented technology from Celona that can enable simple application and device level deterministic QoS.

MicroSlicing Feature Brief



Device certification program eliminates guess work about seamless interoperability

Many popular devices are certified to work with Celona 5G LAN including:

- Zebra TC26
- Zebra ET45
- Getac ZX10
- Getac F110G6
- Sierra Wireless RV55
- Cradlepoint R500
- MultiTech MultiConnect rCell 600 and many more.

5G LAN Certified Devices

To see a demo or learn more,
visit [Celona.io/journey](https://celona.io/journey)



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