Celona 5G NR Launch

FAQs

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1 What is Celona announcing?

Celona is introducing a comprehensive portfolio of new 5G NR products and technology and expanding our private wireless business into Europe.

Celona's 5G NR portfolio includes:

- The first multimode (4G/5G) indoor access point
- A 5G indoor access point and 5G outdoor access point
- Converged 4G/5G core (Celona's Edge O/S and the Celona Orchestrator)
- A cloud-based platform for the administration, management of network services and subscribers

Celona's new 5G NR portfolio is designed to deliver up to 3x the aggregate throughput, ½ the latency, and twice the range and user capacity over existing LTE technology. The new portfolio of 5G products supports all of Celona's patented technologies, such as MicroSlicing™ and intelligent 5G LAN routing.

2 What is 5G NR, and how is it different to 4G (LTE)?

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

5G NR adds important new functionality to improve the performance and reliability of cellular communications. This includes:

Beamforming enables focused 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.

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

Pre-emptive scheduling lowers 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.

A new inactive state for devices reduces 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.

Performance under ideal RF conditions	LTE	5G NR
Peak Throughput – Uplink	50 Mbps	500 Mbps
Peak Throughput - Downlink	200 Mbps	700 Mbps
Latency One-way, UE-Edge	<25 msec	<10 msec

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3 Do Celona's new 5G products only support CBRS?

No. Celona's new private 5G NR solution supports both public and private spectrum requirements across a range of international private wireless bands, including n48, n77 and n78, covering a 3.3 to 4.2 GHz range.

4 What market conditions have driven Celona to deliver a 5G solution?

Global digital transformation initiatives across a wide range of vertical markets are driving the need for alternatives to conventional wireless technologies such as Wi-Fi or public carrier cellular services.

Celona's 5G NR solution has been purposely designed for enterprises and delivers the following benefits:

- Reduced cost and investment in building a private wireless 5G LAN network

- Unified 5G LAN architecture that can be scaled globally for greater agility

- Improved productivity and operational efficiencies by running critical apps over a highly reliable and pervasive private wireless network

- Ability to quickly add new applications to the wireless network

- Lower operational costs and increased control by eliminating dependencies on third parties

- Lower cost and complexity for securing the network by eliminating additional components

- Seamless integration with existing infrastructure with all indoor APs with PoE++

5 What makes Celona's 5G private wireless offering unique?

Celona's 5G LAN system incorporates a unique architectural approach that combines and optimizes all the essential elements of a private wireless solution by mapping directly to existing IT network infrastructures. Today, Celona's 5G portfolio is the industry's only comprehensive and fully integrated private wireless solution purpose-built for enterprise use. The solution is engineered to directly integrate with existing enterprise IP domain, network services, QoS policy and security postures. Celona's 5G LAN eliminates the need for configuration changes by overlaying private wireless seamlessly over enterprise L2/L3 infrastructure. In addition, Celona's 5G LAN portfolio includes the industry's first multimode 4G/5G access point and converged 4G/5G core.

Finally, the Celona 5G NR system is the only solution to support end-to-end QoS enforcement from the RAN across the LAN on a per applications per device basis.

6 How is Celona's 5G solution different from the current 4G offering?

Celona's new 5G NR portfolio leverages the same unified 5G LAN architectural framework as existing Celona products, but importantly, it effectively delivers twice the aggregate throughput range and user capacity at less than ½ the latency. Key technical differences include:

- Higher aggregate performance up to 1 Gbps
- Sub 10 millisecond guaranteed latency
- Extended range - up to twice the distance in many cases
- Higher modulation rates - up to 256 QAM
- Support for concurrent 4G/5G radio and core services
- Operation in new international 5G NR bands - n48, n77 and n78
- Support for channel widths up to 100 MHz.

7 What is the price uplift from celona's 4G offering compared to celona's 5G products?

Depending on the type of access point being used, the general uplift is roughly 80%

8 What is the pricing and availability of celona's new 5G offering?

Celona's new 5G NR products are available through a diverse network of channel partners from February 2023. All components of Celona's 5G NR private wireless system are priced as a single software-as-a-service license with three- and five-year subscription options.

This all-inclusive subscription pricing model incorporates Celona's indoor and outdoor access points, a Spectrum Access System (SAS) license if required, Celona Edge O/S software and cloud-based Orchestrator management system and 5G SIMs/eSIMs – along with technical support and hardware warranty.

The three-year subscription list pricing per indoor or outdoor AP starts at US$17,000 and $57,500, respectively.

9 Which market segments and vertical markets are best suited for this solution?

Celona's 5G systems are ideally suited for non-carpeted enterprise environments with high bandwidth applications or essential mobility requirements tied to vital business operations. This includes large global manufacturers, warehousing and logistics operations, shipping ports and transportation hubs, oil and gas refineries, and smart cities. Celona's 5G systems also support industrial applications such as wireless Profinet and high uplink video applications.

10 What unique problems will it help customers solve?

- Lack of end-to-end (RAN to LAN) Quality of Service (QoS) continuity
- Network disruptions, application downtime and lost productivity caused by wireless roaming issues, interference, packet loss or latency
- Mobility problems caused by poor wireless coverage or signal propagation
- The inability to support new high bandwidth applications such as HD video streaming and surveillance, computer vision and VR/AR use cases
- Spotty indoor and outdoor wireless coverage
- The need for an agile and unified global 5G LAN architecture across multiple sites
- Mission-critical apps requiring low latency

11 Will customers be able to run 4G and 5G services over the same network?

Yes. As long as they are using Celona access points and Celona edge O/S software.

12 What speeds and latencies can customers expect to achieve?

Depending on the country and channel widths used, customers can expect to experience aggregate performance (uplink/downlink) of up to 1 Gbps and round-trip latencies under ten milliseconds.

13 Will any carriers be offering Celona's 5G system?

Yes. In the US, Verizon and NTT will offer Celona's new 5GNR system as part of their respective P5G and on-site private wireless offerings. However, we have yet to announce carrier partnerships outside the U.S.

14 What 5G user equipment, if any, has Celona certified to interoperate with its new 5G NR products?

Today, over 100 third-party end devices on the market support 5GNR (Band 48.77.78). Celona has certified a myriad of end-user equipment for operation on new products. These range from smartphones and tablets to 5G dongles and mobile router gateways – from various manufacturers, including Zebra, Getac, Google, Sierra Wireless, Samsung and many others.

15 Why would customers want or need a multimode 4G/5G access point?

Celona's unique 4G/5G access points allow customers to invest in private wireless networks today by leveraging the already mature 4G device ecosystem while also setting the foundations to introduce 5G when their use cases demand it or to align with their device refresh cycles. This helps future-proof investments by avoiding technology lock-in as the industry goes through a radio technology transition.

16 What is an enterprise ran intelligent controller (RIC), and why is this functionality included?

The Enterprise RAN Intelligent Controller (ERIC) is a 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.

Open APIs enable discrete software programs - such as load balancing or capacity optimization - to interact with the RAN, dynamically optimizing its operation and environmental conditions. Celona's ERIC support includes non-real-time control of hardware elements and near real-time control of hardware elements.

17 What are the benefits of a converged 4G/5G core?

Celona 5G LAN Edge O/S is radio technology agnostic. This enables flexible deployment options for enterprises looking to deploy a 4G and 5G private wireless infrastructure to address their specific use cases. Celona's Edge OS is the only enterprise-focused software that allows for the concurrent operation of both 4G and 5G radios.

18 What are the top use cases for private 5G?

Top use cases for private 5G include manufacturing automation, real-time asset management tracking, high-definition video surveillance, robotics and smart city IoT systems.

19 Is ther an upgrade path for current 4G customers that want 5G?

Yes. If customers continue to operate 4G-only clients, they will need to retain their 4G radios. In this case, customers can roll out additional 5G radios to complement their existing 4G deployment. Both the 4G and 5G radios will take advantage of the customer's existing Celona Edge O/S and Celona Orchestrator platform. For Celona customers who wish to physically replace their 4G radios with 5G radios, Celona will offer an upgrade path to 5G by leveraging the unused value of their existing 4G subscription. Customers should contact Celona directly for details.

20 Can the current solution (4G) be leveraged while adding or migrating to 5G APs?

Yes. The Celona Edge, SIMs and the Orchestrator are all designed to be radio technology agnostic and can be fully leveraged while adding 5G APs to the current site.

21 Will Celona support mixed deployments of 4G and 5G APs in the same location?

Yes. The Celona Edge O/S now supports a converged core to allow the concurrent operation of 4G and 5G. In addition, the new multimode 4G/G AP supports both 4G and 5G radio access concurrently.

22 Will Celona private 5G support any licensed spectrum?

Yes. The supported spectrum includes:

- 3550-3700 GHz (band 48) in the United States,
- 3300-3800 GHz (band 78) & 3800-4200 GHz (band 77) in Europe & UK
- Future support for band 79 (supporting Japan, Korea etc.) is expected by the end of 2023.

23 Do you have any customers currently using or testing your new 5G system?

Yes. Celona's new 5G NR products are being deployed by the City of Glendale in Arizona, Aeris wireless, NTT labs in Europe, and Cotton Holdings.

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24 How do Celona's 5G products compare with todays 4G and wi-fi technologies?

Relative to Wi-Fi, the differences are distinct. Celona's 5G NR offering effectively operates in a cleaner spectrum using higher transmit power to provide profound coverage improvements (from 4 to 10x). Additionally, latency is radically reduced (under ten milliseconds), with improved mobility. Wi-Fi uses a distributed, contention-based media access method (CSMA/CA). In contrast, 5G uses a centrally controlled and scheduled media access method (OFDMA) with 5G mobility and roaming handoffs centrally controlled by the network. Wi-Fi requires off-channel client scanning, with clients deciding the best AP to connect to at any given time.

Relative to LTE, 5G provides improvements in aggregate throughput (2X), user capacity (2X), coverage (2x) and latency (½).

25 Do the new 5G APs have the necessary FCC (US), ONGO (US) and CE (Europe) certifications?

Yes. The new 5G APs will have FCC, WInnForum CBRS, CE and CE-UK certs at FCS.

26 Do Celona's new products support O-RAN implementations?

Yes. While the O-RAN framework was developed more for carriers, Celona's standards-based RAN software supports the disaggregation of different radio functions as required. While these products are specifically designed to be deployed as a fully integrated solution, our software architecture is modular and supports all the standard O-RAN interfaces to allow split RAN functionality.

27 How is Celona delivering its new products to international markets?

Celona will deliver these new products to international markets through a combination of existing partners who operate globally and new regional partners who are being signed up on an ongoing basis.

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celona.io

hello@celona.io