# Celona Private 5G Suite

Portfolio launch of global indoor and outdoor 5G NR products

Celona is a privately-funded Silicon Valley startup focused on enterprise private wireless. Founded by networking veterans with WiFi and cellular technology expertise, Celona has raised over $100M in venture funding from Qualcomm Ventures, NTTVC, DigitalBridge Ventures, Norwest Venture Partners, Lightspeed Venture Partners, and Cervin Ventures. Celona's go-to-market partnerships include NTT and Verizon Business, with HPE Aruba reselling its solutions.

In this AvidThink Research Note, we examine Celona's recent announcement of private 5G solution availability, upgrading and complementing their existing private 4G LTE product line. Our work with communication service providers (CSPs), hyperscalers, enterprises, and multiple vendors in the private wireless space help inform this analysis.

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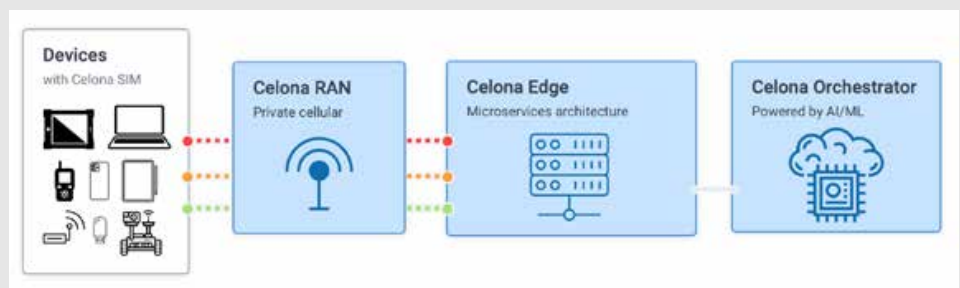
Celona's Announcement in a Nutshell

Celona's recent announcement in Feb 2023 covers several elements:

- **Private 5G RAN upgrades** — Private 5G RAN with new 5G 2x2 MIMO access points that support 100 MHz bandwidth across multiple 5G NR bands (n48, n77, n78 with n79 coming). Unlike their 4G LTE US CBRS-focused products, the new APs can be deployed internationally across Latin America, Europe, the Middle East, and Australia, with Asia unlocked when n79 support shows up. The 5G radio suite includes a multi-mode (4G/5G) indoor access point (Model AP-20), a 5G-only indoor access point (AP-22), and an industrial 5G outdoor access point (AP-21).
- **Celona Converged Edge update** — Celona's Edge is on-premises microservice-architecture-based software hosted on multiple platforms (bare metal, virtual machines, ruggedized edge servers). Local management and high availability are achieved using Kubernetes, which provides redundancy and service slicing. The recent release of Celona's new Converged Edge provides 4G and 5G private wireless mobile core services. The Converged Edge supports 4G/5G data planes and has an O-RAN Alliance-compliant RAN intelligent controller (RIC) optimized for enterprises.
- **Celona Orchestrator update** — The Celona Orchestrator is a cloud-based platform that supports the deployment and management of Celona's Access Points, and Celona Converged Edge instances across multiple enterprise locations. It handles SIM (and eSIM) provisioning and device-specific access control policies.

With the recent release, Celona continues to tout their proprietary MicroSlicing technology, which now works on 5G in addition to 4G LTE, for fine-grained QoS for enterprise applications.

Celona's 5G NR products are now available and sold as a software-as-a-service package with three-year and five-year subscription options. The company continues to emphasize its simplified all-in-one approach, with its SaaS offering encompassing indoor and outdoor access points, Spectrum Access System (SAS) license for CBRS (if required), Celona Converged Edge software, Celona SIM cards or eSIMs, and their cloud-based Celona Orchestrator. Support and hardware warranty are included. The list price starts at USD 17,000 per indoor AP and USD 57,500 per outdoor AP for three-year subscriptions.

Before we delve into our analysis of the market impact of Celona's announcement, let's take a quick run-through of what we currently observe in the enterprise private wireless market.

Enterprise Private Wireless Landscape

Enterprises today can purchase private wireless solutions from multiple sources in diverse forms. CSPs, networking vendors, system integrators (SIs), and hyperscalers offer private wireless solutions. Enterprises can buy all the equipment and software, install and operate it themselves, or subscribe to a fully-managed service designed and deployed by an integrator. Those who want a hassle-free starting point can even order a private network from a hyperscaler with a few button clicks.

Private Wireless Adoption Challenges

Our last private wireless report, which we will refresh in 2023, covered multiple issues enterprises encountered in rolling out private 4G LTE and 5G. Many of the trends and drivers we identified continue to resonate with enterprise customers. In addition to deciding how and whom to purchase from, there are other common challenges:

- **Lack of business application integration** — Many WiFi deployments and upgrades are driven by horizontal connectivity needs, in contrast with vertical business drivers for adopting private 4G LTE/5G. Enterprises that we speak with cite digitization, IoT, and business automation initiatives as the drivers for exploring private wireless. Not all private wireless solution providers understand this and provide seamless integration with typical industrial applications. This adds unnecessary friction to deployments.
- **Confusion around enterprise network insertion points** — Even though the recent wave of interest in private wireless spurred by the onset of 5G has risen over the past few years, many private wireless providers and enterprises don't understand the appropriate deployment topology. Enterprise IT (for both IT and OT deployments) is familiar with WiFi installations, both local

controller-managed and cloud-managed. They know how to integrate necessary security services, configure and manage endpoint policies at scale, and troubleshoot network traffic issues. Enterprise IT doesn't yet understand private wireless, and many mobile technology vendors and mobile network operators (MNOs) don't always understand the intricacies of enterprise IT.

- **Supply chain issues** — As with other technology companies, private wireless vendors have been impacted by hardware platforms and components delays, slowing deployment of private 4G LTE, and availability of private 5G platforms.

- **Management complexity** — The traditional mobile solution vendors have tried to simplify their macro 4G LTE and 5G solutions for enterprise deployment but have not always been successful. Enterprises and SIs alike bemoan the complexity of understanding and managing private wireless networks. While they understand that private wireless is more involved, they seek private wireless solutions that are as easy to deploy as cloud-managed enterprise WiFi solutions from vendors like HPE Aruba, Cisco Meraki, and Juniper Mist.

- **Prohibitive costs** — Many of the private wireless solutions in the market are expensive, especially private 5G. While private 4G LTE provides adequate capacity for many industrial applications, these solutions are costly compared to enterprise WiFi. Nevertheless, due to the critical nature of many deployments — enabling shipping port automation, providing reliable video surveillance for safety and health, and ensuring consistent coverage for industrial robots — companies can generate a positive return on their private wireless investments in a reasonable timeframe. However, lower-cost private wireless would lower barriers to adoption, allow more use cases to be served, and unlock faster growth for the market.

AvidThink Analysis of Celona's 5G Suite Announcement

Celona isn't the first vendor to bring private 5G solutions to the market, but it's led the way in simplifying and streamlining private wireless deployments that integrate well into existing enterprise IT — their "5G LAN" architecture. Here's AvidThink's view of Celona's recent announcement:

- **Solution architecture** — Celona is bringing private 5G (and their 4G LTE offerings) into an easy-to-deploy solution for enterprise IT (and OT). Ease of integration has been a critical criterion for AvidThink since the recent interest in private wireless a few years ago. When we met Celona soon after their initial launch, we were impressed that they were conversant in enterprise IT and cellular architectures. We believe that simplification is critical to private wireless uptake. We applaud Celona for providing LAN-like deployment options with desired QoS controls for their 4G, and 5G converged offerings. We continue to run into enterprises that don't understand why the private wireless solutions they are evaluating can't fit into their LANs or be served by their existing firewalls and security appliances and why they need to spend time to figure out where to place S/PGWs, UPFs, and plumb SGi/N6 interfaces into their LANs.

- **It's 5G!** — We recognize MNOs have overhyped public 5G, and 5G was prematurely pressed into service for private wireless, with vendors mislabeling private 4G LTE under the Private 5G moniker. Nevertheless, 5G does provide performance advantages. Celona indicates their 5G LAN has demonstrated aggregate speeds of up to 1 Gbps with latencies of 10 milliseconds or less. This unlocks more industrial use cases, including bandwidth-heavy 4K video surveillance and latency-sensitive manufacturing control applications.

- **Simplified and cost-effective pricing** — We're not expecting that private wireless will immediately reach enterprise WiFi pricing levels. However, one of the biggest complaints we hear from enterprises is the high prices associated with private 5G (and even private 4G LTE). At launch, Celona entered the market with a subscription pricing model more aggressive than other solution providers. Our past in-house analysis showed their indoor access point pricing is a 4-6X multiple of what managed enterprise WiFi services charge per managed AP. With a 4-8X coverage area of WiFi (Celona cites 4X for indoor, 10x for outdoor; our industry sources see a range of 4-9X indoor), Celona's pricing is designed to keep it competitive with enterprise WiFi. We're hoping that a lower total cost of ownership (TCO) will spur more customers into using private 5G for their automation and digital transformation business initiatives.

- **Additional spectrum options** — Celona's previous products supported CBRS in the US (n48: 3550-3700 MHz). With the updated product suite, Celona wants to serve multi-national enterprise customers with sites across the US, Europe, Latin America, Australia, and Asia. Supporting n77 (3300-4200 MHz), n78 (3300-3800 MHz), and soon n79 (4400-5000), Celona hopes to unlock more private wireless opportunities worldwide, finding an additional go-to-market partnership with MNOs in those regions.

- **Strong ecosystem** — While not highlighted in the press release, Celona (along with other private wireless vendors) has cemented strong relationships with software and hardware providers for manufacturing and industrial use cases. This includes Zebra, certifying Zebra's CBRS-enabled products (tablets, mobile devices) on Celona's 5G LAN, Inseego, Cradlepoint, Sierra Wireless, Apple, and other partners. As we indicated, private wireless is driven by vertical applications, mainly industrial applications, and Celona understands the criticality of ensuring seamless compatibility.
- **Enterprise RIC** — Part of Celona's updated platform includes an open RAN enterprise-tuned RIC or ERIC. Celona hopes partners, SIs, and CSPs will extend the platform's value by writing rApps or xApps for its RIC. We're unsure if Celona's industrial application partners have sufficient expertise to write applications that can optimize the RAN via the RIC or use data from the RIC to improve industry applications. Nevertheless, our conversations with Celona indicate that building an O-RAN-compliant architecture doesn't incur additional development costs and provides them with a standards-based approach that MNOs, SIs, and enterprises might appreciate. Given AvidThink's interest in open RAN, we'll track this area closely.

Wrapping Up

Celona's recent announcements represent ongoing innovation from their 4G LTE product line. We applaud Celona for sticking to its mission to simplify private wireless and make it as simple as procuring, deploying, and managing cloud-controlled enterprise WiFi. With Celona's upgrade to 5G with its converged 4G/5G RAN and core options, we see an expansion of use cases unlocked by lower latencies and improved throughput. Likewise, additional spectrum flexibility allows their enterprise customers with global sites to deploy Celona in more locations and increases opportunities for their business partners, Verizon and NTT. At AvidThink, we see much to like in this recent announcement. Celona's robust slate of early enterprise customers and partners speaks to healthy demand and long-term viability for Celona's platform.