

SOLUTION OVERVIEW

Celona CBRS for Private Mobile Networks

Citizens Broadband Radio Service, or CBRS, is emerging as an innovative way to deliver private enterprise mobile networks based on cellular technology. These new CBRS-based solutions are possible thanks to 150 GHz of coordinated spectrum (3.55-3.7 GHz) approved by the Federal Communications Commission and the introduction of a new generation of devices that support CBRS. Although there are many possible applications of CBRS, enterprises are excited about deploying private LTE/5G networks to provide additional clean spectrum or network segmentation, next to existing Wi-Fi networks.

Aruba and Celona have forged a business and technology partnership to deliver CBRS-based private mobile networks to Aruba customers. Celona's integrated solution architecture can be deployed next to existing Aruba Wi-Fi and switching infrastructure and can converge and follow a similar policy based networking model similar to Aruba's.

USE CASES FOR CBRS IN THE ENTERPRISE

Large enterprises in the U.S. are taking advantage of CBRS-based private LTE wireless networks to provide new dedicated spectrum for mission-critical wireless applications, for performance at longer ranges than are typical of Wi-Fi particularly outdoors, and for granular network segmentation. In addition, industries including retail, healthcare, manufacturing, government, logistics and hospitality industries have identified specific use cases in support of strategic digital initiatives:

- Reserving 100% of Wi-Fi spectrum for guests, fans or other user communities: Large public venues such as airports, stadiums or theme parks experience congestion today. By offloading all its back-of-house networking to cellular the enterprise can maximize capacity for fans.

KEY BENEFITS

- 1. New dedicated spectrum:** Clean, interference-free spectrum and network segmentation for targeted enterprise use cases.
 - 2. Wireless with SLAs:** CBRS-based LTE wireless coupled with Celona MicroSlicing™ enforces latency, jitter, throughput and packet error rate metrics on a per application basis.
 - 3. Wireless performance at range:** Celona indoor and outdoor APs respectively offer up to 25K and 1M square feet of wireless coverage
 - 4. Simple, turnkey deployment:** The Celona solution is integrated with all the product components required to build a private mobile network, and can be deployed as overlay on an existing enterprise network.
 - 5. Fully automated operations:** Integration with Spectrum Access System (SAS) service for CBRS operation and radio frequency/channel management are automated across the network.
- Clean, interference-free spectrum: CBRS solutions can provide clean spectrum required to meet rising user expectations in facilities with known interference challenges. For example, CBRS can be used to address issues in an electronics store with hundreds or thousands of devices generating uncontrolled management traffic or at airport gates with huge Wi-Fi usage immediately prior to boarding, which can interfere with airline devices.



- Outdoor wide-area coverage: Due to significantly higher power levels permitted by the FCC, a single outdoor small cell can cover a very large area – up to several miles of range by itself. CBRS provides a cost-effective solution for industrial sites, airports, railyards, container terminals, distribution centers, oil fields or other large facilities to deliver wide-area data and voice services.
- More spectrum for enterprise needs: As enterprises go all wireless, some are finding that even with clean spectrum they simply do not have enough to meet all their requirements. For example, some customers wish to backhaul HD security camera video without tying up Wi-Fi channels.

CELONA CBRS FOR PRIVATE MOBILE NETWORKS

Celona delivers a turnkey bundle with all the required hardware and software ingredients to enable enterprise IT teams with their own CBRS-based private LTE network. Its architecture integrates with existing enterprise IT network services and configuration – considerably simplifying deployment compared to other solutions in the private LTE market.

DESIGNED FOR THE ENTERPRISE

Using Celona CBRS, enterprises retain data ownership and seamlessly integrate with existing IT network architectures to leverage prior investments and existing operational models. This model provides cost efficiencies and the ability to extend enterprise policy controls to private mobile networks. The Celona solution can integrate with many enterprise IT infrastructure systems, including security solutions, application infrastructure and policy management solutions.

FULLY INTEGRATED HARDWARE AND SOFTWARE

Celona CBRS includes all components required: LTE indoor and outdoor access points, a mobile core ready for enterprise networks known as Celona Edge, SIM cards for CBRS capable devices connecting to the network, a Spectrum Access System (SAS) license access for CBRS spectrum, and a cloud-hosted operations console known as Celona Orchestrator. There is no longer the need to purchase different components separately from different product vendors and spend valuable cycles for system integration.

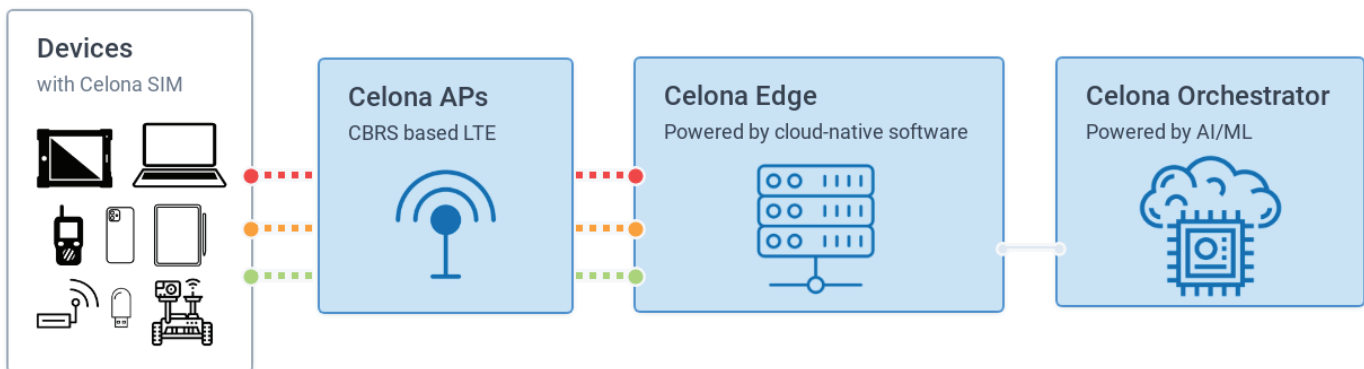


Figure 1: Components of the Celona solution architecture.

All solution components are supported by cloud software and are designed to be plug-and-play. Celona Access Points (APs) and Celona Edge offer zero-touch deployment within the enterprise environment. Their configurations are maintained via a cloud-hosted Celona Orchestrator, which automates radio frequency selection via machine learning. The Celona Edge directly integrates with SAS solutions to coordinate the use of the frequency channels in the specific geo-location per CBRS dynamic spectrum sharing specifications. There is no need to acquire licenses separately to integrate with the SAS.

CONVERGED MODEL FOR CBRS AND WI-FI

The converged Aruba Wi-Fi and Celona CBRS model delivers concurrent role-based policies and opens the door for new options for secure and mobile connectivity to a new generation of devices and applications.

ENABLING ROLE-BASED POLICIES FOR PRIVATE LTE

It is critical that enterprise IT teams extend their existing network access and traffic forwarding policies to private LTE connectivity – similar to Wi-Fi and wired access. Today, it is not possible to bridge traffic directly from a cellular device to an Ethernet network, since cellular devices do not have IEEE 48-bit MAC addresses. This severely limits the ability of most

private LTE solutions to integrate with existing enterprise L2/L3 network architectures and can force coarse-grained security strategies such as segmenting off cellular traffic into untrusted subnets. With the current technology from traditional cellular equipment makers, identifying individual LTE devices, protecting specific application quality of service and applying per-device policy inside the trusted enterprise perimeter is simply not possible.

By contrast, the Celona solution has been designed from the ground up for seamless integration to existing enterprise infrastructures and to address the full set of these requirements.

Celona's unique MicroSlicing™ technology supports flexible L2 VLAN assignment on a per device group basis and can enforce application specific service levels (latency, jitter, throughput, packet error rate). In addition, Celona supports the extension of enterprise L3 address space into the cellular domain on the one hand and is capable of creating synthetic L2 identities for each connected device on CBRS based cellular wireless. This unlocks rich enterprise policy in existing L3 forwarding elements, allowing the core network to apply a single device-agnostic policy regardless of whether traffic originates on CBRS, Wi-Fi or even Ethernet.

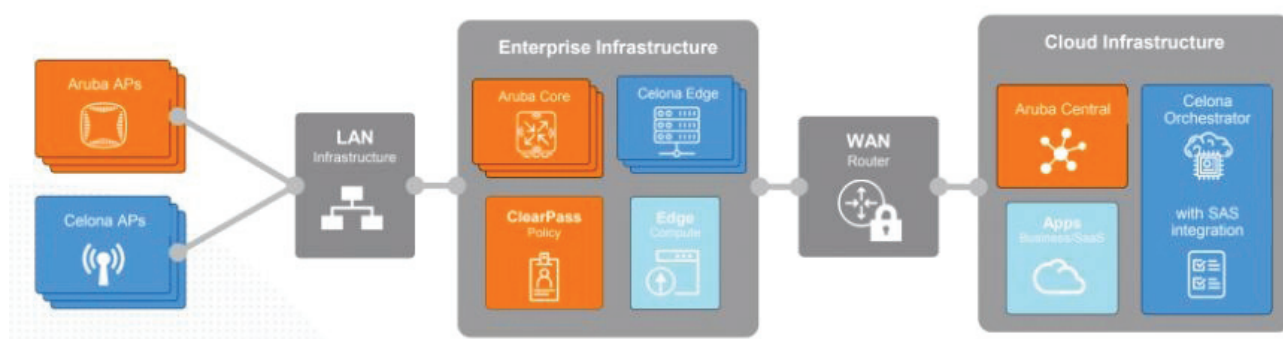


Figure 2: Converged Aruba Wi-Fi and Celona CBRS environment



CBRS: A NEW APPROACH TO PRIVATE MOBILE NETWORKS

As part of a broader strategy, enterprises are turning to CBRS-based LTE networks to augment Wi-Fi to help meet the insatiable demand for wireless voice and data. Typical enterprise use cases are those that require more total spectrum, greater outdoor coverage from a limited number of vertical assets with power and backhaul, or to provide network segmentation of mission-critical low-latency applications. And very soon, the transition to 5G will also come to CBRS, bringing new levels of performance and flexibility for both enterprises that rely exclusively on Wi-Fi and those that have deployed CBRS-based LTE-based mobile networks. Through Aruba's partnership with Celona, enterprises can harness the latest generation of wireless connectivity as a new asset in the IT network architect's toolkit.



Celona, the enterprise 5G company, is focused on accelerating the adoption of business-critical apps on enterprise wireless and helping organizations implement new generation of digital business initiatives. Taking advantage of the Citizens Broadband Radio Service (CBRS) in the United States, Celona's solution architecture is designed to automate deployment of cellular wireless technology by enterprise organizations and their technology partners. For more information, please visit [celona.io](https://www.celona.io) and follow Celona on Twitter [@celonaio](https://twitter.com/celonaio).

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