Solution Application

Citizens Broadband Radio Unlocks New Spectrum

Casa Systems and Intel provide important building blocks for new shared spectrum

If you are looking to develop a mobile network, but are not interested in buying spectrum, a new option could provide a welcome path forward. Called the Citizens Broadband Radio Service, or CBRS, this new shared spectrum scheme uses TD-LTE to provide a wireless voice and data service at 3.5 GHz (3550 MHz to 3700 MHz).

The radio interface is exactly the same as for LTE at other frequencies, supporting voice, text, and data services with seamless mobility. The frequency allocation for the new spectrum spans existing LTE Band 42 (3400 MHz to 3600 MHz) and LTE Band 43 (3600 MHz to 3800 MHz) with the new designation Band 48 (3550 MHz to 3700 MHz).

A boon for in-building small cells

Corporations have traditionally had their own Wi-Fi networks. However, Wi-Fi does not provide a seamless voice experience, so companies increasingly rely on 3G/4G small cells inside their buildings to support coverage and capacity demands. CBRS is ideal for in-building small cells, unlocking new spectrum for virtually anyone looking to use standard LTE on future mainstream smartphones. Using an attractive midband spectrum with more desirable propagation and transmit power characteristics, CBRS also avoids contention from Wi-Fi users.

Deploy CBRS base stations and you can create private broadband networks that are uniquely tailored to your needs, including enterprise applications, voice/video communication, and mission-critical control applications for the Industrial Internet of Things (I-IoT).

How CBRS works

CBRS is distinguished by how the spectrum is assigned to users. Unlike other spectrum regimes, CBRS is neither sold in large blocks covering nationwide geographic areas nor offered as an open, unlicensed option, such as with Wi-Fi. CBRS will be shared among three tiers:

1. **Incumbents**
   This includes federal users and fixed satellite service operators.

2. **Priority access (PA) licensees**
   This license provides authorization to use an unpaired 10 MHz channel. Within the PA geographic service areas, licensees can aggregate up to four PA channels at any given time. Licenses can be obtained in any available PA geographic service area.

3. **General authorized access (GAA) operators**
   This license permits access to 80 MHz of the 3.5 GHz band that is not assigned to a higher tier. GAA will be licensed "by rule," meaning that entities that qualify to be Federal Communications Commission (FCC) licensees may use FCC-authorized telecommunications equipment in the GAA band without having to obtain an individual spectrum license.

The assignment is also automated, with several spectrum allocation servers (SAS) coordinating the scheme nationwide. When use of the spectrum is no longer required, that assignment is discontinued and made available for use by others.

New option means new opportunities

CBRS is poised to disrupt the mobile industry. At the same time that it opens the door for private broadband networks, it also invites new public entrants. Consider the example of a cable provider that has operated as a mobile virtual network operator (MVNO). That provider could augment its MVNO agreement by putting together a network that leverages the CBRS spectrum in key locations in the provider's footprint. A CBRS offload solution would enable it to offer more coverage at a lower price to its wireless users with the opportunity to reduce MVNO fees and 3rd party cellular roaming fees.

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CBRS is also ideal for entities that want to stand up neutral host services in, among other places, a public venue like a sports stadium. Long the domain of high-end, expensive distributed antenna systems (DAS), these locations need neutral hosts as they must accommodate a wide variety of end users needing access in their venues.

Harnessing CBRS with Casa Systems

Casa Systems is helping drive the disruption by serving as a member of the CBRS Alliance and providing important building blocks for harnessing CBRS. Key technologies such as the Apex™ Small Cells and Axyom™ Software Platform equip entities, from enterprises and cable operators to fixed telco operators, governments, and mobile network operators, with the technology they need to embrace this emerging broadband opportunity.

CBRS Provides New Opportunities for Venues

In lieu of leasing spectrum, large venues can use CBRS to create private LTE networks. For example, a big theme park could deploy private LTE to assure consistent coverage and the speed and security advantages of LTE throughout the venue for staff and guests, regardless of the network to which the guest subscribes.

With CBRS-capable user equipment and CBRS-enabled small cells, a neutral host gateway will allow private LTE owners to provide transparent connectivity. Customized services for park visitors, including low-latency video applications and virtual and augmented reality, will transform the theme park experience to be more immersive and visitor driven.

Apex Small Cells

As part of Casa's small-cell solution, the Apex Small Cells support not only 3.5 GHz CBRS but also LTE-FDD and LTE-TDD in licensed bands. Casa has developed multiple CBRS Apex Small Cell form factors: the PicoStrand, a cable strand mount picocell; Lifestyle Small Cell; and indoor and outdoor picocells. These small cells incorporate self-organizing network (SON), security, and backhaul into a low-complexity solution. Apex successfully addresses coverage and capacity challenges, while being ideally suited for service providers who want to move beyond network optimization to network monetization.

Apex's management and SON features provide zero-touch flow-through provisioning and were designed to enable self-configuration, self-healing, and self-optimization. Apex's low-power requirements, small form factor, band flexibility, and SON features make it ideal for private LTE networks.

Axyom Software Platform

The Axyom Software Platform uses common software to deliver optimized mobile, fixed, and cable solutions. Axyom includes high-density small-cell core solutions, including HeNB and HNB gateways, an integrated or stand-alone Security Gateway (SeGW), a robust small-cell manager with SON and KPI management, and an optional EPC.

It features a suite of virtual network functions designed to help providers simplify their access networks with a single unified software framework. It also provides security, management tools, and the ability to offer end users the highest quality of experience (QoE).

Axyom's flexible architecture enables placement of network functions where they make the most sense, including the data center/central office, service edge, the metro edge, or the enterprise premises. Locating network functions at the network edge lowers latency and can dramatically improve performance.

In addition, simultaneous scaling in multiple dimensions is enabled by Casa Systems' unique approach to network functions virtualization (NFV). Virtualization gives service providers the opportunity to address numerous inefficiencies that exist in legacy network architectures.

The Axyom Software Platform is designed from the ground up to deliver optimal performance and efficiency. Casa's performance innovations include intelligent pipeline processing, performance acceleration, and application of real-time intelligence.

Network innovation powered by Intel

To deliver network solutions that continue to meet customer needs today and tomorrow, Casa Systems relies on a range of Intel® technologies to power and protect its products.

Data Plane Development Kit

In addition to processing power, the Axyom Software Platform also takes advantage of the Data Plane Development Kit (DPDK). This powerful set of software libraries removes the most common performance bottlenecks for packet processing

software on the Intel® architecture platform. It allows Casa Systems to improve the packet processing performance of the solution by more than 10x, resulting in performance gains that outpace legacy solutions many times over.

Intel® QuickAssist Technology

The Axyom platform benefits as well from utilizing Intel® QuickAssist Technology, which provides security and compression acceleration capabilities to improve performance and efficiency across the service provider network. Developers can use the technology to meet the demands of today's escalating data volumes, especially data bound for encryption and compression. And this can be done while still ensuring applications are fast, secure, and available.

Intel® Xeon® Scalable Processors

Intel® Xeon® Scalable Processors makes it possible to transition from using discrete architectures for major workloads (e.g., applications, controls, packets, and signal processing) to a common architecture that converges the workloads to a more scalable and simplified solution.

The family takes performance and efficiency to new heights across the widest range of workloads, while providing an array of technologies for more efficient virtualization, smarter resource orchestration, and enhanced protection of systems and data.

A tailored broadband network

CBRS is changing the landscape of the mobile industry. Based on an innovative three-tier coordinated spectrum assignment scheme, it invites new neutral host providers to get into what has been until now a very capital-intensive business. Casa Systems and Intel are helping make that move possible, enabling you to build a private broadband network that is customized to your business and goals.

Learn more about Casa Systems and CBRS at casa-systems.com.

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