CITIZEN BROADBAND RADIO SERVICE (CBRS)
The Most Important New Mobile Technology Today

RUCKUS™
an ARRIS company

CBRS 101

The scheme and criterion for CBRS operation are codified in Part 96 of the FCC Rules and Regulations [WT Docket No. 12-354; FCC 16-55], which are expected to take full effect in the second half of 2018.

The following table compares the main characteristics of licensed, unlicensed and CBRS spectrum allocation schemes:

ALLOCATION SCHEME	LICENSED	UN-LICENSED	CBRS
Rights	Exclusive	None	Exclusive over lower user tiers (IU > PAL > GAA)
Costs	$$ Billions	Free	Free with SAS Subscription

CBRS rules allow three tiers of users to request up to four of the fifteen 10 MHz channels from 3550 to 3700 MHz based on their exact geographical location and RF conditions. The three tiers of users are as follows:

- **Incumbent Users (IU)**—These users have the highest priority, but usually occupy only a small portion of the band or are limited to a very small and remote geographic area. CBRS uses a Spectrum Allocation Service (SAS) to find unused portions of the band or geographic areas by combining FCC registration records, a network of RF sensors (ESC), and detailed RF propagation calculations.

- **Priority Access License Users (PAL)**— These users get higher priority than GAA users for a fee. The fee will be determined at auctions, and will likely depend on the geographical size and length of the license, but it is expected to be much lower than the fees the mobile operators pay for licensed spectrum. PAL users can buy at most 7 out of the 15 CBRS channels available, and at most 4 channels can be owned by the same entity.

- **General Authorized Access (GAA)**— These users get free access to any part of the CBRS band the SAS determines is not being used by IU and PAL users at a given location. At a minimum, 80 MHz will be available for GAA use.

INTRODUCTION

The FCC is finalizing a momentous piece of technology policy. The agency has set aside 150 MHz of wireless spectrum in the 3.5 GHz cellular band for citizens and companies to share as they see fit, rather than auctioning it off for billions to the highest bidder. Citizen Broadband Radio Service (CBRS) shared spectrum could change the course of wireless communications in the United States. And Ruckus Networks is leading the efforts to make this a reality.

CBRS allows Private LTE cellular (sometimes called 4G) networks to be deployed just like Wi-Fi, which has unleashed so much innovation in recent years. Due to our societal shift towards mobility, wireless access has become so important it is often referred to as "the fourth utility." CBRS offers improved security, quality of service and performance over existing Wi-Fi.

Federal agencies, will, for the first time, be able to build their own Private 4G LTE networks with commercially available products rather than expensive, proprietary equipment. They can then address their most challenging mission-critical use cases with CBRS without having to rely on a mobile operator.

Military "smart bases" are major opportunities, where CBRS can add flexibility and performance while also preparing bases for an expected avalanche of IoT devices. Medical facilities run by the VA or DHA could avail themselves of CBRS to protect critical wireless communications inside facilities. With CBRS the Pentagon could run its own private wireless mobile network to improve phone coverage and security in its massive headquarters.

From wide-area surveillance to remote data transfer to critical communications, private LTE networks enable the most challenging use cases to be realized. And with IoT management issues emerging as a major challenge for federal agencies, CBRS could be the perfect communications backbone for high throughput, low latency IoT uses.

RUCKUS TECHNOLOGY

Over 100 leading technology and communications companies have formed the CBRS Alliance to support the development, commercialization and adoption of the applications and services that will leverage CBRS. Ruckus Networks was one of the founders, and its executives have taken leading roles within the organization.

With the help of the Ruckus CBRS LTE portfolio, organizations can deploy and manage a private LTE network as easily as they deploy Wi-Fi today. With that LTE network, they can finally support applications and services that only a dedicated, secure, and ultra-high-performance mobile network can enable.
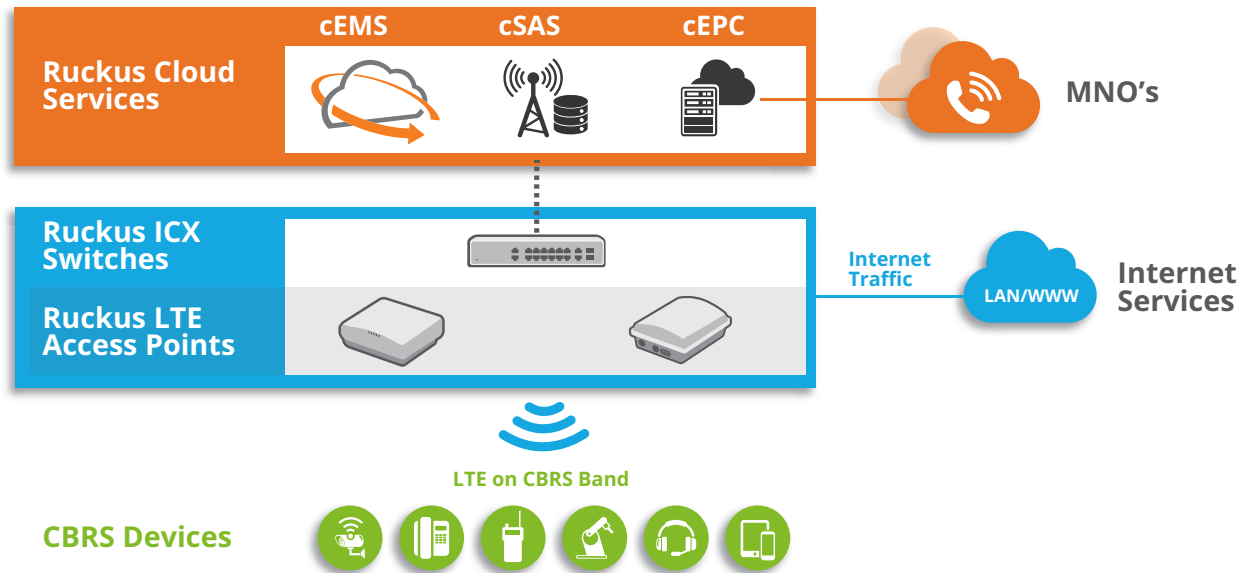
The Ruckus CBRS LTE portfolio (all cloud components can be deployed on premises if preferred):

- **Ruckus Q710**—A 3.5 GHz indoor LTE AP that covers approximately 10,000 square feet.

- **Ruckus Q910**—A 3.5 GHz outdoor LTE AP

- **Ruckus cEMS**—Cloud-based element management system (cEMS) delivered as a subscription service that brings Wi-Fi like simplicity and zero-touch provisioning to LTE AP management. cEMS enables single-pane-of-glass management of Ruckus LTE and Wi-Fi APs as well as future-combined LTE/Wi-Fi devices.

- **Ruckus cEPC**—Cloud-based evolved packet core (cEPC) delivered as subscription service that provides required LTE network core functionality and subscriber management.

- **Ruckus cSAS**—Cloud-based spectrum allocation server (cSAS) delivered as a subscription service that ensures spectrum availability per CBRS spectrum requirements.

The Ruckus Q710 and Q910 access points have the technology that can unlock the potential of CBRS. Ruckus has received formal certification from the FCC for the Q710 and Q910, the first fully certified CBRS APs. Both devices can aggregate up to four separate CBRS channels, delivering over 200 Mbps combined throughput to end users in high density areas such as a headquarters or agency campus.

These access points are as powerful as they are easy to deploy, packed with advanced technology such as LTE-Advanced Carrier Aggregation, Self-Organizing Networks (SON), Self-Organizing Timing and Zero Touch Provisioning™. They are also lightweight and energy efficient—the Q710 looks and feels just like a Wi-Fi access point, and the Q910 can be discreetly attached to light poles or cable strands.

CONCLUSION

CBRS is a game changer. A large amount of high quality spectrum, made available for all, which can support high performing networks. Customers are looking to take advantage of this opportunity to drive experiences in in-building cellular, security, safety, automation and analytics.

The Ruckus CBRS LTE portfolio makes all this a reality and enables enterprises and service providers to deploy private LTE networks to ensure a high quality-of-service for business-critical applications and use cases.

The superiority isn't limited to our APs. Ruckus innovates across wired technologies, as well as wireless, to enable awesome customer experiences. The Ruckus ICX Family of fixed form-factor switches work together to simplify network set-up and management, enhancing security, minimizing troubleshooting and making upgrades easy. Our low-latency, non-blocking architecture ensures excellent throughput for the most demanding applications powered by a Private LTE network.

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