



## CONTENTS

WI-FI AND CBRS CALLING .....	1
Advanced Voice for MDU .....	1
Coverage Problems.....	2
Where does this solution fit?.....	2
Ruckus Wi-Fi Calling and CBRS: Solving Tough Connectivity Problems .....	3
How Wi-Fi Calling and CBRS Works .....	4
About ARRIS.....	6

## WI-FI AND CBRS CALLING

### Advanced Voice for MDU

In today's "wireless first" world, (or is it "wireless only"?) apartments, condos, student housing, and other multi-tenant/guest facilities must meet their tenant's high expectations for voice, data, and messaging services. Potential tenants will likely make decisions based on the communication services provided by the property as the expectation of connectivity, both for data and voice, is of critical importance to the tenants. The quality of these services shapes their opinion of a facility and ultimately affect their decision to move into one property or another. Wi-Fi networks with reliable Wi-Fi calling, or LTE available networks have become not just a need, but a necessity in these deployments and the quality of those offerings to tenants and guests have a direct effect on the properties' bottom line. Ruckus Networks has developed a Calling Ecosystem that can support not only the new CBRS LTE standard but a carrier-grade Wi-Fi calling offering in the same footprint. This provides carrier-grade voice coverage for existing Wi-Fi clients as well as supporting next generation CBRS enabled devices hitting the market this year.

## Coverage Problems

Many properties have ongoing problems with providing quality voice services to their occupants and guests. These range from being in a remote area with poor or no LTE cell coverage to structural issues that impede available LTE signals. Wi-Fi calling has been the go-to solution for most of these up until the development of CBRS (Citizens Band Radio Service). While CBRS will solve many of these problems listed below, it will not be backwards compatible with legacy handsets that must still rely on Wi-Fi calling for voice connectivity.



e-Glass



High Floor



Remote Area



Interior Room



Low Floor/Urban Canyon



Nearby Events

## Where does this solution fit?

The Ruckus voice solutions for MDU bring a flexibility for voice networks to operators that has, until recently, been nonexistent. Wi-Fi calling has been a best effort feature and LTE coverage is out of the control of anyone other than the carriers, until now.

- Treated glass systems are a big problem in high density areas and secure buildings. Even with LTE in the area, signal will not penetrate a protected building. Ruckus networks can provide a solution with the flexibility to deploy anywhere within a property.
- Higher floors in cities such as Miami have zero coverage due to the density of the buildings and the lack of roof space for carriers. This is a huge problem in higher-end properties as the customer's expectations are very high. Ruckus solves this with our flexible deployment options for voice.
- Remote areas have little or no LTE coverage. The Ruckus system provides the ability to deploy and manage CBRS in the same manner as Wi-Fi and if there is an existing Ruckus Wi-Fi system already in place, a few changes are all that is needed for the network to accommodate carrier grade Wi-Fi calling.
- Interior rooms are always an issue and usually where conference rooms are located. The Ruckus system allows the augmentation of existing Wi-Fi networks to accommodate a Carrier grade Wi-Fi calling experience as well as a CBRS deployment in the same footprint. This flexibility allows for an easily managed voice offering that is both backwards compatible for older phones and also CBRS/5G ready.
- Urban canyons are in some areas a "no mans land" for any type of Wi-Fi coverage. This is where CBRS can shine. With nothing else in the CBRS spectrum, interference is nonexistent and the coverage area provided by the CBRS frequency is perfect for this type of environment. CBRS can provide both voice and data to areas that previously only allowed best effort.
- Events. Ruckus networks is the world leader in high-density networks. With the ability to manage tens of thousands of wireless access points and switches from a single console, our management platforms are up to the task for any event coverage. The ability to provide CBRS for voice, Wi-Fi for data, and Wi-Fi Calling in the same footprint vastly expands the capabilities of any operator providing service to any size event.

## Ruckus and IoT

IoT is beyond the scope of this document but merits a brief mention. Ruckus access point currently support on-board and modular IoT transport for both ZigBee and BLE with additional protocol support in the near-term future. With the emerging CBRS market, many IoT products are in development that will utilize CBRS technology as a transport back to their management platforms. Over the course of the next few years, IoT and CBRS will continue to develop as a viable tool in any MDU deployment.

CBRS as a technology will allow for more reliable IoT connectivity both in terms of range and in network reliability. By using LTE standards, CBRS mitigates many of the network latency problems suffered by Zigbee and BLE in hard to reach areas. Smart homes/buildings and smart neighborhoods can look to CBRS as a reliable IoT transport system with a far greater range than anything we have today. Utility monitoring systems for neighborhoods and door lock systems for condos and apartments will benefit from emerging CBRS IoT products now hitting the market.

## Ruckus Wi-Fi Calling and CBRS: Solving Tough Connectivity Problems

Ruckus' proven performance and ease of use combines with LTE to tackle the hardest connectivity challenges that Wi-Fi alone cannot address. This includes:

### Wi-Fi Calling Features

- Existing Ruckus Wi-Fi infrastructure can be utilized with a simple Wi-Fi calling policy implementation on the SmartZone management platform.
- Once enabled, Wi-Fi calls are tunneled to the carrier's Evolved Packet Data Gateway (EPDG), which eliminates dropped calls when switching from Wi-Fi to LTE and vice versa.
- Multiple carriers' EPDGs can be supported on a single WLAN.
- Wi-Fi Calling coexists seamlessly with Ruckus CBRS APs.

### Ruckus CBRS

- The range of coverage for Ruckus CBRS deployments is as much as 4 times the range of a typical 5GHz cell and with a Neutral Host network, no interaction from the client is needed to join the LTE network.
- CBRS is part of the new 5G standard.
- With Ruckus CBRS deployed, nonresident devices are not taking up any of the much-needed space on the Wi-Fi network.
- Cloud Managed: private LTE networks are managed in the cloud by the Ruckus Enhanced Management Service (EMS). This negates the need for building out a virtual controller or the installation of additional management hardware. The system can be managed from anywhere at any time.
- CBRS coexists seamlessly with Ruckus Wi-Fi APs.



Ruckus has provided an excellent means of successfully supporting Wi-Fi calling for the major carriers by their latest roll-out of Wi-Fi Calling profiles. We now have a means to allow for better connections to exist between handset and the carriers IP network while riding on our Wi-Fi networks. The addition of Wi-Fi calling profiles on our VSZ infrastructure is a cost-effective way to provide a better Wi-Fi calling experience to our end-users. It is a great improvement over just letting these calls happen organically. We get insight to the number of calls per zone and takes less than 5 minutes to setup for a venue. By no means a replacement for a DAS system or true carrier roaming handoff – but a great tool for our smaller locations.

TAYLOR P. JONES  
VICE PRESIDENT, TECHNOLOGY SOLUTIONS  
BOINGO WIRELESS, INC

## How Wi-Fi Calling and CBRS Works

The combination of Ruckus W-Fi calling and Ruckus CBRS creates a voice ecosystem that is not only robust and best-of-class in reliable service but is also on the leading edge of the new LTE and Voice over Wi-Fi standards.

In current Wi-Fi calling scenarios, the client device connects to the local WLAN and a call is established with little problem. However, when that device roams to a cellular signal, the call is dropped. This is due to the lack of visibility of the carrier system to the client traffic prior to establishing an LTE link. Ruckus Wi-Fi Calling networks can identify a Voice Wi-Fi call through Ruckus QoS and establish a tunneled connection to the local carrier Packet Data Gateway. These settings allow the call to roam from the Wi-Fi initiated call to an LTE connection without drops or interruptions.

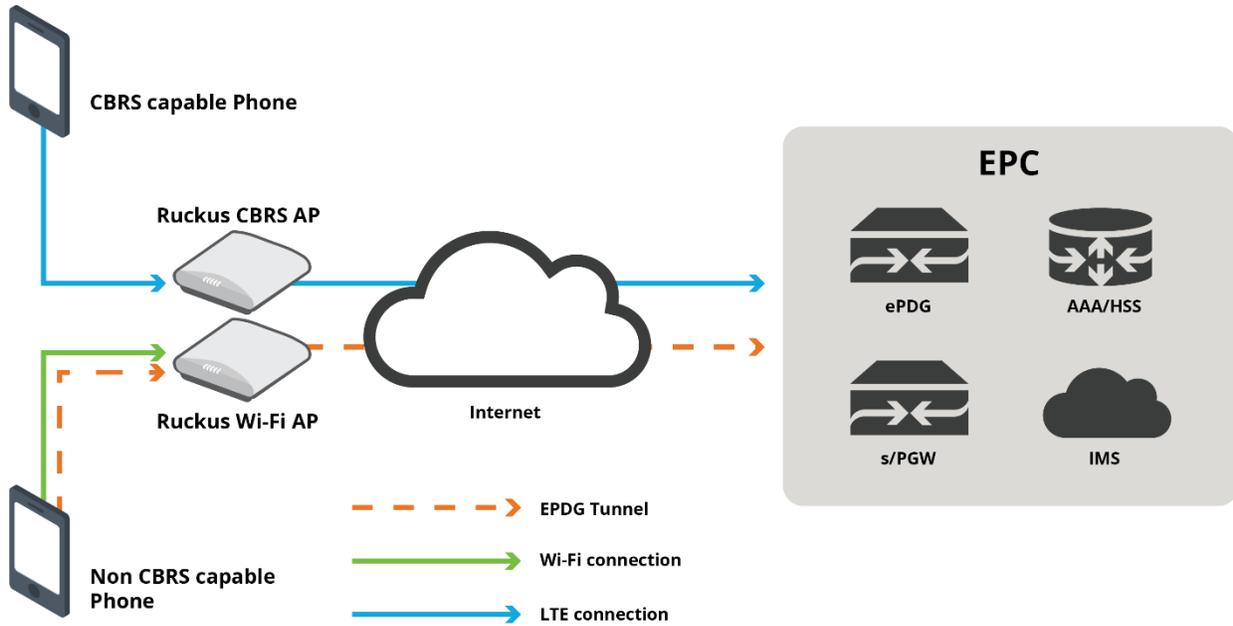


Figure 1. Network Diagram

Ruckus CBRS is deployed like Wi-Fi but is still LTE. The access points are deployed in the same fashion as traditional Wi-Fi-only access points. The APs have an Ethernet connection into the Ruckus ICX switching infrastructure and are managed by the Ruckus Cloud EMS just like the current Cloud Wi-Fi access points. The LTE portion of the CBRS system is much the same as any other LTE deployment. A Spectrum Access Server (SAS) serves as the gatekeeper for channelization and signal level adjustments. The Evolved Packet Core (EPC) and SIM Management System (SMS) are where network access and client authentication take place. Everything is still LTE; it's just in a much simpler platform that is more easily managed by operators.

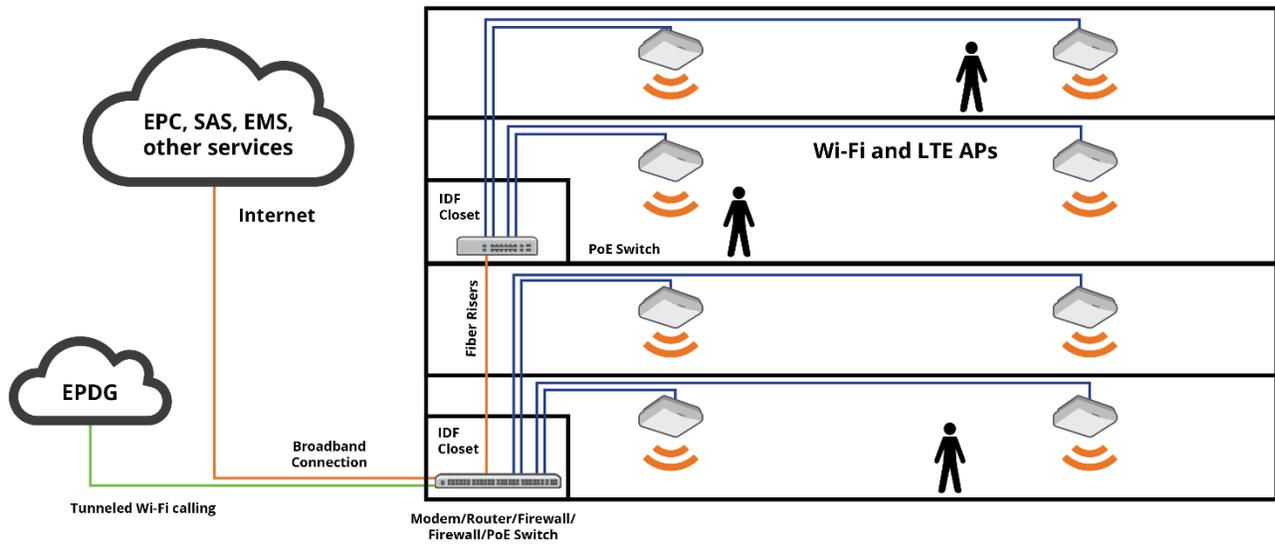


Figure 2. Network Diagram

These two technologies deployed together not only deliver the latest and greatest in CBRS LTE technology, but also a Voice over Wi-Fi class of service far above anything currently offered by our competitors. This combination will not only make way for new client voice devices on CBRS but will provide carrier class service for legacy non CBRS devices into the future.

## About Ruckus Networks

Ruckus Networks enables organizations of all sizes to deliver great connectivity experiences. Ruckus delivers secure access networks to delight users while easing the IT burden, affordably. Organizations turn to Ruckus to make their networks simpler to manage and to better meet their users' expectations. For more information, visit [www.ruckuswireless.com](http://www.ruckuswireless.com).

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## About ARRIS

ARRIS International plc (NASDAQ: ARRS) is powering a smart, connected world. The company's leading hardware, software and services transform the way that people and businesses stay informed, entertained and connected. For more information, visit [www.arris.com](http://www.arris.com).

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