



Who are the CBRS SAS players and what do they do?

This article is part of our series exploring the Citizens Broadband Radio Service (CBRS), how it works and how it is progressing. In this piece, we look at the spectrum access system (SAS) administrators, with the aim of explaining their vital role in enabling CBRS.

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What is CBRS: Recap

In our previous articles, we discussed how the Citizens Broadband Radio Service (CBRS) **came into being** and **how it's been developing over the recent years**. In this article, we want to shine light on spectrum access system (SAS) administrators which carry out an essential role in enabling CBRS spectrum sharing.

But before delving deeper into this, let's do a quick recap on some of the basics:

- In 2015 FCC, the US regulator, **developed** a framework for shared commercial use of the 3550-3700 MHz band (3.5 GHz band), thus establishing CBRS in the US.
- CBRS can be used for private networks (predominantly LTE/4G today, with plans to support 5G in the near future), as well as for **macro extensions** (additional wireless capacity for carriers' macro networks), and fixed wireless access for backhaul.
- Three types of CBRS access tiers were defined:
 - **Incumbent Access (first priority)**: available to users who previously used this spectrum band e.g., the US Navy
 - **Priority Access (second priority)**: available through auctions for Priority Access Licenses (PAL)
 - **General Authorized Access or GAA (last priority)**: unlicensed spectrum available for free
- In a nutshell, CBRS is a successful experiment of spectrum-sharing that allows commercial use of the 3.5 GHz band when federal users are not using it. To avoid interference, only one user can use a specific channel at a given time.
- Incumbent users get priority over PAL users which, in turn, get priority access over users in the GAA tier. This is ensured thanks to a Spectrum Access System (SAS) that handles the spectrum allocation and management among different users. FCC requires the use of a SAS administrator to manage this process.

What do SAS administrators actually do?

SAS providers manage CBRS operations to ensure that interference between the different access tiers and among the same user groups is minimised. This is a paid service that the operator of the private network has to account for when making the investment.

As to how this works, technically, users put in a request in the SAS system to use the band and access is granted if the spectrum is free in the given location. This might sound fairly straightforward, but significant work goes into the process behind the scenes. Because there are multiple centralised systems that manage this process and have access to only a subset of devices in the band, there is a need for these competing companies/SAS administrators to **share** a great deal of interference-related information with each other once a day to be able to predict future interference. This is not only a challenging situation from a competitive perspective but it is also a time-consuming and compute-heavy process. As a result, according to the FCC Technological Advisory Council's **report**, a device requesting spectrum during the day may have to wait a long time to be offered a final determination of availability while this process (data exchange and computation) is played out.

To be able to guarantee incumbents' priority access to the band, SAS administrators need to know when they are using the spectrum and therefore other users need to be refused access. SAS managers obtain this information from a system called Environmental Sensing Capability (ESC) which is a network of dedicated coastal sensors that detect incumbent military radar activity.

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Who the FCC-approved SAS administrators?

In the first wave, FCC **approved** the following companies to operate as SAS managers in the 3.5 GHz band: Federated Wireless, Sony, Google, CommScope, **Amdocs**, and **Key Bridge Wireless**.

Let's do a quick review of the FCC-approved SAS administrators:

- **Federated Wireless:**

Founded in 2012, Federated Wireless is somewhat of a challenger in the space and has background in spectrum sharing advocacy. In fact, the company took a leading role in establishing the CBRS Alliance and was the first player to build a nationwide ESC network. As an established player in the CBRS space, Federated Wireless has over 450 customers and 150,000 access points deployed.

- **Sony:**

While the company was approved for operation of SAS, Sony has disclosed limited information on commercial deployments of its platform. The company has, however, **shared** that "a private (cellular) network has been deployed at the Sony Pictures Entertainment studio lot in Culver City, California, under the same SAS management with considerations underway to develop it for new applications. Sony plans to conduct the same proof-of-concept experiments at Sony Europe's UK Technology Centre in Pencoed, United Kingdom".

- **Google:**

The company's SAS is "purpose-built to support dense networks across operators and to scale on-demand — from a small in-building network to the largest nationwide deployment." Google partnered with CommScope to develop a shared ESC network. It has developed the ESC sensor and cloud decision engine and will operate the cloud that communicates with each SAS. CommScope will deploy and manage the operation of the physical network.

- **Amdocs:**

The company prides itself for going beyond SAS administration. It offers not only SpectrumONE, its SAS administration service, but also solutions called Automated CBRS (a citizens band device rollout solution) and ISEN (Interoperation of Shared & Exclusive Network). Amdocs claims that these offerings extend beyond helping with basic SAS manager tasks and offer more value-added capabilities to help operators be successful with CBRS. Example tasks include bulk CBSD (transmitter devices that operate in the CBRS spectrum) planning, registering and day-to-day operations.

- **Key Bridge Wireless:**

"API-driven, cloud native NFV / VRAN model allows service providers to readily integrate SAS capabilities and applications into their service delivery network, support new functionality, and respond quickly to changing market dynamics." The company **partnered** with Nokia to bring to market an integrated offering, whereby Key Bridge's SAS/ESC platforms are combined with Nokia's CBRS radios, user devices and new Domain Proxy.

Interestingly, in 2022 CommScope chose to no longer be a SAS administrator in the 3.5GHz band without citing any apparent reason. However, this is not to say that the company is exiting the CBRS business altogether as it has big ambitions to play in the market as a technology provider. For example, CommScope will **continue** operating and managing the ESC network together with Google.

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This being said, the market for SAS administrators has been fairly static even though a second wave of players has been trying to jump on the SAS-wagon. In 2021, FCC **conditionally approved** another three players to become SAS administrators: Fairspectrum, Nokia, and RED Technologies which was also recently **approved** to begin initial commercial deployments in 2023.

One of the anticipated prospects in this space is the development of a secondary market for CBRS licenses. Essentially, when Priority Access Licenses are not used by the licensees they can potentially be leased to other parties for a profit. For example, a venue might want to sublease CBRS to support a live show for the duration of the event only. Despite the excitement around this opportunity, secondary markets for CBRS have not yet taken off, likely due to technological constraints. While it's a big potential opportunity for SAS administrators, they have to invest in dynamic and automated spectrum allocation capabilities in order to compete and win in this market.

In conclusion, it is fair to say that SAS managers play a pivotal role in enabling successful and interference-free CBRS spectrum-sharing. We are, however, yet to see how the role will evolve and who the main companies serving this market will be.

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