The Benefits of Active DAS Using CBRS

FEDERATED WIRELESS

eBook | version 1.0

Table of Contents

The Growing Need for Reliable Indoor Cellular Connectivity

SEAMLESS COVERAGE NEEDS TO EXPAND FROM AN EXPECTATION TO A REALITY

In today's mobility-first world, people expect their cell phones to work flawlessly everywhere whether in offices, hospitals, campuses, or retail spaces. Employees rely on mobile devices to collaborate, access information, and manage operations, while guests and tenants expect seamless connectivity as part of their overall experience.

Reliable in-building connectivity is a core component of business continuity and digital infrastructure. At the same time, public safety depends on robust in-building coverage, with more than 80% of 911 calls now made from mobile phones indoors, highlighting the critical importance of maintaining strong, reliable cellular connections when they are needed most.

However, achieving high-quality indoor cellular service remains a major challenge. Most buildings today are still served "from the outside in" relying on signals that originate from often distant outdoor cell towers rather than purpose-built in-building systems.

Yet most commercial and enterprise buildings were never designed with radio propagation in mind. Modern construction materials—such as reinforced concrete, steel framing, and low-emissivity (low-E) glass—block or reflect radio signals, while interior construction elements such as thick walls, partitions, office layouts, and furniture further absorb and scatter signals throughout the space.

As a result, these external signals are typically weak, inconsistent, and unreliable by the time they reach mobile devices, leading to dropped calls, poor data performance, and user frustration. The outcome is a growing gap between the expectation of seamless, high-speed connectivity and the reality of macro networks that cannot deliver adequate indoor coverage on their own.

Historically, this problem was addressed through carrier-funded Distributed Antenna Systems (DAS) that extended wireless coverage into large venues such as airports, hospitals, and stadiums. These systems delivered excellent performance but were often complex, costly, and sometimes carrier-specific, with each mobile network operator (MNO) deploying and maintaining its own dedicated infrastructure.

Neutral Host DAS

AN APPROACH WITH OPERATIONAL AND DEPLOYMENT CHALLENGES

While neutral-host DAS solutions—where multiple carriers shared the same system—emerged to simplify deployments, they introduced their own challenges, particularly around dedicating spectrum for use within the DAS. Because that spectrum was drawn from each MNO's licensed holdings, operators had to carefully coordinate indoor DAS usage with their outdoor networks to prevent interference and manage handovers, adding another layer of operational and deployment complexity.

As the industry transitioned to 5G, operators reduced direct investment in in-building systems, redirecting resources toward outdoor macro coverage and new spectrum bands like C-Band. Part of this shift has meant that the burden of ensuring reliable indoor connectivity increasingly falls on enterprises and property owners to solve, many of whom lack the in-house expertise, carrier relationships, or capital resources once provided by the operators.

To fill this gap, Neutral Host Networks (NHNs) based on the Citizens Broadband Radio Service (CBRS) were introduced to simplify indoor deployments. The CBRS framework opened 150 MHz of shared midband spectrum at 3.5 GHz and created a new operational model that allows multiple service providers to share common infrastructure. In principle, this made it possible for property owners and enterprises to deploy their own LTE or 5G systems, without waiting for individual carrier approvals or licenses.

While the Neutral Host Network promise remains compelling, in practice CBRS NHN deployments have proven complex. Integrating multi-operator core networks, achieving seamless roaming, and coordinating across equipment vendors, system integrators, and service providers requires significant technical and commercial alignment. As a result, adoption has been slower than anticipated, particularly outside of large enterprise and public venue environments.

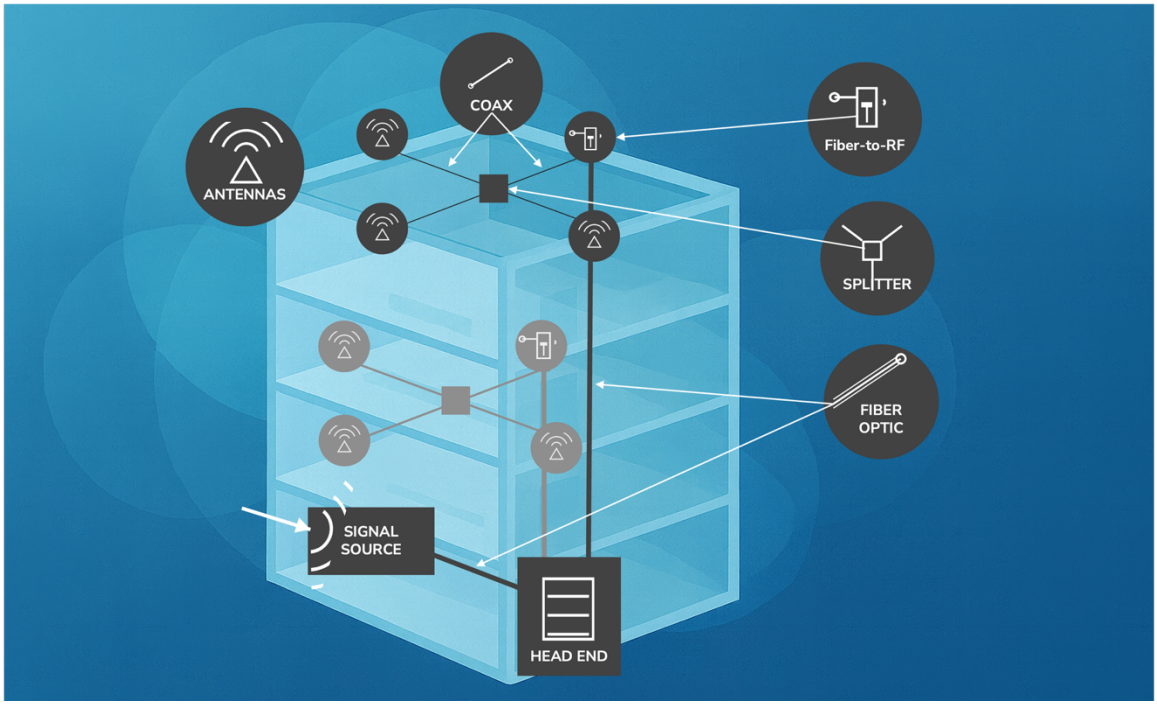
Introducing Active DAS with CBRS

A MORE FLEXIBLE, SECURE AND LOWER-COST SOLUTION

A more scalable and immediate evolution is now taking shape through Active DAS using CBRS. Active DAS remains the gold standard for in-building connectivity, delivering superior performance, consistent signal quality, and multi-operator support through centralized, fiber-fed digital distribution. By combining this proven architecture with CBRS shared spectrum, building owners gain access to abundant midband capacity without the need for complex carrier negotiations or dedicated licensed spectrum. Active DAS using CBRS provides a neutral, carrier-grade platform that supports both public mobile services and private enterprise networks over the same infrastructure — flexibly, securely, and at lower cost.

Together, Active DAS and CBRS represent the most practical, future-ready approach to indoor cellular connectivity. They combine the reliability and performance of traditional DAS with the agility and openness of shared spectrum, empowering enterprises to deliver seamless mobile service across all carriers and use cases.

Active DAS using CBRS reflects an operator model, not an exclusively private wireless model. This initiative extends the traditional operator paradigm — supporting mobile network operators (MNOs), and their OEMs and system integrators, in deploying Active DAS systems for enhanced indoor coverage.



Options for In-Building Enterprise Connectivity

HISTORICALLY, THERE HAVE BEEN THREE INDOOR CELLULAR CONNECTIVITY OPTIONS

Wi-Fi Networks

Wi-Fi is easy to deploy and cost-effective but lacks the mobility, reliability, and traffic management required for mission-critical enterprise applications. Public Wi-Fi also poses significant security risks and fails to integrate with carrier voice and data services.

Small Cell Systems

Carrier or enterprise-deployed small cells provide strong localized coverage but require dedicated spectrum or operator integration. Multi-operator support is complex, requiring coordination with each MNO, and typically results in 'Frankenstein' systems where each carrier operates its own hardware footprint.

Distributed Antenna Systems (DAS)

DAS solutions, especially Active DAS, have long been the gold standard for multi-operator coverage in large venues such as airports, hospitals, and stadiums. Active DAS uses fiber-connected radio heads and remote units to distribute RF signals with minimal loss and full digital control, providing uniform coverage, high capacity, and aesthetic flexibility.

Support for Public and Private Networks

While Federated Wireless already supports private wireless solutions using CBRS, Active DAS expands this by creating a shared infrastructure that supports both public and private cellular services simultaneously. In this hybrid design, the Active DAS can be logically partitioned into a public slice (extending MNO network coverage) and a private slice (enabling enterprise-specific connectivity). This integrated approach increases the overall utility and efficiency of in-building wireless infrastructure — providing carrier-grade performance and enterprise flexibility on the same platform.

Operator Spectrum and CBRS

DEMOCRATIZING DAS

Mobile Network Operators are constantly seeking new ways to expand capacity and improve coverage. Traditionally, this meant acquiring more licensed spectrum, but that path has become increasingly costly, competitive, and constrained by limited availability. As traffic demands surge indoors—where people live, work, and communicate—operators need solutions that allow them to extend coverage and capacity without sacrificing their existing spectrum assets.

CBRS provides a breakthrough alternative. Operating in the 3550–3700 MHz band, CBRS offers 150 MHz of shared mid-band spectrum under a dynamic, three-tier access framework governed by the FCC's part 96 rules. A spectrum access system (SAS) dynamically coordinates usage across federal incumbents, licensed users (PALs), and unlicensed general authorized access (GAA) users—preventing interference and enabling multiple users to share the same band securely and efficiently.

For MNOs, this means they can now augment their licensed spectrum holdings with shared CBRS capacity, offloading indoor traffic and improving coverage where their macro networks are weakest. Rather than allocating their valuable licensed spectrum for in-building systems, operators can use CBRS within an Active DAS to serve public users, private enterprise networks, or both—without disrupting the macro network or requiring new spectrum purchases.

TOGETHER, ACTIVE DAS + CBRS EMPOWER OPERATORS AND ENTERPRISES ALIKE TO BUILD FLEXIBLE, HIGH-PERFORMANCE AND FUTURE-READY IN-BUILDING CONNECTIVITY—MAKING SHARED SPECTRUM A CORNERSTONE OF THE MODERN OPERATOR MODEL

This approach effectively democratizes the Distributed Antenna System model. CBRS removes the spectrum barrier that once limited DAS deployments to carrier-funded projects, allowing neutral hosts, property owners, and enterprises to deploy carrier-grade, multi-operator systems on their own initiative. It gives MNOs a low-friction path to improve indoor service while opening the door for shared public and private use over a single, cost-efficient platform.

Active DAS with CBRS Advantages

A SCALABLE, INTEROPERABLE AND FUTURE-READY SOLUTION SOLUTION

Active DAS using CBRS represents the next evolution of in-building wireless connectivity — merging the reliability and multi-operator flexibility of DAS with the agility and cost-effectiveness of shared spectrum. For enterprises, it delivers seamless indoor coverage across carriers and devices, a single infrastructure for both public and private cellular services, lower cost of ownership, enhanced security, and readiness for 5G and beyond. As indoor connectivity becomes a competitive differentiator and safety necessity, CBRS-based Active DAS stands out as the most scalable, interoperable, and future-ready solution for modern enterprises, campuses, and venues.

Technology and Architecture Advantages

Active DAS architectures combine the distributed intelligence and digital flexibility of modern radio systems with the signal uniformity of traditional DAS. In a fully Active DAS, fiber-fed remote units convert digital signals to RF and actively manage output power and interference across multiple antennas. Within CBRS, each DAS transmission point is treated as a Citizens Broadband Radio Service Device (cbsd) and registered with the SAS, ensuring FCC part 96 compliance.

Multi-Operator and Neutral Host Capabilities

Unlike small cells that are typically single-operator, Active DAS inherently supports multiple carriers through shared infrastructure. Combined with CBRS-based neutral-host frameworks, this allows one installation to serve AT&T, T-Mobile, and Verizon simultaneously, as well as private 5G “network slices” for enterprise use.

Economic Efficiency

Traditional DAS deployments required operator funding or carrier participation, limiting adoption. With CBRS, enterprises can deploy independently using shared spectrum, dramatically reducing the cost of deployment.

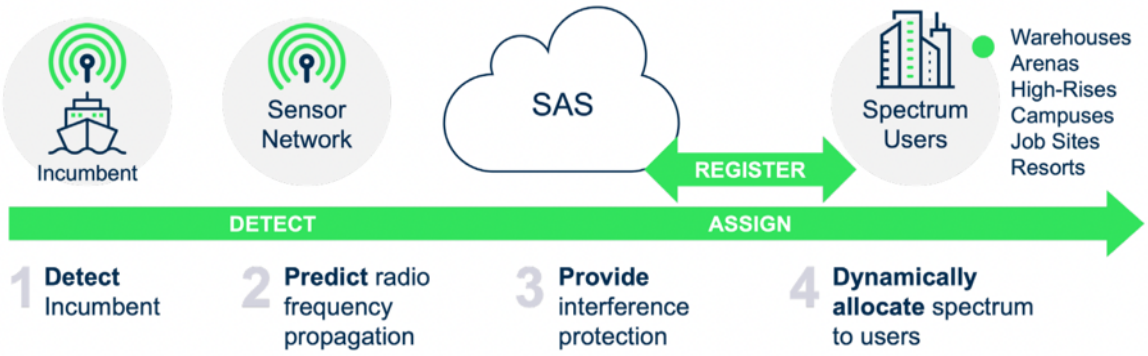
Operational Simplicity and Security

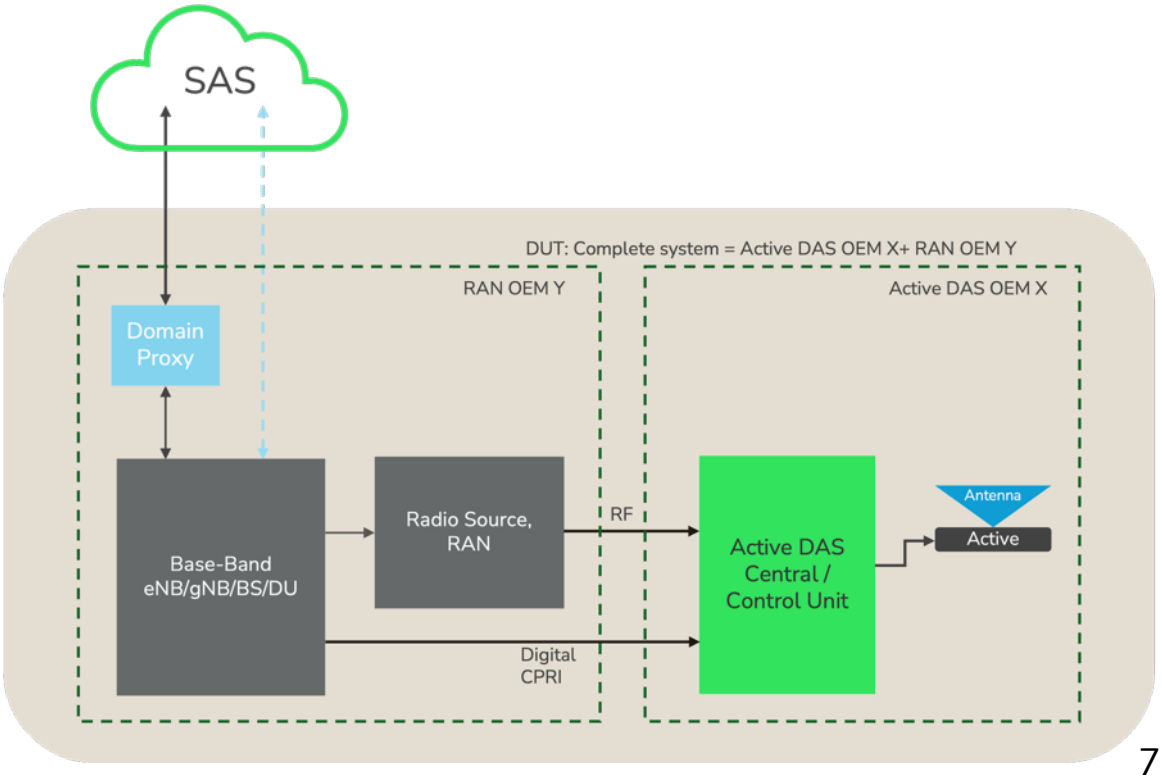
CBRS Active DAS systems leverage modern digital management interfaces, enabling cloud-based control, predictive analytics, and AI-assisted optimization. Integration with Federated Wireless’ SAS and ESC networks ensures interference-free operation and dynamic frequency coordination across CONUS and OCONUS regions.

Deployment Considerations

COLLABRATION AND EXPERTISE ARE KEY

Deploying Active DAS in the CBRS band involves collaboration among multiple stakeholders — the enterprise, DAS OEM, SAS administrator, and Certified Professional Installer (CPI). Key considerations include certification and compliance, design and power management, CPI registration, integration with RAN equipment, and futureproofing for 5G and beyond.





Conclusion

THE FUTURE OF IN-BUILDING CONNECTIVITY

Active DAS using CBRS represents more than an incremental improvement in wireless infrastructure — it marks a fundamental shift in how in-building connectivity is designed, deployed, and managed. By blending the proven performance of Active DAS with the flexibility of shared spectrum, this model bridges the gap between mobile network operators and enterprises, aligning their goals around a shared, carrier-grade platform.

For operators, it offers a scalable way to extend indoor coverage and enhance capacity without consuming licensed spectrum or investing in complex bespoke systems. For enterprises and property owners, it delivers control, flexibility, and the ability to host both public and private networks over a single, future-ready infrastructure.

In essence, Active DAS using CBRS democratizes access to high-performance cellular connectivity, empowering operators, integrators, and enterprises to collaborate in building smarter, safer, and more connected environments. It is the next logical evolution of the operator model — one that unites public and private connectivity under a common framework for innovation and growth.