

FROST & SULLIVAN

FEDERATED WIRELESS

2022
ENABLING
TECHNOLOGY
LEADER

UNITED STATES
SHARED SPECTRUM AND PRIVATE
WIRELESS INDUSTRY

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Federated Wireless excels in many of the criteria in the shared spectrum and private wireless space.

AWARD CRITERIA	
<i>Technology Leverage</i>	<i>Customer Impact</i>
Commitment to Innovation	Price/Performance Value
Commitment to Creativity	Customer Purchase Experience
Stage Gate Efficiency	Customer Ownership Experience
Commercialization Success	Customer Service Experience
Application Diversity	Brand Equity

The Citizens Broadband Radio Service (CBRS) Band Enabling Innovative Spectrum Sharing for Seamless Wireless Connectivity

Wireless networks have seen rapid evolution in recent years. Accelerating 5G deployments, the evolution of smart infrastructure, and network virtualization are some industry disruptions. The exponential growth in mobile data and wireless traffic outpaces existing network coverage, capacity, and capabilities. 5G deployments facilitate and increase demand for private wireless networks by enterprises, venues, and other entities.

In the United States, a segment of shared spectrum was recently made available in the CBRS band of spectrum in the middle band (3,550MHz to 3,700MHz). This frequency was only reserved for the US military and satellite communications in the past. The Federal Communications Commission (FCC) now makes this spectrum available to commercial users on a shared and prioritized basis.

The CBRS spectrum in the United States is now set up with three tiers of service. The first tier comprises incumbent users, including the US Navy, that use the spectrum for ship-to-ship and ship-to-shore radar communications. Incumbent users have the highest priority and are protected from the lower tiers. The second tier is for Priority Access Licenses (PAL), which were auctioned off (by US county) in 2020. The third tier is for General Authorized Access (GAA). Access to the three tiers is dynamically managed by the Spectrum Access System (SAS), so interference is kept to a minimum.

As the CBRS spectrum is shared concurrently by incumbents, PAL, and GAA users, the FCC requires SAS to manage potential interference. This is where Federated Wireless comes in with a cloud-based solution for the management and sharing of spectrum access in CBRS.

Technology Leverage through Commitment to Innovation and Creativity

Federated Wireless, founded in 2012 and headquartered in Arlington County, Virginia, is a pioneer in shared spectrum and a market share leader in CBRS in the United States. The company was named a SAS administrator by the FCC in January 2020.

Since its inception, the company has secured significant funding from financial investors such as Schroders, Allied Minds, GIC, Pennant Investors, and wireless infrastructure strategists such as SBA Communications, American Tower, Charter Communications and Cerberus Management. The company has the largest partner ecosystem in the CBRS industry, with more than 45 device manufacturers, channel and cloud partners, and edge partners all dedicated to the proliferation of CBRS services.

Federated Wireless's core competency is using cloud automation to manage spectrum sharing in the CBRS band. The company has enabled an entirely new spectrum model in the United States, which has gained substantial traction in the market. The cloud management of spectrum access helps achieve two key objectives: it allows incumbent users to remain and operate in the band without any interference and enables very deterministic access to the spectrum on a shared basis.

“Through its innovative spectrum sharing and management technology, Federated Wireless is able to fully predict the entire RF environment and provide spectrum assignments to a user which is interference free even if they're in geographic proximity to each other.”

**– Navdeep Saboo,
Industry Analyst**

Federated Wireless products include the cloud automation platform, known as spectrum controller, along with Environmental Sensing Capability (ESC), a network of sensors or listening devices. The ESC continuously detects incumbent activities and informs the cloud platform or spectrum controller of any specific action needed to avoid interference with incumbent users. The two key components enable incumbent protection capability and shared access to new commercial users such as enterprises, MNOs, cable operators, and fixed wireless service providers.

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Federated Wireless is working on other innovative and creative products, also centered on making the spectrum available for new and exciting uses. The company recently announced the availability of Spectrum Exchange, which is like a spot market for trading spectrum rights. It enables CBRS license holders to lease their spectrum to third parties when not in use. The Spectrum Exchange is an automated portal that enables almost instant access to the spectrum without direct interaction with the FCC. Such innovative spectrum allocation and utilization models will enable new business opportunities and use cases that have only become possible due to the innovation CBRS has brought into the market.

Owing to its success in providing deterministic access in the 3.5 GHz band, Federated Wireless is also working on a variant of its spectrum controller technology for the 6 GHz band, which is a global band for Wi-Fi devices. Along with the United States, several countries in European Union and Asia are expected to finalize regulations for 6 GHz shared operations in the near future. Frost & Sullivan believes that extending the spectrum controller to 6 GHz will greatly expand the company's global footprint and business opportunities.

Commercialization Success and Application Diversity

Federated Wireless has seen tremendous success in business growth in the past two years. The company has well over 90,000 devices (small cells) operating on its system. These devices include indoor and outdoor small cells deployed throughout the United States by service providers like MNOs and cable companies, utilities, and private and fixed wireless network providers. This highlights the highly diverse range of customers it supports.

The company also sees enormous growth and market expansion opportunity with private wireless. Private wireless is possible over the CBRS band because this form of shared access does not require a license to operate. It just requires devices to connect to the cloud platform to get a spectrum assignment. Federated Wireless has collaborated on numerous private wireless deployments such as Smart 5G Warehouse for US DoD and Carnegie Mellon University. This development speaks volumes of how massive the private wireless opportunity is as the industry looks ahead to the internet of things (IoT), factory automation, smart warehouses, improved connectivity in traditional office environments, and modernization of utility operations. Frost & Sullivan believes that in 2022 and beyond, such partnerships will materialize into highly meaningful commercial growth and scaling of private wireless networks in the CBRS band.

"The reason behind the company's success in this space is not only because of its pioneering work to make the CBRS band a commercial reality, but also because of the investments in the usability of its platform, the reliability, and a white glove like service to customers that they highly value."

**– Navdeep Saboo,
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Federated Wireless is already seeing initial success in the private wireless area through recent deployments, such as the Smart 5G Warehouse for the US DoD. CBRS enabled wireless network across the city of McAllen, Texas, to provide seamless connectivity to students for online education at the height of pandemic and intelligent video analytics for enabling smart campus at the Carnegie Mellon University in Pittsburgh, Pennsylvania. These are some early and meaningful indications of the commercial direction for CBRS in enabling private wireless networks in 2022 and beyond. Major potential application areas for the company's offerings in the immediate future include manufacturing, agriculture, venues, education, and logistics.

Enhanced Customer Experience and Strong Brand Equity

Federated Wireless invests heavily in its platform to make it highly available and resilient. The company understands that the spectrum is the lifeblood of any wireless network, and if it is not available because of some outage on the cloud management platform, that has a direct and negative impact on

customers. Hence, Federated Wireless makes sure its platforms are highly redundant and leverages all AWS capabilities in cloud development, and the network of listening devices or sensors used to protect incumbent users. Frost & Sullivan strongly believes that such attributes have helped Federated Wireless offer the best overall customer experience and stay ahead in the competitive curve.

For the service provider customer segment, management of networks that operate on the shared spectrum is a different operating paradigm than the traditional exclusive use spectrum. Federated Wireless understands this and helps its customers with tools, analytics, and other capabilities to plan and manage networks. Moreover, in the last few years, in addition to its investments in the scalability and reliability of its platform, Federated Wireless has also launched tools to help customers plan networks, dashboards to improve visibility, and ensure operational ease around using the shared spectrum.

For CBRS-enabled private wireless networks, the key challenge is simplicity. Deploying a private 5G network for an enterprise is considerably more complex than deploying and operating a Wi-Fi network. Federated Wireless is doing a lot of work to abstract this complexity, simplify the process, and make deploying private 5G a lot more like what Wi-Fi is today. Toward this end, the company is developing CBRS-compatible hardware devices with OEM partners, developing an integrated solution on the AWS platform, and providing pre-packaged solutions to help design, install, and operate with customers. Such customer-centric offerings and complete guidance throughout the spectrum lifecycle have directly translated into a greater velocity of deployments for the company with the service provider and private wireless customer segments.

Federated Wireless has emerged as an undisputed market leader in the CBRS band spectrum management space in the United States and competes at parity with its closest competitor. The company's robust and vast ESC network has built in redundancies and tweaked algorithms that have enabled five 9s network reliability levels, which is unmatched in the country. Frost and Sullivan attributes the company's success in this space not only to its pioneering work to make the CBRS band a commercial reality, but also to its investments in the usability of its platform, continuous optimization of ESC network, and white glove-like technical support and services to customers they highly value. Such customer-focused operations and product development strategies are unrivaled in the market and difficult for competitors to replicate. Moreover, such traits reinforce the company's brand equity and instill a sense of trust among customers.

Conclusion

With its unrivaled solutions in enabling and leading the way in commercializing the CBRS band in the United States, Federated Wireless is favorably positioned for unprecedented future growth. The company's spectrum sharing services are truly a form of democratization of spectrum access, where different sorts of entities that previously would not have the financial means or ability to acquire, exclusive-use geographically licensed spectrum can now implement reliable and efficient private wireless networks. Such traits make Federated Wireless's name synonymous with spectrum sharing in the country. Moreover, solutions such as Spectrum Exchange and expansion of spectrum controller to 6GHz band give the company a competitive edge and access to the global markets in the future.

With its strong overall performance, Federated Wireless earns Frost & Sullivan's 2022 United States Enabling Technology Leadership Award in the shared spectrum and private wireless industry.

What You Need to Know about the Enabling Technology Leadership Recognition

Frost & Sullivan's Enabling Technology Leadership Award recognizes the company that applies its technology in new ways to improve existing products and services and elevate the customer experience.

Best Practices Award Analysis

For the Enabling Technology Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Technology Leverage

Commitment to Innovation: Continuous emerging technology adoption and creation enables new product development and enhances product performance

Commitment to Creativity: Company leverages technology advancements to push the limits of form and function in the pursuit of white space innovation

Stage Gate Efficiency: Technology adoption enhances the stage gate process for launching new products and solutions

Commercialization Success: Company displays a proven track record of taking new technologies to market with a high success rate

Application Diversity: Company develops and/or integrates technology that serves multiple applications and multiple environments

Customer Impact

Price/Performance Value: Products or services provide the best value for the price compared to similar market offerings

Customer Purchase Experience: Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

Customer Ownership Experience: Customers proudly own the company's product or service and have a positive experience throughout the life of the product or service

Customer Service Experience: Customer service is accessible, fast, stress-free, and high quality

Brand Equity: Customers perceive the brand positively and exhibit high brand loyalty

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The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.

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Key Impacts:

- **Growth Pipeline:** Continuous Flow of Growth Opportunities
- **Growth Strategies:** Proven Best Practices
- **Innovation Culture:** Optimized Customer Experience
- **ROI & Margin:** Implementation Excellence
- **Transformational Growth:** Industry Leadership



The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

Analytical Perspectives:

- Mega Trend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)

