Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Unlicensed Use of the 6 GHz Band	)	ET Docket No. 18-295
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183
	)	

COMMENTS OF FEDERATED WIRELESS, INC.

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TABLE OF CONTENTS

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I. INTRODUCTION AND SUMMARY.

Federated Wireless, Inc. ("Federated Wireless") offers these comments in response to the Notice of Proposed Rulemaking ("NPRM") issued by the Federal Communications Commission ("Commission") in the above-captioned proceeding.[1] Federated Wireless commends the Commission for its continued leadership in making available much-needed licensed, unlicensed, and shared spectrum for flexible use to meet the surging demand for broadband and next-generation wireless services. To accomplish these ends, Federated Wireless urges the Commission to act expeditiously to make the 5925-7125 MHz ("6 GHz") band available for unlicensed use as broadly as possible and leverage the lessons learned in implementing other sharing regimes to ensure that the 6 GHz automated frequency coordination ("AFC") system meets both the present and future needs of incumbent licensed and newly authorized unlicensed users. To these ends, the FCC should focus on adopting rules that: (A) reflect the characteristics of the band and its users in order to best enable the AFC systems to protect incumbent operations, (B) leverage the capabilities of the cloud to optimize the functionality of AFC

[1] *Unlicensed Use of the 6 GHz Band, Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, ET Docket No. 18-295, GN Docket No. 17-183, Notice of Proposed Rulemaking, FCC 18-147 (2018) ("NPRM").

systems and simplify the development and deployment of unlicensed devices, (C) leverage industry incentives to create a successful sharing regime by empowering multi-stakeholder bodies to develop consensus standards that foster the development of new services while protecting incumbent operations, and (D) promote competition and innovation among AFC system operators.

II. THE COMMISSION SHOULD MAKE THE 6 GHz BAND AVAILABLE FOR UNLICENSED USE AS QUICKLY AS POSSIBLE TO ENABLE NEEDED SPECTRUM ACCESS FOR INNOVATIVE USE CASES.

Federated Wireless supports the Commission's efforts to make the 6 GHz band available for unlicensed use as quickly as possible. As the Commission has noted, unlicensed spectrum has enabled a number of applications that have become "indispensable for providing low-cost wireless connectivity in countless products used by American consumers."[2] Indeed, making broader swaths of spectrum in the 6 GHz band available for unlicensed use is likely to "promote new technology and services that will advance the Commission's efforts to make broadband connectivity available to all Americans, especially those in rural and underserved areas" and to "complement new licensed 5G services by allowing providers to offer a full range of services to consumers and helping to secure U.S. leadership in the next generation of wireless services."[3] In light of the ever-growing demand for broadband connectivity, it is particularly crucial to provide significant additional unlicensed capacity in the 6 GHz band. Doing so will "allow users, regardless of location, to off-load data from smartphones, laptops, and other mobile devices, freeing up capacity of commercial wireless systems for applications more suitable for licensed systems."[4] Expeditiously making the 6 GHz band available for unlicensed use is critical to

[2] *Id.* at ¶ 1.

[3] *Id.*

[4] *Id.* at ¶ 21.

meeting demand and enabling the U.S. wireless industry to continue to innovate at its characteristically rapid pace, thereby advancing continued U.S. leadership in the global wireless industry.

III. THE COMMISSION SHOULD LEVERAGE ITS EXPERIENCE IN CREATING SHARING REGIMES TO ENSURE ITS 6 GHz RULES MAXIMIZE FLEXIBILITY AND SPECTRUM UTILIZATION.

Just as the record makes clear the importance of making additional unlicensed spectrum available to meet ever-growing demand for the development of innovative services, it is equally clear that the 6 GHz band is intensively used by important incumbent operations in a variety of licensed services. These incumbent uses include public safety, critical infrastructure, and common carrier fixed service users, C-band fixed-satellite service uplink operations used to distribute video and audio content to hundreds of millions of Americans, and broadcaster and cable newsgathering and other operations.[5] These important incumbent operations must be protected, both because of their significant value to U.S. consumers and the economy and because unlicensed operations in the 6 GHz band must, by their nature, be conducted on a non-interference basis with respect to these licensed operations.

To best serve the dual goals of this proceeding, the Commission has appropriately proposed to use a database-enabled sharing regime to ensure that incumbent operations can continue and grow unimpeded while maximizing the amount of spectrum available to meet exponentially growing demand for unlicensed capacity. As noted in the NPRM, together with industry, the Commission has experience in designing and implementing interference avoidance and database-enabled sharing regimes that allow unlicensed or lightly-licensed users to access spectrum while ensuring priority users are protected from harmful interference, including

[5] *See id.* at ¶¶ 8-12.

Dynamic Frequency Selection ("DFS"), TV White Spaces ("TVWS"), and Citizens Broadband Radio Service ("CBRS").

As an initial matter, it is clear that the circumstances necessitating the use of a Spectrum Access System ("SAS") and Environmental Sensing Capability to administer the CBRS sharing regime are not present in the 6 GHz band. Namely, there is no need in the 6 GHz band to detect and protect offshore federal radar operations near the coastline, while also managing shared use between and among users in different priority tiers, and transitioning grandfathered wireless systems from legacy service rules that are set to sunset to CBRS operations. The entire 6 GHz band is exclusively allocated for non-Federal use, such that no government systems require protection under the AFC system-administered 6 GHz regime. As a result, upon the authorization of unlicensed use in the 6 GHz band, there will only be two "tiers" of users: (1) incumbent licensed services, who need not alter their current operations or future expansion plans, and who will receive interference protection from newly authorized unlicensed users; and (2) those newly authorized unlicensed users, whose operating rights are conditioned on the obligation to cause no interference to licensed operations. In light of the relatively straightforward nature of the sharing regime, it should be similarly straightforward to implement an AFC system that will protect incumbents. The more challenging aspect will be to provide protection to incumbents while simultaneously maximizing spectrum access for unlicensed devices. Despite the differences between the 6 GHz and CBRS bands, the Commission's experience in establishing database-enabled sharing regimes holds particular value for informing the development of the AFC system that will be used to protect incumbent and maximize unlicensed access to 6 GHz spectrum.

Although the sophistication of the CBRS SAS itself is not needed to enable unlicensed spectrum access for unlicensed access points in the 6 GHz band, the model the Commission used

to enable the development and implementation of the SAS has been extraordinarily successful and a number of these successful elements should be replicated in establishing the rules for the 6 GHz AFC system. Accordingly, the Commission should implement rules for the 6 GHz AFC systems that: (A) reflect the characteristics of the band and its users in order to best enable the AFC systems to protect incumbent operations; (B) leverage the capabilities of the cloud to optimize the functionality of AFC systems and simplify the development and deployment of unlicensed devices; (C) leverage industry incentives to create a successful sharing regime by empowering multi-stakeholder bodies to develop consensus standards that foster the development of new services and protect incumbent operations; and (D) promote competition and innovation among AFC system operators.

A. The Commission Must Ensure That Its Rules Reflect the Realities of the 6 GHz Band and Enable the AFC to Obtain the Information Needed to Facilitate Robust Unlicensed Spectrum Access and Protect Existing and Expanded Incumbent Operations.

As a foundational matter, it is critical that AFC systems be provided information regarding both incumbent licensed and newly authorized unlicensed operations to enable the systems to conduct the interference calculations needed to coordinate unlicensed operations on a non-interference basis with respect to licensed users.

In particular, with respect to incumbent operations, the Commission should require AFC systems to access Commission databases, including the Universal Licensing System, to obtain data regarding incumbent licensees' locations and operational characteristics, including power levels, antenna height, among others. The AFC would then use such information for conducting the analyses necessary to implement and enforce incumbent protection criteria. As the Commission has recognized, regularly synchronizing the AFC system with Commission databases containing relevant information regarding licensed operations in the 6 GHz band will

be critical to enable the AFC to account for "newly licensed facilities or any changes to licensed facilities."[6]

It is similarly crucial that 6 GHz unlicensed access points, whether indoor or outdoor,[7] provide the AFC system the information needed to perform its coordination and incumbent protection functions. To accomplish this, when establishing a connection to the AFC system and submitting a query requesting channel availability information, 6 GHz unlicensed access points should provide location and technical information to the AFC system with sufficient accuracy that it can conduct the computations needed to identify the channels on which the unlicensed device could operate in accordance with the incumbent protection criteria. The provision of this location and technical information, such as antenna height and power level, is fundamental to allowing the AFC to perform its intended incumbent protection functions. Knowledge of this information enables the AFC system to conduct the computations needed to determine the channels on which a device may operate without causing interference to nearby incumbent users. To that end, this information allows the AFC system to enforce any incumbent protection criteria the Commission may adopt – whether today or in the future. This is the case regardless of whether such criteria are based on the use of exclusion zones or on an aggregate interference basis where limits are measured at an incumbent licensee's receive antenna. Should the Commission elect to adopt aggregate interference-based protection rules, it would facilitate co-

[6] 47 C.F.R. § 96.63(b) (requiring SAS administrators to synchronize their databases with Commission databases at least once per day).

[7] It is important to note that indoor and/or low power operation is not a panacea for effective incumbent protection. The Commission has experience where loopholes such as these have been exploited, e.g. TVWS and DFS. The Commission is taking the important step to implement a trusted capability in the AFC to assure incumbent protection. This AFC capability should therefore be leveraged to the greatest extent possible. The benefits of applying the AFC to all unlicensed uses far outweigh concerns of added complexity.

channel unlicensed operations at locations and power levels that would not harmfully interfere with incumbent users but that nevertheless may be prohibited under an exclusion zone approach.

Location and technical information for access points operating in the 6 GHz band is also needed to allow both AFC system operators and the Commission to confirm that it is doing so in accordance with the Commission's rules. Without knowledge of a standard-power access point's location and operational parameters, AFC system operators would be unable to demonstrate to the Commission that they are effectively enforcing incumbent protections with respect to that access point's operations, nor would they be able to assess and implement any needed modifications to their interference calculations in the event of unexpected interference to an incumbent licensee.

Unlicensed 6 GHz access points should further send a periodic query back to the AFC to receive updated channel availability information in order to ensure ongoing compliance with the Commission's incumbent protection criteria. The combination of regular synchronization between the AFC system and the Commission's databases with respect to incumbent licensee operations and a mechanism under which unlicensed devices regularly query the AFC system to obtain channel availability information creates a "closed loop" ecosystem that ensures the AFC system has an accurate picture of the local RF environment to facilitate unlicensed spectrum access and incumbent protection. This mechanism would also provide additional flexibility for incumbents to modify or expand their operations, as the regular updates between the Commission's databases, the AFC system, and unlicensed devices would ensure appropriate protection for newly deployed incumbent operations.

B. AFC Systems Should Exploit the Capabilities of the Cloud to Foster Innovation and Enhancement in AFC System Operations and Simplify Unlicensed Device Development.

The Commission's past experience in establishing sharing regimes also provides a stark illustration of the power of cloud-based coordination databases. Leveraging the capabilities of the cloud, and cloud computing in particular, would allow the AFC system to offer enhanced processing and database capability and will enable efficient scaling as new uses of the band expand. This, in turn, would allow the cloud-based AFC system to, for instance, update its interference calculations in real-time as new licensed links come online or new channel availability queries are received from standard-power access points, enabling the AFC system to recommend channels to the unlicensed device that maximize spectrum utilization efficiency. A cloud-based AFC system also would provide improved security and reliability by virtue of its distributed nature and the redundancies inherent to cloud architectures.

In addition, a cloud-based AFC system would foster innovation and enhancements of AFC system functions themselves. By centralizing the computational and data management capabilities, AFC system operators could develop enhancements to their systems to continue maximizing spectrum access for unlicensed users and support emerging use cases. Such enhancements would be reflected in the list of available channels, and thus would be entirely transparent to the unlicensed devices. This would allow standard-power access points to remain relatively simple and inexpensive—they would simply need the capability to receive and act upon the AFC system's communication of available channels and periodically query the AFC system for updated channel availability information as described above. For example, if an AFC system operator updated its interference calculations to more accurately account for the impact of local clutter, and thus enable enhanced spectrum access for unlicensed devices, that enhancement could be implemented simply through the AFC system's communication of

updated channel availability information based upon its refined interference calculations. No upgrades to the unlicensed devices would be necessary.

Such centralized processing capability, in turn, would significantly reduce the complexity and cost of developing and deploying access points in the 6 GHz band as compared to an architecture under which the AFC system capabilities would reside locally in each access point, which would then perform "the necessary computations to determine which frequencies are permissible."[8] Leveraging the capabilities of a cloud-based AFC system would allow device manufacturers to avoid the complex and costly exercise of developing and implementing AFC system capabilities in each access point and developing the processes by which enhancements to those capabilities could be propagated to each of the thousands—or millions—of access points in the 6 GHz ecosystem. The increased simplicity of developing standard-power access points for use in the 6 GHz band would further lead to lower device costs for end users, lowering barriers to entry and facilitating access to unlicensed spectrum to support new and innovative services and use cases.

C. The Commission Should Take Advantage of the Power of Multi-Stakeholder Bodies to Expedite Development of the Standards Needed to Facilitate Unlicensed Access to the 6 GHz Band.

The Commission should rely on cross-industry stakeholder groups to develop consensus standards for the performance of the AFC.[9] For example, once the Commission has adopted the protection criteria for incumbent licensed users in the 6 GHz band, such a multi-stakeholder group should be empowered to develop standards-based approaches to ensure that 6 GHz unlicensed devices and the AFC systems operate and communicate with each other in a way that

[8] NPRM at ¶ 25.

[9] *Id.* at ¶ 34.

ensures compliance with the Commission's protection criteria. This approach has proven enormously successful in the CBRS band, with the Wireless Innovation Forum bringing together stakeholders of every stripe to develop the standards governing interfaces between the SAS and CBRS devices, interfaces between SASs, communications security, professional installation of CBRS devices, and other aspects of CBRS operations.[10]

Adopting a similar approach for the 6 GHz band would allow the Commission to determine baseline technical rules for the service and empower incumbent users and new users to jointly develop standards for operations that meet all parties' requirements, rather than adopting rules that either assume that use cases in the band will remain *status quo* or attempt to prognosticate technological developments, each of which can have the effect of forestalling innovation in the band. Adopting baseline technical rules and leveraging multi-stakeholder bodies to develop standards for operations in the band also allow the Commission's rules to be technologically neutral in accordance with its long-held principle that its rules should not favor one technology or use case over another. This technology neutrality is vital for providing users and device manufacturers with the flexibility needed to innovate and develop the new products and services that will keep the U.S. in its global wireless industry leadership position.

The Commission should also use this approach to leverage stakeholders' incentives to maximize the utility of the band for their business needs by using a multi-stakeholder group to develop the process and requirements for AFC system certification. Industry development of

[10] *See* Wireless Innovation Forum, "Release 1 of the Baseline Standard Specifications," *available at* https://cbrs.wirelessinnovation.org/release-1-standards-specifications (last accessed Feb. 7, 2019).

certification standards and processes has worked well in other bands.[11] However, to further ensure that unlicensed access to 6 GHz spectrum is made available as expeditiously as possible, the certification testing to confirm an AFC system's compliance with the Commission's rules and industry standards should itself be conducted by third-party commercial laboratories, as is the case with Telecommunications Certification Bodies ("TCBs") that certify radiofrequency equipment under Part 2 of the Commission's rules. As the NPRM makes clear, additional unlicensed capacity is needed to meet exponential growth in demand and it is needed now. The Commission should therefore leverage its well-established, well-oiled, efficient equipment authorization procedures for certifying an AFC system's compliance with Commission rules and industry standards. TCBs exist for the purpose of performing this very function, and the Commission should take advantage of their capabilities to expedite unlicensed access to much-needed 6 GHz spectrum resources.

D. There is Significant Value in Facilitating Competition between AFC System Operators.

There is tremendous value in authorizing more than one coordination database administrator to operate in a given band. For example, the Commission has already conditionally certified seven CBRS SAS administrators, and several more prospective administrators have applied for certification.[12] This broad participation in the market for SAS administrator services

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[11] *See* Wireless Innovation Forum, "Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; SAS as Unit Under Test (UUT)," Document WINNF-TS-0061 (Dec. 7, 2018), *available at* https://winnf.memberclicks.net/assets/CBRS/WINNF-TS-0061.pdf (last accessed Feb. 13, 2019).

[12] *See Wireless Telecommunications Bureau and Office of Engineering and Technology Conditionally Approve Seven Spectrum Access System Administrators for the 3.5 GHz Band*, GN Docket No. 15-319, Public Notice, 31 FCC Rcd 13355 (WTB/OET 2016); *Wireless Telecommunications Bureau and Office of Engineering and Technology Establish "Second Wave" Deadline for Proposals from Prospective Spectrum Access System (SAS) Administrator(s) and Environmental Sensing Capability (ESC) Operator(s)*, GN Docket No. 15-319, Public Notice, 32 FCC Rcd 2973 (WTB/OET 2017).

necessarily introduces significant competitive pressure among the administrators, fostering innovation and service enhancements that accrue to the benefit of users and, by extension, the American consumer. The Commission's decision to authorize multiple SAS administrators also aids in ensuring that the diverse array of use cases in shared spectrum bands are all adequately served—where a particular use case is unserved or inadequately served by existing administrators, the Commission's rules allow a new entrant to step in to meet the demand for improved services. The Commission should authorize multiple AFC system operators in the 6 GHz band to promote competition and innovation among AFC system operators and help to ensure that the wide variety of applications enabled by unlicensed access to a broad swath of spectrum at 6 GHz—whether consumer, enterprise, or Internet-of-Things applications—are served, so that the dynamic, innovative ecosystem that the Commission envisions for this band can evolve unimpeded.

IV. CONCLUSION.

Federated Wireless commends the Commission for its leadership in enabling spectrum access to meet exponentially growing demand for wireless connectivity and support the innovative applications that will secure continued U.S. leadership in the next generation of wireless services. To ensure that its actions in this proceeding accomplish these worthy goals, Federated Wireless encourages the Commission to act expeditiously to make the 6 GHz band available for unlicensed use as broadly as possible and leverage the lessons learned in implementing other sharing regimes to ensure that the AFC system in the 6 GHz band best meets the present and future needs of incumbents and newly authorized unlicensed users. To these ends, the FCC should adopt rules that (A) reflect the characteristics of the band and its users in order to best enable the AFC systems to protect incumbent operations, (B) leverage the capabilities of the cloud to optimize the functionality of AFC systems and simplify the

development and deployment of unlicensed devices, (C) leverage industry incentives to create a successful sharing regime by empowering multi-stakeholder bodies to develop consensus standards that foster the development of new services and protect incumbent operations, and (D) promote competition and innovation among AFC system operators.

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