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

In the Matter of	)	
	)	
Expanding Flexible Use of the 3.7 to 4.2 GHz Band	)	GN Docket No. 18-122
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183 (Inquiry Terminated as to 3.7-4.2 GHz)
	)	
Petition for Rulemaking to Amend and Modernize Parts 25 and 101 of the Commission's Rules to Authorize and Facilitate the Deployment of Licensed Point-to-Multipoint Fixed Wireless Broadband Service in the 3.7-4.2 GHz Band	)	RM-11791
	)	
Fixed Wireless Communications Coalition, Inc., Request for Modified Coordination Procedures in Band Shared Between the Fixed Service and the Fixed Satellite Service	)	RM-11778

REPLY COMMENTS OF FEDERATED WIRELESS, INC.

Federated Wireless, Inc. ("Federated Wireless") hereby replies to comments filed in response to the Notice of Proposed Rulemaking ("NPRM") issued by the Federal Communications Commission ("Commission") in the above-captioned proceeding.[1] Based on the record in this proceeding, Federated Wireless urges the Commission to leverage dynamic spectrum sharing technologies for the 3.7-4.2 GHz band, such as the Spectrum Access System ("SAS") developed for the adjacent Citizens Broadband Radio Service ("CBRS"), to: (1) enable widespread, dense terrestrial use of the 3.7-4.2 GHz spectrum at the earliest opportunity; (2)

[1] *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122, Order and Notice of Proposed Rulemaking, FCC 18-91 (2018) ("NPRM").

protect important incumbent operations; and (3) prevent harmful interference to adjacent CBRS operations.

I. THE RECORD DEMONSTRATES THAT THE COMMISSION SHOULD LEVERAGE SPECTRUM SHARING TECHNOLOGIES TO ENABLE RAPID DEPLOYMENT OF 3.7-4.2 GHz SPECTRUM AND PROTECTION OF INCUMBENT OPERATIONS BOTH DURING AND AFTER A TRANSITION TO FLEXIBLE USE.

Commenters joined Federated Wireless in pointing out the many benefits of employing spectrum sharing technologies to enable dense, efficient shared use between and among incumbent fixed-satellite service ("FSS") and prospective users of the 3.7-4.2 GHz band—both for terrestrial flexible use and point-to-multipoint ("P2MP") applications. Spectrum sharing technologies will allow for dense and disparate uses of the 3.7-4.2 GHz spectrum, enable commercial access to the spectrum as quickly as possible to maintain U.S. leadership in the race to 5G, and protect important incumbent FSS operations.

A. Dynamic Spectrum Sharing Technologies Will Facilitate the Densest Possible Use of 3.7-4.2 GHz Spectrum Including a Variety of Use Cases.

Federated Wireless concurs with the Dynamic Spectrum Alliance ("DSA") that by using "a dynamic spectrum management database system to enable shared access to unused spectrum by fixed wireless across the entire band, the Commission can make every unused megahertz of spectrum in the 3.7-4.2 GHz band available for 5G terrestrial deployments, both mobile and fixed."[2] Similarly, Motorola observes that by utilizing SAS or similar technologies in the 3.7-4.2 GHz band, the Commission could enable a variety of use cases and allow "much more efficient utilization of the shared mid-band spectrum [to] take place, and allow broadband services in

[2] Comments of the Dynamic Spectrum Alliance, GN Docket No. 18-122 *et al.*, at 6 (filed Oct. 29, 2018).

public spaces, schools, government, enterprise and industrial facilities . . . This approach also facilitates deployments of capacity enhancing small cell technologies (e.g., cellular off-loading), which has been proven to be a valuable technology in the unlicensed bands."[3]

Commenters also noted the significant advantages that dynamic spectrum sharing technologies hold over legacy spectrum management approaches, such as manual coordination under Part 101 of the Commission's rules. For example, DSA notes that "certification of one or multiple database systems for the 3.7-4.2 GHz band could speed coordination times, lower coordination costs, protect incumbents from interference with greater certainty, and reduce the burden on Commission staff. Most importantly, it could facilitate more intensive use of unused spectrum across the entire band in underserved areas."[4] The Public Interest Spectrum Coalition also observes that "[o]ne or more automated frequency coordination (AFC) systems should be certified by the Commission to enforce real-time, real-world interference protection criteria for incumbent FSS earth stations, to enforce denials of permission to operate in areas where flexible use licensees eventually deploy and commence service, and to enable faster and more cost-effective coordination for P2MP deployments authorized under the proposed rules."[5]

Federated Wireless agrees with all these observations, and urges the Commission to exploit dynamic spectrum sharing technologies to enable dense new uses of the 3.7-4.2 GHz band while providing robust protection to incumbents. Spectrum sharing technologies will ensure that the 3.7-4.2 GHz band is made available for widespread use by a broad array of potential users.

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[3] Comments of Motorola Systems, Inc., GN Docket No. 18-122 *et al.*, at 4 (filed Oct. 29, 2018).

[4] *Id.* at 7.

[5] Comments of the Public Interest Spectrum Coalition, GN Docket No. 18-122 *et al.*, at 18 (filed Oct. 29, 2018).

B. Dynamic Spectrum Sharing Technologies Will Provide the Fastest Transition to Commercial Operations in Crucial Mid-Band Spectrum for 5G Use.

Through use of spectrum sharing technology, the Commission would not need to delay the commencement of commercial terrestrial operations in the 3.7-4.2 GHz band until a "critical mass" of spectrum is cleared.[6] Dynamic spectrum sharing technologies are both readily available and fully capable of managing disparate uses of the 3.7-4.2 GHz band in the near term, and transitioning to flexible use over the longer term, all while minimizing interference and protecting important incumbent operations. Dynamic spectrum sharing technologies can make 3.7-4.2 GHz available for commercial use more quickly than any other approach available to the Commission, because it can react and adapt instantaneously to changes in the spectral environment. From the moment the band transition process begins, a SAS or similar automated coordination database can begin facilitating spectrum access. As the transition progresses, the SAS can update the protection requirements to account for newly cleared geographic areas, and make spectrum available in real-time through software updates that propagate instantly.

C. Dynamic Spectrum Sharing Technologies Will Both Protect Important Incumbent Operations and Preserve Their Necessary Operational Flexibility.

As Federated Wireless explained in its initial comments, the operational characteristics of C-band FSS earth stations are already well-known, and the SAS-administered FSS protections established for the CBRS band are readily transportable to the 3.7-4.2 GHz band.[7] Indeed, by incorporating FSS earth station location and operational information into a SAS or similar automated coordination database, the Commission can ensure important incumbent FSS

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[6] NPRM at ¶ 92

[7] *See* Comments of Federated Wireless, Inc., GN Docket No. 18-122 *et al.*, at 5-6 (filed Oct. 29, 2018).

operations are protected, *and* provide incumbent FSS operators with the flexibility they need to quickly repoint their antennas to ensure continuity of service in the event of a satellite malfunction.[8] Legacy, manual coordination under Part 101 of the Commission's rules cannot possibly respond to these needs quickly enough, and thus would unnecessarily limit the degree to which co-frequency sharing between FSS and terrestrial use is possible in the 3.7-4.2 GHz band.[9]

In light of the record in this proceeding, it is clear that dynamic spectrum sharing technologies will (1) make dense, widespread terrestrial access to the 3.7-4.2 GHz band available to support a wide variety of use cases, (2) enable this access more quickly than any other alternative approach to transitioning the band, and (3) ensure that important incumbent operations are protected during and after the transition. Dynamic spectrum sharing technologies thus provide the fastest and most effective path to accomplishing the Commission's "joint goals of making spectrum available for new wireless uses while balancing desired speed to the market, efficiency of use, and effectively accommodating incumbent Fixed Satellite Service [] and Fixed Service [] operations in the band."[10] The Commission should expeditiously leverage these technologies to enable the widest, densest possible access to the 3.7-4.2 GHz spectrum, which will be crucial to continued U.S. leadership in the race to 5G, at the earliest possible opportunity.

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[8] *See, e.g.*, Comments of the Satellite Industry Association, GN Docket No. 18-122, at 22 (filed Oct. 29, 2018).

[9] *Id.*

[10] NPRM at ¶ 2.

II. THE COMMISSION MUST ENSURE THAT FLEXIBLE USE OF THE 3.7-4.2 GHz BAND WILL NOT RESULT IN INTERFERENCE TO ADJACENT CBRS USERS.

In the NPRM, the Commission proposes to adopt the following power limits for flexible use devices operating in the 3.7-4.2 GHz band: 62 dBm/MHz for non-rural base stations; 65 dBm/MHz for rural base stations; and 30 dBm for mobile and portable devices.[11] These proposed limits are consistent with those applicable to other services licensed under Part 27 of the Commission's rules, but are significantly higher than those applicable to CBRS devices operating in the adjacent 3.55-3.70 GHz spectrum.[12] With good reason, the Commission notes that "[o]ne concern about deploying a robust mobile broadband service adjacent to the Citizens Broadband Radio Service arises from the relatively higher power limits proposed" in the NPRM.[13]

The differential in power limits between CBRS devices and proposed adjacent 3.7-4.2 GHz flexible use operations raises the prospect of well-known issues that arise between services operating in adjacent bands, including receiver degradation due to out-of-band emissions ("OOBE"), reception of unwanted emissions, and receiver overload due to strong adjacent-band signals. These concerns are amplified at the boundary of the CBRS band, where the disparity in power levels between adjacent services is especially pronounced. It is likely that the higher-power 3.7-4.2 GHz operations will impair use of at least 20 MHz and potentially up to 50 MHz of the upper CBRS band. Despite its acknowledgement of these concerns, the Commission nevertheless proposes to adopt power limits up to 65 dBm/MHz and a standard OOBE limit of -

[11] *Id.* at ¶¶ 164-67.

[12] *See* 47 C.F.R. §§ 27.50, 96.41.

[13] NPRM at ¶ 181.

13 dBm at the authorized channel edge for terrestrial operations in the 3.7-4.2 GHz.[14] Given the differential in power levels, this proposal is insufficient to ensure that CBRS operations are not degraded. Absent Commission action to better ensure non-interference between the services, the upper third of the CBRS frequencies will likely be materially—perhaps permanently—impaired.

To address interference concerns between services in adjacent bands, the Commission has traditionally avoided employing the blunt instrument of a mandatory guard band, instead relying on industry to come to a solution that protects each service and delivers value to their users. Here, however, because the interference concern is almost entirely one-way in nature, the adjacent-band services are not on equal footing. 3.7-4.2 GHz users would have little incentive to negotiate a solution that best protects both services' users. It is thus imperative that the Commission consider all possible means to ensure that newly authorized flexible use operations at 3.7-4.2 GHz do not impair the upper CBRS spectrum, including the adjacent-channel power limits discussed in the NPRM.[15]

One readily available solution to help mitigate the anticipated interference is to use an automated coordination capability to mitigate interference to the CBRS band from 3.7-4.2 GHz operations, such as a SAS. In this way, the Commission could ensure that its rules preserve the tremendous investment and momentum in the CBRS band, ensure co-existence between the adjacent bands, and allow the full use of the 3.7-4.2 GHz band for newly authorized flexible use operations.

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[14] *Id.* at ¶ 168.

[15] *Id.* at 181.

III. CONCLUSION.

Crucial mid-band spectrum should be made available as quickly and efficiently as possible so that the U.S. can maintain its leadership in the global race to 5G. The most expeditious way to unlock the value of the 3.7-4.2 GHz band is to employ dynamic spectrum sharing technologies to enable commercial access at the earliest possible opportunity, protect important incumbent operations, and protect adjacent-band users in the CBRS.

Respectfully submitted,

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