

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

In the Matter of)	
)	
Amendment of the Commission’s Rules to Promote Aviation Safety)	WT Docket No. 19-140
)	
WiMAX Forum Petition to Adopt Service Rules for the Aeronautical Mobile Airport Communications System (AeroMACS))	RM-11793
)	
Petition of Sierra Nevada Corporation for Amendment of the Commission’s Rules to Allow for Enhanced Flight Vision System Radar under Part 87)	RM-11799
)	
Petition of Aviation Spectrum Resources, Inc. for Amendment of Sections 87.173(b) and 87.263(a) of the FCC’s Rules to Allow Use of the Lower 136 MHz Band by Aeronautical Enroute Stations)	RM-11818
)	
Petition of Airports Council International-North America Regarding Aeronautical Utility Mobile Stations)	RM-11832

REPLY COMMENTS OF FEDERATED WIRELESS, INC.

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, a leading innovator of and advocate for shared spectrum solutions, commends the Commission for its ongoing commitment to maximizing the efficient use of scarce spectrum resources by identifying and allocating spectrum for sharing between and among varying uses and users. This proceeding

¹ *Amendment of the Commission’s Rules to Promote Aviation Safety, Notice of Proposed Rulemaking*, WT Docket No. 19-140, RM-11793, RM-11799, RM-11818, RM-11832, Notice of Proposed Rulemaking, FCC 19-53 (rel. June 7, 2019) (“NPRM”).

presents an opportunity for the Commission to ensure that the spectrum allocated for Aeronautical Mobile Airport Communication System (“AeroMACS”) operations in the 5000-5030 MHz and 5091-5150 MHz bands (together, the “AeroMACS Bands”) is used as densely and efficiently as possible. In particular, Federated Wireless urges the Commission to adopt a framework for the AeroMACS Bands that maximizes the utilization of this spectrum by: (1) leveraging to the maximum extent possible dynamic coordination and spectrum sharing technologies that are available today in establishing the Channel Manager for the AeroMACS Bands; and (2) ensuring that its service rules for the AeroMACS Bands are technologically neutral and allow for the densest possible use of the spectrum at and in the areas surrounding airports.

I. THE COMMISSION SHOULD LEVERAGE AVAILABLE TECHNOLOGIES TO ESTABLISH A CHANNEL MANAGER FOR THE AEROMACS BANDS.

In the NPRM, the Commission asks “how AeroMACS spectrum should be coordinated among non-Federal users, and between Federal and non-Federal users.”² Federated Wireless agrees with the WiMAX Forum, and the numerous commenters supporting its proposal,³ that the Commission should designate a Channel Manager “to maximize efficient and flexible usage” of the AeroMACS Bands at each airport.⁴ To achieve these goals, Federated Wireless encourages the Commission to exploit available dynamic spectrum sharing and coordination technologies in establishing the AeroMACS Bands Channel Manager.

² NPRM at para. 40.

³ See, e.g., Comments of Collins Aerospace, WT Docket 19-140 (filed Sep. 3, 2019); Comments of Selex ES, Inc., WT Docket 19-140 (filed Sep. 3, 2019); Comments of Telrad Networks LTD, WT Docket 19-140 (filed Sep. 3, 2019); Comments of Ondas Networks, Inc., WT Docket 19-140 (filed Sep. 3, 2019).

⁴ See Comments of the WiMAX Forum, WT Docket 19-140 (filed Sep. 3, 2019).

A. SAS Technology Is Readily Extensible to Other Bands, Including the AeroMACS Bands.

As the Commission is aware, Federated Wireless has deep expertise in dynamic spectrum management and sensing technologies, such those embedded in the Spectrum Access System (“SAS”) and Environmental Sensing Capability, that administer the multi-tier sharing regime and protect critical Federal incumbent operations in the Citizens Broadband Radio Service (“CBRS”) band (3550-3700 MHz). SAS technology is readily adaptable to other spectrum bands and can be leveraged to maximize spectrum utilization while implementing incumbent protections and priority access regimes that address the unique characteristics of each band, including the AeroMACS Bands. The work undertaken by the Commission and industry that has led to success in the CBRS band should serve as a roadmap for the use of efficient spectrum management regimes in additional bands. The model the Commission used to enable the development and implementation of the SAS has been extraordinarily successful,⁵ and a number of these successful elements can be leveraged in establishing the AeroMACS Bands Channel Manager.

SAS technology is based on a dynamic database that, using its up-to-the-second inventory and modeling of spectrum use, provides real-time coordination and manages access on a protected basis for priority users while simultaneously supporting coexistence among secondary users. The CBRS SAS utilizes location and technical operating parameters from user equipment, together with collected sensor information, to manage users and make spectrum available to whomever needs it. While such real-time sensor information may not be necessary for the AeroMACS band, the SAS is smart technology. It relies on learning or cognitive

⁵ See 47 C.F.R. Part 96, Subpart F.

algorithms for spectrum management.⁶ The more it is used, and the more devices it manages, the smarter it gets. With access to more data and more experience, it becomes increasingly more accurate and efficient at assigning spectrum and ensuring interference protections. As the SAS learns, it more efficiently administers scarce spectrum resources, helping to ensure that spectrum is available when and where users need it and providing users in SAS-administered frequency bands the certainty of spectrum access they need to perform their missions. These machine learning capabilities can be readily applied to the AeroMACS Band, improving channel management functions over time.

Additionally, the Commission's experience in establishing frequency management regimes also provides a stark illustration of the power of cloud-based coordination databases. The cloud-based architecture of SAS technology could be leveraged so that the AeroMACS Band Channel Manager could exploit the capabilities of the cloud to foster innovation and enhance efficient spectrum utilization. Leveraging the capabilities of the cloud, and cloud computing in particular, would allow the Channel Manager to offer enhanced processing and database capability and will enable efficient scaling as new uses of the band expand. Cloud capability is particularly advantageous in the AeroMACS Bands as the full nature and extent of deployment, and the various users and operations to be supported, are not yet fully defined. This cloud capability would also allow the Channel Manager to update interference calculations in real-time as new users enter the band or new channel availability queries are received. The end result would be maximized spectral utilization, and a system with improved security, scalability,

⁶ Using performance and spectrum measurements from managed devices, the SAS applies sophisticated machine learning techniques to continually improve propagation models and interference estimates, leading to greater spectrum utilization while enhancing safeguards for protected systems.

and reliability by virtue of its distributed nature and the redundancies inherent to cloud architectures.

B. A SAS-Like Channel Manager Would Be of Particular Value in the AeroMACS Bands, Given the Need to Coordinate Disparate Users and Use Cases.

While the spectrum environment and types of operations in the AeroMACS Bands are obviously distinct from those in the CBRS band, the necessary functionalities of an AeroMACS Channel Manager are conceptually very similar to those of the CBRS SAS. In both instances, a sharing mechanism is needed to coordinate operations between and among various users and use cases to maximize the utilization of limited spectrum resources, and to effectuate priority access regimes as necessary to avoid interference to critical operations. Indeed, this capability would be particularly valuable in coordinating Aeronautical Mobile Telemetry operations in the 5091-5150 MHz band to enable flight testing operations while ensuring AeroMACS users are protected.⁷ Similarly, just as the CBRS SAS is required to protect commercial incumbent users in the Fixed-Satellite Service and fixed wireless broadband service,⁸ so too could the AeroMACS Channel Manager administer coordination with, and protection of, Globalstar's operation of its feeder links between gateway earth stations and space stations in the 5096-5250 MHz band.⁹

In addition, the use of automated sharing technologies such as the SAS would also facilitate sharing between disparate users, such as Federal and non-Federal users, as will be necessary in the AeroMACS Bands given the use of the spectrum for Air Traffic Control and Air Traffic Management operations. These benefits are powerfully demonstrated in the CBRS band, where the SAS's overarching purpose is to automate the sharing of spectrum between Federal

⁷ NPRM at para. 41-42.

⁸ See 47 C.F.R. §§ 96.17, 96.21.

⁹ NPRM at para. 43.

and commercial users, protecting offshore naval radars and inland radar operations while facilitating commercial access to much-needed mid-band spectrum. The use of the SAS enables automated coordination of commercial radio deployments in the vicinity of military and other critical Federal installations, replacing the legacy, time-consuming approaches, such as using a manual or semi-manual notification portal. The automation embedded in the SAS facilitates commercial access at the earliest opportunity while ensuring that Federal operations are unimpeded. The SAS's automated coordination capabilities also generate significant regulatory efficiencies, particularly in a Federal-non-Federal sharing regime. By automating coordination between Federal and non-Federal users, a sharing framework that leverages a SAS-like AeroMACS Channel Manager would reduce the administrative burdens on the Commission and Federal users by streamlining and centralizing the process of conducting interference analyses, assessing Federal user protection requirements, and determining the operational parameters needed to enable shared use. This is of particular benefit when compared to the current Federal-non-Federal coordination process, which is highly manual for both the FCC and Federal users and is exceedingly time-consuming in many instances.

In light of the potential for a SAS-like AeroMACS Channel Manager to maximize the efficiency of spectrum utilization in the AeroMACS Bands, Federated Wireless urges the Commission to adopt a sharing framework for the AeroMACS Bands that builds on the success of the Part 96 rules. Doing so will help ensure that eligible users are able to access the spectrum when they need it, important operations are protected, and the Channel Manager is able to scale as the uses of the AeroMACS Bands evolve and intensify.

II. THE COMMISSION SHOULD ENSURE THAT ITS SERVICE RULES FOR THE AEROMACS BANDS ARE TECHNOLOGY NEUTRAL AND FACILITATE THE MOST EFFICIENT, DENSEST POSSIBLE USE OF THE SPECTRUM.

Federated Wireless agrees with the Commission that it is paramount that its “AeroMACS rules are technology-neutral and flexible.”¹⁰ While Federated Wireless acknowledges that the international and domestic allocations of the AeroMACS Bands may contain some constraints on operators’ flexibility,¹¹ Federated Wireless also observes—as the Commission well knows—that as the pace of technological development often outpaces regulatory efforts, technology neutral rules are important to ensure that spectrum is used to its highest potential. The Commission should therefore be careful to avoid adopting rules that effectively require the use of particular technologies for particular operations.

CBRS is a perfect example of the importance of technology neutral rules, which has resulted in an extremely robust device ecosystem, and a myriad of use cases. The flexibility permitted to manufacturers and users by the technology neutral rules in the CBRS band fostered this ecosystem by letting these same stakeholders to define the use of the band, pursuant to the necessary baseline technical rules. The Commission should examine whether the AeroMACS Bands could similarly benefit from technology neutral rules as manufacturers, and users, continue to define the services and use cases that will be supported in the AeroMACS Bands, and as standards for the use of the spectrum necessarily evolve. Technology neutrality is vital for providing users and device manufacturers with the flexibility needed to innovate and develop the

¹⁰ NPRM at para. 44.

¹¹ See 47 C.F.R. § 2.106, Footnotes 5.444B, US115, US444B (“The use of the frequency band 5091-5150 MHz by the aeronautical mobile service is limited to: –systems operating in the aeronautical mobile (R) service and in accordance with international aeronautical standards, limited to surface applications at airports. Such use shall be in accordance with Resolution 748 (Rev.WRC-12)”; see also *id.* § 87.5 (defining the aeronautical mobile (route) service to which the AeroMACS Bands are allocated as “An aeronautical mobile service reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes”).

new products and services that will ensure the AeroMACS Bands are available to support the evolving needs of eligible users at the nation's airports.

III. CONCLUSION

For the foregoing reasons, Federated Wireless urges the Commission to act expeditiously to: (1) leverage to the maximum extent possible dynamic coordination and spectrum sharing technologies that are available today in establishing the Channel Manager for the AeroMACS Bands; and (2) ensure that its service rules for the AeroMACS Bands are technologically neutral and allow for the densest possible use of the spectrum at and in the areas surrounding airports. Doing so will ensure that these vital spectrum resources are put to maximum use in support of critical operations at the nation's airports and permit those operations to grow and evolve as users' needs and technology evolve.

Respectfully submitted,

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