Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of

Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions (GN Docket No. 12-268)

REPLY COMMENTS OF
AEROSPACE AND FLIGHT TEST RADIO COORDINATING COUNCIL, INC.

Aerospace and Flight Test Radio Coordinating Council, Inc. (“AFTRCC”) hereby submits its Reply to the Comments on the Notice of Proposed Rulemaking in the above-captioned proceedings.1

I. AFTRCC STANDS READY TO WORK WITH WIRELESS MICROPHONE MANUFACTURERS TO EXPLORE LICENSED OPERATION ON A SECONDARY BASIS IN THE 1435-1525 MHZ BAND

The initial commenters supporting operation of licensed wireless microphones in the 1435-1525 MHz band recognize the need to protect aeronautical mobile telemetry (“AMT”) operations, echoing the Commission’s concerns in the NPRM. Shure Incorporated (“Shure”), for example, notes that “introduction of microphones on a more routine secondary use basis” in the band will require that the microphone equipment and rules “provide[] AMT operations with full

and comprehensive interference protection.”

Shure recognizes the need to “[r]equire licensees to coordinate operations through the FCC with [AFTRCC], which already serves as the coordinating body for the existing primary users in the 1.4 GHz Band.”

The Society of Broadcast Engineers, Incorporated (“SBE”) and Broadcast Sports, Incorporated ("BSI") have certain reservations about the Commission licensing wireless microphone operations in the band on a more routine basis than has occurred pursuant to AFTRCC-coordinated Special Temporary Authorities (“STAs”). Yet, they too note that, should the Commission make the band available for licensed use, licenses should be “limited to professional production companies only” and otherwise be made available as proposed in paragraph 177 of the NPRM. In particular SBE and BSE cite with approval the Commission’s proposal that “use of this band be limited to licensed professional users at specified locations and times, and include specified safeguards designed to protect AMT use of the band.”

No commenter in support of secondary licensed wireless microphone operations in the band proposed expanding the pool of eligible users beyond that proposed by the Commission and

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3 Comments of Shure at 39.


6 NPRM, ¶ 177; see Comments of SBE at 15; Comments of BSI at 15.
supported by AFTRCC in its comments. Moreover, the wireless microphone manufacturers and users commenting on use of the band did not challenge the need for coordination or, with one exception, the need for “a mechanism . . . to ensure that wireless microphone systems marketed for use in this spectrum can only be operated after successful coordination, such as an electronic key or other means.”

Sennheiser contends that such mechanisms are unnecessary because “Class A professional wireless microphone users are experienced at avoiding interference to fixed incumbents (such as TV stations and public safety land mobile communications) without self-location capability, and we expect that success to carry over to the 1.4 GHz band.”

Sennheiser’s equating interference threats to TV stations and public safety land mobile communications to potential harmful interference facing AMT operations is inapposite. Far more than these other uses, as important as they are, it is vital for the Commission’s rules to protect AMT in the 1435-1525 MHz band against even brief occurrences of interference to real-time telemetry communications. AMT data communicated using these frequencies are the critical source of real-time measurement and status information transmitted from airborne vehicles during live tests of manned and unmanned aircraft. The demands of flight test operations for clean, continuous communications paths is predicated on considerations of safety of life and property that far exceed any concerns about brief interference to television stations or even public safety land mobile communications. Even interference to AMT operations that lasts a fraction of a second can interrupt communications between a test aircraft and a distant ground.

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7 See Comments of AFTRCC, GN Docket No. 14-166 and GN Docket No. 12-268, at 15 (filed Feb. 4, 2015); see also NPRM, ¶ 186 (proposing to limit eligible users to certain defined classes of professional users).

8 Id., ¶ 178.

9 Comments of Sennheiser at 24.
station, by causing the AMT receive antenna tracking control loop to lose lock, with results that could be disastrous.\(^\text{10}\)

Moreover, as AFTRCC explained, the potential for resold equipment capable of operating in the band being used by non-eligible users creates the need for a control mechanism in addition to coordination to ensure there is not harmful interference to AMT operations. Without a control mechanism in place to prevent equipment from being operated at coordinated locations and times, users not eligible for licenses would be free to deploy equipment obtained on the secondary market at locations and times of their choosing. Moreover, there is always the possibility that, on occasion, even professional users might inadvertently forget to coordinate an intended use and, in the exigencies of the moment given the commercial demands placed upon them, risk operating without coordination. A control mechanism would protect AMT against interference in both types of situations. AFTRCC certainly agrees with Shure that “the service rules and operating parameters promulgated” in the 1435-1525 MHz band should be “reasonable,” and AFTRCC reiterates its openness, explained in its opening comments, to work with the manufacturers to develop reasonable and effective coordination and control mechanism parameters that do not unduly burden the equipment or their users while adequately protecting AMT communications against harmful interference.\(^\text{11}\)

\(^{10}\) See Comments of AFTRCC at 4-5. If the antenna control unit loses lock, recovery of the AMT downlink can take many minutes, assuming it can even be accomplished without restarting the flight test segment. The loss of real-time communications during a test presents potentially severe risk to the flight crew and aircraft, as well as persons and property on the ground. Moreover, if the flight test segment needs to be restarted as a result of interference, this is an expensive and time consuming proposition.

\(^{11}\) See, e.g., id., at 19 n. 33. With respect to control mechanisms, AFTRCC notes that the manner in which networks of microphones operating on different channels are linked to a nearby receiving hub lends itself to a system analogous to that the Commission found could be beneficial for networks of MBANs devices to ensure that MBAN devices, as the
Shure proposes certain operating parameters for wireless microphone equipment in the 1435-1525 MHz band, including a maximum operating power of 250 mW in a 200 kHz channel. With respect to Shure's proposed technical characteristics for wireless microphones operating in the band, AFTRCC questions the automatic extension of UHF parameters for existing high power microphones into the AMT band. In particular, except in unusual circumstances involving a very limited number of microphones operating within a single 5-10 MHz AMT channel, the transmit power level for a single microphone operating over a 250 kHz or smaller bandwidth could reasonably be limited to 10 mW, rather than the proposed 250 mW. In many countries, operation of wireless microphones in the UHF bands is already limited to 10 mW per transmitting device.

Shure sets out what it sees as the inherent compatibilities of AMT operation and wireless microphone use, stating that

AMT operations are generally conducted during the day, over unpopulated areas in relatively discrete locations. With certain exceptions, wireless microphone operations generally occur in and around populated areas, at low power levels. The large-scale events that urgently require spectrum . . . in many instances occur at night to maximize attendance or viewership. Given these inherent compatibilities, shared use of the band, with wireless microphones operating on a secondary and non-interfering basis, enables more efficient use of spectrum that is at present underutilized, while ensuring the band retains its utility for the incumbent user.

Commission’s rules require, only operate indoors at coordinated locations. See NPRM, ¶ 184. In the case of wireless microphones, AFTRCC is not suggesting that operations be limited to indoors, but that operation be limited to times and locations that have been successfully coordinated and the control mechanism be used to ensure that operation in the 1435-1525 MHz band can only occur at such times and locations.

Comments of Shure at 39.

See, e.g., ETSI EN 300 422-1 V1.3.2 (2008-03).

Comments of Shure at 39-40.
AFTRCC notes that these are broad generalizations, and one should draw only an appropriately limited amount of comfort from them. Flight tests typically do occur during daylight hours, but they may occur at night as well, and at any day during the week or month. The flight tests also occur in all weather conditions. For example, testing of de-icing systems entails deliberate flight into conditions under which normal flight is often avoided. By the same token, wireless microphone operation by professional users certainly would not be limited to night. NASCAR events and golf tournaments are daytime examples that come to mind. Further, flight test ground stations, which are the AMT locations that require protection are generally located at or near airports and so a significant number are in proximity to urban locations.

In short, the compatibility between wireless microphone use and AMT operations is not as simple as Shure makes it out to be. Having said that, because the proposed wireless microphone operations to be licensed would be at fixed locations at fixed times, the considerations of terrain and building attenuation – depending on whether proposed operations will be outside or inside – and the characteristic of limited clusters of microphones communicating with “centralized” receivers, makes coordination likely in a large percentage of cases, albeit perhaps after certain adjustments to the proposed wireless microphone operations, as AFTRCC has found in coordinating many STAs in the band. AFTRCC notes that it may be the case that, particularly near AMT-equipped airports in urban locations (e.g., Dallas/Fort Worth, Seattle and St. Louis), line-of-sight propagation will prevail, and successful coordination may not always be possible. AFTRCC recognizes that much work remains to fill in the necessary details regarding coordination between AMT and secondary licensed wireless microphone operations envisioned by the Commission and the use of adequate control mechanisms to ensure
non-interfering operation. AFTRCC reiterates its openness to exploring operating parameters, coordination methodologies, and control mechanisms with the manufacturers to ensure compatibility beyond the very general characteristics cited by Shure.

II. THE COMMISSION SHOULD NOT HOLD INCREASED EFFICIENCIES IN THE USE OF RADIO SPECTRUM HOSTAGE TO THE INSATIABLE DESIRE BY THE COMMERCIAL MOBILE BROADBAND INDUSTRY FOR MORE LICENSED SPECTRUM

In its initial comments, AFTRCC explained that 1435-1525 MHz is a band on the critical path for the aerospace industry, the manufacturing sector that has generated the largest net annual trade surplus in the United States for the past fifty years. Use of the band for flight testing is vital for aerospace research and development, and for certifying aircraft to safety standards. AFTRCC detailed in its initial comments the long history of the Commission protecting the 1435-1525 MHz band from the introduction of co-channel use that is incompatible.

One commenter, CTIA, asks the Commission to postpone consideration of making a secondary allocation in the 1435-1525 MHz band for wireless microphones unless and until the band has been found unsuitable to host commercial broadband services. Concerned that spectrum “appropriate” for commercial mobile services may be becoming “increasingly scarce,” CTIA asserts its “belie[f] that the Commission should not take action with respect to this spectrum until it has been fully examined for its suitability to host licensed wireless services.”

CTIA argues that the band is under consideration in international fora for potential use by mobile

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15 See Comments of AFTRCC at 3.
16 See id. at 6-10.
18 Id.
broadband services, but it ignores entirely the evidence, and the U.S. position in international fora, that sharing of this band with AMT is infeasible.19

As AFTRCC demonstrated in its comments, the United States, in preparation for the 2015 World Radiocommunication Conference has examined whether the 1435-1525 MHz band could accommodate sharing between safety-of-life AMT operations and commercial mobile operations.20 Based on ITU Joint Task Group 4-5-6-7 studies examining AMT and commercial mobile sharing prospects, the United States has rejected calls from other Administrations to make all or a portion of the 1435-1525 MHz band available for mobile commercial service, i.e., International Mobile Telephony (“IMT”), on an international basis, despite the views of other administrations. In order to protect AMT operations in this country, the prevailing U.S. position

19 See, e.g., “Sharing studies between potential International Mobile Telecommunication systems and aeronautical mobile telemetry systems in the frequency band 1429-1535 MHz,” ITU-R Report M.2324, in press at ITU.int. The U.S. view on the matter of sharing between AMT and IMT the in L band is captured in detail in Annex 4, Study 4 of this report, beginning on page 37. The study found that large protection zones, on the order of hundreds, rather than tens of kilometers, would be required to protect AMT ground stations from co-channel interference caused by commercial mobile broadband stations and that similarly significant zones would be required to protect commercial mobile stations from interference from aircraft transmissions during flight tests, which can cover tens of thousands of square miles. The studies contained in the other annexes in ITU-R Report M.2324 do not represent the U.S. view, typically because they are based on different assumptions about AMT operations than what apply in the U.S., or they use different interference protection criteria than those presented in Recommendation M.1459. See Amendment of Part 27 of the Commission’s Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band, WT Docket No. 07-293, and Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band, IB Docket No. 95-91, Order on Reconsideration, FCC 12-130, at 67-68 (rel. Oct. 17, 2012) (Commission declines to remove the reference to ITU-R M.1459 in Section 27.73(a) governing coordination between Wireless Communications Services (“WCS”) and AMT and clarifies “that WCS and AMT entities, using accepted engineering practices, are required to apply ITU-R M.1459, as adapted to local conditions and operating characteristics of both WCS and AMT systems, in coordinating their stations” (emphasis added))

20 See id. at 9-10.
at this time is to retain the International Telecommunication Union footnote, Radio Regulation 5.343, which proscribes that “In Region 2, the use of the band 1435-1535 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile service.”\textsuperscript{21}

For these reasons, the Commission should not put this band in some sort of reserve status and off limits to secondary users until the commercial mobile wireless industry at some indeterminate point in the future gives up the fight, on its terms, to gain access to this spectrum. Given that the \textit{NPRM}'s proposal that this band be an option to meet future wireless microphone needs \textit{for professional users} is a consequence of making other spectrum in the television bands available to commercial mobile users – and what may well be considerable portions of the current broadcast spectrum as a result of the incentive auctions to be held in 2016 – it is clear that the commercial mobile industry is asking the Commission to freeze the 1435-1525 MHz band against further changes until it gives up its claims on the spectrum. In light of the Commission’s long history of protecting safety-of-life AMT operations in this band from potentially interfering co-channel use and the absence of any realistic opportunity for sharing between AMT and commercial mobile broadband, the Commission has no reason to suspend consideration of a secondary use in 1435-1525 MHz conducive to sharing which meets a legitimate need and increases the overall use of the band, \textit{i.e.}, wireless microphones, provided that the coordination protocol and control mechanism requirements are properly developed.

\textbf{III. CONCLUSION}

For the foregoing reasons and those set forth in its initial comments, successful co-channel secondary operation of wireless microphones in the 1435-1525 MHz band can be

achieved provided that the Commission adopts certain measures. Specifically, the Commission should limit the entities eligible for licenses to professional users, require advance coordination of wireless microphone operations at specific locations and times with AFTRCC, and mandate that a control mechanism be integrated into microphone equipment certified for use in the 1435-1525 MHz band to ensure that operation can only occur after coordination has been obtained at coordinated times and places.

Respectfully submitted,

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February 25, 2015