Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
	)	
Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands, and Duplex Gap, and Channel 37, and	)	ET Docket No. 14-165
	)	
	)	
Amendment of Part 74 of the Commission's Rules For Low Power Auxiliary Stations in The Repurposed 600 MHz Band and 600 MHz Duplex Gap	)	
	)	
Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions	)	GN Docket No. 12-268

COMMENTS OF SHURE INCORPORATED

Shure Incorporated ("Shure"), by its undersigned counsel, hereby comments on the Petitions for Reconsideration filed in connection with the Commission's August 11, 2105 order ("Order") in the above-captioned proceeding.[1] Among other steps, the Commission's Order substantially restructured the technical and operating rules that apply to wireless microphones, unlicensed and licensed, as a consequence of making significantly more UHF spectrum available for high power mobile use and low power White Space Devices ("WSDs"). In this proceeding, Shure and other wireless microphone stakeholders urged the Commission to preserve access to a sufficient amount of UHF spectrum, the principal band where wireless microphones have

[1] *See Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, and Amendment of Part 74 of the Commission's Rules for Low Power Auxiliary Stations in the Repurposed 600 MHz Band and 600 MHz Duplex Gap*, ET Docket No. 14-165, GN Docket No. 12-268, Report and Order, 30 FCC Rcd 9551 (rel. Aug. 11, 2015) ("*Order*").

successfully operated for decades. However, as a result of the Order, and other Commission actions relating to the broadcast Incentive Auction, all wireless microphone users will experience sharp reductions in the amount of UHF spectrum that will be available for wireless microphone operations. Wireless microphone users, in particular, will have very limited opportunity, if any, to access *interference-free* UHF spectrum.

Given the very challenging spectrum environment produced by the Commission's decisions to accommodate high power mobile and low power WSDs in the UHF band, Shure sought reconsideration and/or clarification of a number of specific issues in the interest of managing the cost and significant dislocation that these changes will undoubtedly bring to wireless microphone manufacturers and users. Shure specifically requested that the Commission:

- clarify that Part 15 antenna connector limitations do not apply to unlicensed wireless microphones, for the reason discussed below;[2]

- adopt 50 mW power limits for unlicensed microphones operating on guard bands and licensed microphones operating in the duplex gap in light of record evidence confirming that a 50 mW power limit for wireless microphones in 600 MHz guard bands protects wireless licensees and incumbent TV stations from interference. The present 20 mW limit diminishes the utility of the guard bands for wireless microphone use, and makes the development and manufacture of equipment uneconomical and impractical;[3]

- permit radiated or conducted power measurements for Part 15 wireless microphones. The record does not support limiting power measurements for unlicensed microphones to radiated measurements only, which creates an unnecessary hardship for manufacturers during certification testing. Manufacturers should have the flexibility to undertake radiated or conducted measurements depending on the device under test;[4]

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[2] *See* Petition for Reconsideration of Shure Incorporated in ET Docket No. 14-165, GN Docket No. 12-268 ("Shure Petition"), at 3-7 (filed Dec. 23, 2015).
[3] *See id.*, at 7-10.
[4] *See id.*, at 11.

- refrain from applying operation cut-off dates to 600 MHz band microphones that can tune to permitted frequencies. Reconsideration of the requirements will avoid the onerous cost burden and dislocation caused by early retirement of a significant amount of 600 MHz hardware, when labeling and outreach can adequately inform end users about frequencies that remain available for use;[5]

- reinstate a channel reservation process for unlicensed wireless microphones so that important classes of professional but unlicensed audio wireless microphone users may gain access to modest amounts of clean spectrum, at a minimum, for special circumstances. Reconsideration is warranted because the Commission grossly overestimated the availability of clean spectrum for unlicensed microphone use. The expansion of licensing eligibility still falls far short of encompassing important classes of professional audio wireless microphone users that require interference protection.[6]

Shure submits the following response to the Petitions filed by other parties in this proceeding.

I. Wireless Microphone Manufacturers Agree that Part 15 Antenna Connector Limitations Should Not Apply to Unlicensed Wireless Microphones

Shure requested Commission reconsideration, or in the alternative, clarification that the Order did not extend the Part 15 limitations on the use of standard antenna jacks and electrical connectors ("connectors") to unlicensed wireless microphones operating in the TV bands.[7] Specifically, the Order established permanent Part 15 rules for unlicensed wireless microphones to replace the earlier blanket waiver created in 2010.[8] The Order clearly expressed an intent to align the Part 15 microphone technical rules with the Part 74 technical rules, where possible, to ease the transition for end users to a permanent unlicensed regulatory framework. The Order did not discuss any public interest reason to apply, and no party raised a concern that would justify an incompatible antenna connector requirement that would force significant redesign of virtually all wireless microphone equipment and significantly disrupt product development. Accordingly,

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[5] *See id.*, at 12-13

[6] *See id*. at 13-15.

[7] *See* 47 C.F.R. §§ 15.201, 203 and 204. Section 15.201 requires equipment authorization for intentional unlicensed radiators under Part 15 rules. Sections 15.203 and 15.204 specify rules for the unlicensed device use of external antennas.

[8] *See Order* at ¶ 94.

Shure sought confirmation in its Petition for Reconsideration that the antenna connector limitations in Sections 15.201, 15.203 and 15.204 of the Commission's Rules do not apply to unlicensed wireless microphones.[9]

As discussed in Shure's Petition, those limits, if applied to wireless microphones, would impose an onerous burden on manufacturers and end users, would be unnecessary to address concerns about human safety, interference, or spectral efficiency, and would be contrary to the Commission's intent to maintain consistency with the Part 74 technical rules requirements.[10] There is no record evidence that the Part 15 standard antenna prohibition is necessary to prevent interference to other services and/or facilitate frequency reuse.[11]

Other manufacturers agreed. In consolidated Petitions for Reconsiderations, Audio-Technica U.S., Inc. ("Audio-Technica") and Sennheiser Electronics Corporation ("Sennheiser") both urged the Commission to make clear that wireless microphones certified under Part 15 would not be not be subject to the prohibition on standard connectors on transmitters. Audio-Technica stated: "[w]ireless microphones have unique requirements . . . and readily available replacements are necessary in order to accomplish satisfactory performance given other technical

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[9] Conventional wireless microphones used for sound reinforcement as well as devices used for cue and control communications, synchronization of TV camera signals, and in-ear monitors fall with the Commission's definition of a "wireless microphone." *See Promoting Spectrum Access for Wireless Microphone Operations; Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions,* GN Docket Nos. 14-166 and 12-268, Report and Order, 30 FCC Rcd. 8739, at n. 8 (rel. Aug. 11, 2015).

[10] Manufacturers would need to spend considerable time and effort to develop and implement new antennas with proprietary connectors into next generation wireless microphones, which would be very difficult, due to the fact that these devices are highly compact and operational performance is strongly affected by connector characteristics. Further, in-ear-monitor systems are often used with RF combiners to aggregate the output of several transmitters for use with a single antenna. These transmitters are normally rack mounted, requiring that the antennas be mounted outside the rack for these systems to operate properly. The use of RF Combiners also significantly increases the spectrum efficiency of the wireless system.

[11] *See, e.g., Amendment of the Commission's Rules to Provide for Operation of Unlicensed NII Devices in the 5 GHz Frequency Range,* ET Docket No. 96-102, Report and Order, 12 FCC Rcd 1576 at ¶ 50 (rel. Jan. 9, 1997).

restrictions."[12] According to Sennheiser, "[g]iven the lack of clarity in the proceeding, the difficulty in meeting these rule pars, and the absence of any issue from equipment in the field," the Commission should keep the Section 15.201 waiver in force.[13] Accordingly, the Commission should reconsider and/or clarify that this requirement does not apply to wireless microphones.

II. The Commission Should Grant NAB's Petition to Reconsider Measures to Improve Database Functions including Replacing the "Push" Notification Requirement with the More Efficient and Effective Plan to Require More Frequent Rechecks

Shure supports NAB's request for reconsideration of the new framework that requires the white spaces database to "push" information to WSDs in areas where licensed wireless microphones have notified the database that they are or will be operating. In the Notice of Proposed Rulemaking in this proceeding, the Commission originally proposed to improve database operating procedures and functions by requiring WSDs to recheck the database no less than every 20 minutes (rather than every 24 hours) and for database administrators to share wireless microphone registrations within ten (10) minutes.[14] Shure supported this original proposal as an efficient and technically feasible approach that would minimize the harmful effect of WSD interference on incumbent wireless microphones that have registered but are not yet reflected in the geolocation database.[15] Despite support from Shure and other interested parties for the Commission's original

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[12] *See* Petition for Reconsideration of Audio-Technica U.S., Inc. in ET Docket No. 14-165, GN Docket No. 12-268 ("Audio-Technica Petition") at 9-10 (filed Dec. 17, 2015).

[13] *See* Consolidated Petition for Reconsideration of Sennheiser Electronics Corporation in ET Docket No. 14-165, GN Docket No. 12-268 ("Sennheiser Petition"), at 9-10 (filed Dec. 17, 2015).

[14] *See* Petition for Reconsideration of National Association of Broadcasters in ET Docket No. 14-165, GN Docket No. 12-268 ("NAB Petition"), at 4-7 (filed Dec. 23, 2015).

[15] *See* Comments of Shure Incorporated in ET Docket No. 14-165, GN Docket No. 12-268, at 33-35 (filed Feb. 4, 2015).

proposal, the Commission adopted a new approach that would require databases to "push" out updated information directly to WSDs.[16]

Shure agrees with NAB that increasing the frequency of database rechecks is still the most efficient and effective method of improving the functionality of the database.[17] Shure shares NAB's view that, as written, the rules do not fully achieve the stated goal of protecting licensed wireless microphones from interference. In particular, the rules need to specify how WSDs will determine that a channel is no longer available, and mandate that the device must cease transmitting, and how that it to be accomplished. Further, the rules need to specify how this scheme is to be implemented with WSDs that do not maintain continuous Internet connectivity. If the "push" notification approach is maintained, the rules must also specify that WSDs must incorporate the capability to receive such notifications, including when the devices are not in operation and are not connected to the Internet. A receiving WSD should also be required to send a confirmation that the device has received the notification and is complying with the push notification requirement.[18]

Shure also supports other important improvements to database operations requested in NAB's Petition, including the proposed revision of Section 15.711(b)(3)(iii) of the

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[16] *Order* at ¶¶ 273-278.

[17] Shure also believes the Commission's original proposal is superior to the proposed more narrow version of this method that would limit frequent rechecks to two "fast polling" lanes designated in each market. *See* Petition for Reconsideration of Google Inc. in ET Docket No. 14-165, GN Docket No. 12-268 1-8 (filed Dec. 23, 2015). This approach rests on the unfounded assumption that the two designated "fast-polling" frequencies would be sufficient in all cases to handle the demand by licensed wireless microphones to make interference-free channels available quickly. Another significant drawback to this approach is that there would be no assurance that the microphones operating in a given market could tune to the channels designated for that market. It is preferable simply to improve the functioning of the database with more frequent rechecks and database synchronization.

[18] *See* NAB Petition at 15.

Commission's Rules that permits WSDs to continue operating up to 48 hours after the last database contact.[19] NAB requests that this rule be revised to require that WSD operations cease after two failed scheduled checks.[20] Shure also agrees that the Commission should establish a reasonable location accuracy limit of +/- 100 meters and require WSDs to provide to the database the power level and channel on which a device operates.[21] Finally, the Commission should clarify that WSDs must use the latest available channel list provided by the database.

III. Professional Installation Must be Retained for Fixed Devices in Public Spaces.

Microsoft asks the Commission to revisit several aspects of the Part 15 rules as they apply to indoor fixed devices.[22] Shure urges caution in this regard.

Shure does not agree with Microsoft's statement that "[c]learly, an indoor-only fixed device presents even less interference risk than a personal/portable white-space device operating at the same power level."[23] In fact, indoor-only fixed devices could operate in close proximity to wireless microphones in many situations thus raising the potential for interference as compared to a fixed device operating outdoors.[24] In a typical configuration, an outdoor fixed device would be located further from wireless microphones being used indoors. Signals from an outdoor WSD entering a nearby building would also be subject to some amount of additional building attenuation (typically 6-20 dB) and these devices would normally be elevated above ground, resulting in additional separation.

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[19] *See id.* at 15-17.

[20] NAB Petition at 17.

[21] *Id.* at 11.

[22] *See* Petition for Reconsideration of Microsoft Corporation in ET Docket No. 14-165, GN Docket No. 12-268 ("Microsoft Petition"), at 15-16 (filed Dec. 23, 2015).

[23] Microsoft Petition at 16.

[24] For example, a fixed WSD operating in a hotel meeting room may be in close proximity to wireless microphones operations.

Indoor-only fixed devices operating in public places such as public buildings, meeting centers, classrooms, stadiums, theatres, and similar locations are likely to be operating near to professional wireless microphone operations. For that reason, while Shure has no position with respect to Microsoft's request to eliminate professional installation requirements for fixed devices in residential home use, it is important to retain the professional installation requirement for fixed WSDs operating in public places and places near to environments where professional wireless microphones are used. Further, Shure does not agree with Microsoft's overreliance on the fixed device registration requirements to address interference concerns. [25] The databases are not mandated by rule to make available public fixed device registration information to those who are tracking down potential sources of interference. Anecdotal experience to date confirms that it is a challenge to obtain relevant information from database operators. Therefore, unless and until the public is given access to fixed device registration information, other spectrum users experiencing interference cannot be assured that identifying information necessary to locate the source of interference will be made readily available from the databases.

[25] Microsoft states that "identification of a fixed device that may be causing harmful interference [is] fairly straightforward since those devices' locations must be registered in the database." Microsoft Petition at 16.

Respectfully submitted,

/s/

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