

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

In the Matter of

Promoting Spectrum Access for Wireless
Microphone Operations

GN Docket No. 14-166

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

REPLY COMMENTS OF MICROSOFT CORPORATION

The *Further Notice* in this proceeding recognized that any new rules for wireless microphones should achieve two important spectrum policy goals. First, any expansion of Part 74 low power broadcast auxiliary service ("LPAS") eligibility to accommodate additional performing arts organizations must occur in a limited manner that "ensur[es] that spectrum . . . remains available for other uses, such as by white space devices."¹ Second, that expansion should "promot[e] efficient use of spectrum . . . and spectrally efficient wireless microphones."²

¹ *Promoting Spectrum Access for Wireless Microphone Operations, et al.*, Order on Reconsideration and Further Notice of Proposed Rulemaking, FCC No. 17-95, GN Docket Nos. 14-166 and 12-268, ET Docket Nos. 14-165 and 10-24, WT Docket Nos. 08-166 and 08-167, ¶ 89 (rel. July 14, 2017) ("Wireless Microphone FNPRM").

² *Id.* ¶ 91.

The best way to achieve the Commission’s goals is to permit performing arts organizations to use the large amount of Part 74 spectrum the Commission has made available outside of the TV and 600 MHz bands. This would provide spectrum for these organizations while accommodating other socially and economically beneficial wireless uses, including increased access to broadband services across the United States.³ In contrast, while wireless microphone manufacturers and operators support expanding Part 74 eligibility within the TV and 600 MHz bands, none of these commenters describe how the Commission could accomplish its goals. In fact, wireless microphone proponents explicitly seek to expand Part 74 eligibility far beyond qualified performing arts organizations, and their proposals would allow even a single narrowband wireless microphone to block consumer access to an entire six-megahertz block of spectrum. This approach would undermine the use of TV white spaces and fail to meet the Commission’s stated objectives in this proceeding.

I. The Commission Should Only Expand Part 74 Eligibility Outside of the TV and 600 MHz Bands.

The record reflects broad support for making wireless microphone bands outside of the TV and 600 MHz bands—including the 900 MHz, 1.4 GHz, and 7 GHz bands—available for any newly eligible wireless microphone entities.⁴ Rules that encourage wireless microphones to use these frequencies will promote efficient spectrum use both inside and outside the TV bands. As

³ See generally Comments of Microsoft Corporation, GN Docket Nos. 14-166 and 12-268, ET Docket No. 14-165 (filed Oct. 2, 2017) (“Microsoft Comments”).

⁴ See, e.g., Comments of the Performing Arts Wireless Microphone Working Group at 8, GN Docket Nos. 14-166 and 12-268, ET Docket No. 14-165 (filed Oct. 2, 2017); Performing Arts Group Comments”; Comments of CP Communications, LLC at 3, GN Docket Nos. 14-166 and 12-268, ET Docket No. 14-165 (filed Oct. 2, 2017) (“CP Communications Comments”); Comments of Sennheiser Electronic Corporation at 8, GN Docket Nos. 14-166 and 12-268, ET Docket No. 14-165 (filed Sept. 29, 2017) (“Sennheiser Comments”); Microsoft Comments at 6.

the Performing Arts Wireless Microphone Working Group (“Performing Arts Group”) explains, new wireless microphones “are likely to be spectrally efficient.”⁵ Opening up Part 74 spectrum eligibility in these new bands will drive demand for wireless microphones that can take advantage of this spectrum—particularly if this is the only Part 74 spectrum that is available for this newly eligible group of users. There should be no expansion of Part 74 eligibility in the TV and 600 MHz bands.

Sennheiser maintains that the 1.4 GHz and 7 GHz bands are “poor substitute[s]” for UHF band spectrum, and that “only the 900 MHz band would be useful to most newly eligible licensees.”⁶ But even if the Commission only made the 900 MHz band available for newly eligible entities, this band alone would still constitute access to over 17 megahertz of spectrum for narrowband wireless microphone operations.⁷ This spectrum would accommodate dozens of microphones simultaneously operating at the same location—even assuming that parties were to deploy analog microphones, since modern analog technologies may now accommodate up to 16 microphones per six-megahertz channel.⁸ Parties requiring access to spectrum to accommodate additional microphones would be eligible to access TV band spectrum under the Commission’s existing Part 74 eligibility criteria for venues with more than 50 wireless microphones.⁹

In addition, as even wireless microphone proponents acknowledge, “movement of licensed users to other frequency bands would leave more TV band spectrum available for

⁵ Performing Arts Group Comments at 8.

⁶ Sennheiser Comments at 8.

⁷ See 47 C.F.R. § 74.802(a)(1).

⁸ See Wireless Microphone FNPRM ¶ 89 n.269.

⁹ See 47 C.F.R. §§ 74.832(a)(7)-(8).

unlicensed users.”¹⁰ Indeed, as Microsoft has explained, preserving access to unlicensed spectrum in the TV band will be critical to enabling the nationwide availability of white space devices, which require access to a minimum of 18 megahertz of spectrum in each market to justify the substantial investments needed to create affordable consumer devices.¹¹

The Performing Arts Group objects that purchasing new equipment to operate outside of the TV bands would create financial hardships for non-profit performing arts groups.¹² Although new wireless microphone costs are not insignificant, this equipment would enable these entities to access frequency bands without having to share spectrum with unlicensed devices or pay for a spectrum license at auction—an extraordinarily valuable right. In addition, if wireless microphone operators do not wish to purchase new equipment outside the TV bands, there is still spectrum in the TV and 600 MHz bands available for wireless microphones where white space devices do not operate.¹³ Moreover, as other commenters have noted, performing arts organizations can rent wireless microphone equipment as well.¹⁴ Finally, there is a large countervailing cost if the Commission were to increase Part 74 eligibility inside the TV bands. Such a Commission action would undermine consumer broadband at the very moment when consumers need it most, removing spectrum needed to provide internet access to unserved and

¹⁰ Performing Arts Group Comments at 8.

¹¹ See Microsoft Comments at 6, 13.

¹² Performing Arts Group Comments at 8.

¹³ See Microsoft Comments at 3-4, 7.

¹⁴ See CP Communications Comments at 2 (“CP Communications . . . is a leading source for the rental of wireless production equipment that is subject to [the Part 74] rules.”); Letter from Raymond Gibson, Cypress College, Fine Arts Division, to Chairman Pai and Commissioners Clyburn, O’Rielly, Carr, and Rosenworcel at 2, GN Docket Nos. 14-166 and 12-268, ET Docket No. 14-165 (filed Oct. 12, 2017) (noting that, while Cypress College owns 24 wireless microphones, it rents any additional mics it requires).

underserved areas, schools and universities, and many of the other communities served by performing arts organizations.¹⁵ The benefit of these broadband uses far outweigh any incremental benefit of expanding the number of wireless microphones eligible for Part 74 use inside the TV band when the Commission has also made several other spectrum bands available for this purpose.

II. Wireless Microphone Proponents Fail to Explain How Expanding Part 74 Eligibility in the TV and 600 MHz Bands Would Promote Use of Efficient Microphones and Preserve Spectrum for Consumer Broadband.

Wireless microphone proponents ask the Commission to expand Part 74 eligibility inside the TV and 600 MHz bands. However, they do not adequately explain how the Commission could do so consistent with its goals of promoting the use of spectrally efficient wireless microphones and ensuring that spectrum remains available for consumer broadband uses.¹⁶ These are particularly important considerations given that the success of TV white spaces technologies will require reliable access to a minimum of three usable six-megahertz-wide channels in each market.¹⁷

Some commenters observe that microphone coordination techniques can enable more efficient spectrum use.¹⁸ Similarly, as the Performing Arts Group explains, limiting the ability of Part 74 entities to reserve spectrum when it is not actually in use, or when “high-quality”

¹⁵ See Microsoft Comments at 6.

¹⁶ See Wireless Microphone FNPRM ¶ 89-92.

¹⁷ Microsoft Comments at 6.

¹⁸ See, e.g., Performing Arts Group Comments at 7 (“The fifty-unit proxy currently assumes that a licensee will have audio professionals experienced in frequency coordination who know the necessity of making the best use possible of scarce radio spectrum. Newly qualified performing arts organizations will have equivalent professionals with the same goal.”). See also CP Communications Comments at 2 (touting company’s expertise at “finding and efficiently using spectrum and applying the Commission’s Rules in actual practice.”).

wireless audio is not required, will encourage spectrum efficiency.¹⁹ Importantly, the Commission’s TV white space database registration rules already include the requirement that microphone users not reserve spectrum when they are not using it.²⁰ While the Commission certainly should ensure applicants are complying with its rules, and operating wireless microphones consistent with the actual usage information they submit to the Commission,²¹ wireless microphone proponents’ proposals do not address the Commission’s fundamental question of whether case-by-case expansion of Part 74 would promote the “use of . . . *spectrally efficient wireless microphones*”²² as opposed to the use of more efficient procedures for the operation of spectrally inefficient microphones. Indeed, none of the proposals set forth by wireless microphone proponents would preclude the use of older inefficient wireless microphone technologies that accommodate only 6-8 narrowband wireless microphones in an entire six-megahertz channel.²³

In contrast, the Commission can encourage wireless microphone operators to use efficient technologies by requiring newly eligible entities to demonstrate that deploying spectrally efficient technologies in the parts of the TV and 600 MHz bands where white space devices do

¹⁹ See Performing Arts Group Comments at 7.

²⁰ See 47 C.F.R. § 15.713(j)(8)(vii)(requiring TV white space database registrations for Part 74 wireless microphones to include the “[s]pecific months, weeks, days of the week and times” when microphones are being used and noting that the registration site will not be protected when microphones are not in use).

²¹ See *id.*

²² Wireless Microphone FNPRM ¶ 91 (emphasis added).

²³ See Wireless Microphone FNPRM ¶ 89 n.269 (“In earlier proceedings, the Commission noted that 6-8 high-fidelity analog wireless microphones operated on a six-megahertz TV channel, whereas in more recent years such analog microphones may allow twice that many on a channel.”).

not operate would still be insufficient to accommodate their needs.²⁴ Such technologies are already available today, including those that take advantage of advancements in VHF band microphones and digital technologies. Sennheiser repeats its previous arguments about the purported limitations of efficient digital microphone technologies;²⁵ however, in its opening comments, Microsoft demonstrated that these arguments are incorrect.²⁶ Moreover, even if the Commission accepts an applicant's claim that it is unable to take advantage of digital technology, the Commission should still assume that the applicant can deploy an average of least 2.5 narrowband analog microphones for each megahertz of TV band and 600 MHz band spectrum available at their location where TV white spaces devices do not operate.²⁷

Wireless microphone proponents likewise fail to explain how Part 74 expansion within the TV and 600 MHz bands would allow the FCC to achieve its policy of ensuring spectrum remains available for important consumer broadband uses such as white space operations. The Recording Academy makes the odd claim that expanding Part 74 would “benefit[], not hinder[], unlicensed use” because unlicensed devices will be able to see an additional group of wireless microphone users in the database and avoid them.²⁸ This misunderstands how the FCC's rules work. The purported “benefit” would preclude white space devices from operating on those frequencies entirely—reducing the amount of spectrum in important areas below the minimum three channels necessary for development and deployment of unlicensed broadband

²⁴ Microsoft Comments at 12-13.

²⁵ See Sennheiser Comments at 8-9.

²⁶ Microsoft Comments at 9-10.

²⁷ *Id.* at 12.

²⁸ Comments of the Recording Academy at 6, GN Docket Nos. 14-166 and 12-268, ET Docket No. 14-165 (filed Oct. 2, 2017) (“Recording Academy Comments”).

technologies. This is why the Commission’s rules must also include safeguards to ensure that newly eligible Part 74 licensees do not preclude consumers from accessing the last vacant channel available for white space operations in the TV band.²⁹

Significantly, without these safeguards a few narrowband wireless microphones—or even one single microphone—could deny every consumer in a community access to spectrum for broadband use. How could this promote efficient use of spectrum or serve the public interest? For example, the Performing Arts Group argues that the Commission should expand Part 74 eligibility to entities including “single-person performance[s]” that “might use far fewer than fifty wireless units.”³⁰ Similarly, Shure asks the Commission to expand Part 74 to accommodate “the university chancellor delivering a commencement address.”³¹ In these cases a single narrowband 200 kHz wireless microphone could block an entire six-megahertz channel that could have otherwise accommodated broadband operations, wasting over 96% of the spectrum in that channel, which would remain unused. If a performance requires only a small number of wireless microphones, the facility can easily use another frequency where the rules do not permit white space devices to operate.³²

Finally, comments by wireless microphone proponents in support of case-by-case eligibility determinations underscore the difficulty that the Commission will have in using this approach to create meaningful limits on eligibility. For example, the Recording Academy concedes that “there is no appropriate singular quantifiable metric to process licenses.”³³ The

²⁹ Microsoft Comments at 13.

³⁰ Performing Arts Group Comments at 5.

³¹ Shure Comments at i.

³² See Microsoft Comments at 3-4.

³³ Recording Academy Comments at 5.

Performing Arts Group suggests a series of “safe harbor” requirements an applicant could demonstrate—including a mission statement and history of performing arts productions and commitment to “register for protection only the frequencies, times and locations actually needed”—but also similarly argues that even entities that cannot meet these requirements should be eligible on a case-by-case basis.³⁴

Wireless microphone manufacturers go even further. Shure expressly argues for eligibility beyond performing arts activities, maintaining that applications such as corporate presentations at “investor meeting[s]” should have the right to exclude consumer unlicensed spectrum use.³⁵ Similarly, Sennheiser argues that “*any* entity that has the wherewithal to prepare, pay for, and file an FCC license application and regulatory fees, with accompanying information to demonstrate eligibility, is most likely a professionally-run organization able to comply with the responsibilities of being a FCC licensee.”³⁶ This approach would result in an assignment system that is administratively burdensome, subjective, and likely ungovernable.³⁷ Expanding Part 74 eligibility to any entity, not just small performing arts organizations, based on asserted need and ability would also undermine long-standing FCC spectrum policy by granting users of one favored technology the right to exclude all other technologies without an auction or any legitimate policy justification. For this reason, the Commission should expressly define the class of additional Part 74 LPAS eligible entities as “performing arts organizations” in its rules,

³⁴ Performing Arts Group Comments at 8-9.

³⁵ Comments of Shure Incorporated in Response to Further Notice of Purposed Rulemaking at 6, GN Docket Nos. 14-166 and 12-268, ET Docket No. 14-165 (filed Oct. 2, 2017).

³⁶ Sennheiser Comments at 6 (emphasis added).

³⁷ Microsoft Comments at 17.

and assess eligibility under this definition by requiring the applicant to show that it is engaged in a discipline recognized as a performing art.³⁸

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Increasing Part 74 LPAS eligibility inside the TV and 600 MHz bands would reduce the amount of spectrum available for unlicensed technologies, undermining broadband deployment at a time when it is critical to expand it. Accordingly, the Commission should achieve its goal of accommodating additional performing arts organizations while promoting efficient spectrum use by enabling these entities to use the significant new spectrum available to wireless microphones outside of the TV and 600 MHz bands. If the Commission nevertheless decides to expand Part 74 eligibility within the TV and 600 MHz bands, it is critical that it adopt rules that promote the use of efficient wireless microphone equipment, preserve spectrum access for unlicensed broadband applications, and carefully limit this expansion to performing arts organizations.

Respectfully submitted,

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³⁸ *Id.* at 16.