



PUBLIC NOTICE

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DA 12-1570

Released: October 5, 2012

THE WIRELESS TELECOMMUNICATIONS BUREAU AND THE OFFICE OF ENGINEERING AND TECHNOLOGY SEEK TO UPDATE AND REFRESH RECORD IN THE WIRELESS MICROPHONES PROCEEDING

WT Docket Nos. 08-166, 08-167, ET Docket No. 10-24

Comment Date: 30 days from publication in the Federal Register

Reply Comment Date: 21 days after comments are due

By this Public Notice, the Wireless Telecommunications Bureau and the Office of Engineering and Technology invite interested parties to update and refresh the record pertaining to two specific issues raised in the Commission's 2010 *Wireless Microphones Further Notice*¹ – (1) whether the Commission should provide for a limited expansion of license eligibility that would permit some wireless microphone and other low power auxiliary station users, which currently operate in the TV broadcast spectrum on an unlicensed basis, to operate on a licensed basis under the Part 74 rules applicable to low power auxiliary stations (LPAS); and (2) what steps the Commission should take to promote more efficient use of this spectrum by wireless microphones.² We ask that these comments take into consideration recent industry developments, including advances in wireless microphone technologies, as well as related Commission proceedings that affect use of wireless microphones, including the TV White Spaces proceeding³ and the Incentive Auctions proceeding proposing auction of spectrum currently allocated to television broadcasting.⁴

¹ See Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band, WT Docket No. 08-166, Public Interest Spectrum Coalition, Petition for Rulemaking Regarding Low Power Auxiliary Stations, Including Wireless Microphones, and the Digital Television Transition, WT Docket No. 08-167, Amendment of Parts 15, 74 and 90 of the Commission's Rules Regarding Low Power Auxiliary Stations, Including Wireless Microphones, ET Docket No. 10-24, *Report and Order and Further Notice of Proposed Rulemaking*, 25 FCC Rcd 643 (2010) (*Wireless Microphones Order* and *Wireless Microphones Further Notice*, respectively).

² In the *Incentive Auctions NPRM* adopted on September 28, 2012, the Commission noted that we would be issuing this public notice to refresh the record on expanding eligibility for licensed operations to specified classes of users, and on improved efficiency standards. See *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, *Notice of Proposed Rulemaking*, FCC 12-118, ¶ 224 n.354 (adopted Sept. 28, 2012) (*Incentive Auctions NPRM*).

³ Unlicensed Operation in the TV Broadcast Bands, ET Docket No. 04-186, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, ET Docket No. 02-380, *Second Memorandum Opinion and Order*, 25 FCC Rcd 18661 (2010) (*TV White Spaces Second MO&O*). See also Unlicensed Operation in the TV Broadcast Bands, ET Docket No. 04-186, *Third Memorandum Opinion and Order*, 27 FCC Rcd 3692 (2012).

⁴ See generally *Incentive Auctions NPRM*.

Background

In the *Wireless Microphones Further Notice* adopted in January 2010, the Commission sought comment on the use of wireless microphones and other low power auxiliary stations on an unlicensed basis in the current TV bands (Channels 2-51, excluding Channel 37). Noting that the Commission currently permits such operations pursuant to the waiver granted in the *Wireless Microphones Order*, the Commission specifically proposed that wireless microphones that operate on an unlicensed basis pursuant to that waiver be permitted to operate in the TV bands pursuant to Part 15 and certain specified technical rules. In addition, the Commission sought comment on whether it should revise the Part 74 low power auxiliary station (LPAS) rules to provide for a limited expansion of the categories of entities that would be eligible for licensed use of wireless microphones and other related LPAS. The Commission also sought comment on possible long-term reform, based in part on technological innovations that would enable wireless microphones to operate more efficiently and with improved immunity to harmful interference, thereby increasing the spectrum available for wireless microphones and other uses.⁵

Subsequently, in the *TV White Spaces Second MO&O* adopted in September 2010, the Commission took additional steps to make unused spectrum in the TV bands available for use by unlicensed TV band devices (referenced herein as “white space devices”) and addressed the operations of both licensed and unlicensed wireless microphones with respect to unlicensed white space devices. The Commission generally excluded white space devices from two of the unused channels in the UHF TV band near Channel 37 so that if these channels were available they could be used for wireless microphones.⁶ In addition, the Commission provided that LPAS licensees could register their wireless microphones (and related low power auxiliary station operations) in the TV bands databases so that they may be protected from interference from unlicensed white space devices on available channels at specified times. The Commission, subject to its approval, also permitted certain unlicensed microphone users (*e.g.*, those operating at major events where wireless microphone operations cannot be accommodated on channels not available for white space devices) to register their wireless microphone operations in the TV bands databases.⁷ More recently, in the *Incentive Auctions NPRM* adopted on September 28, 2012, the Commission proposed to repack television stations. Noting that this action may reduce the spectrum available in the TV bands for secondary use by licensed and unlicensed wireless microphones as well as for unlicensed white space devices, the Commission sought comment on various proposals that would affect each of these operations.⁸ Specifically, the Commission sought comment on what additional steps it could take to promote more efficient and effective operation of wireless microphones in the spectrum that remained for TV broadcast.⁹

⁵ See generally *Wireless Microphones Further Notice*, 25 FCC Rcd at 691-704 ¶¶ 107-151 (also seeking comment on adoption of certain marketing and labeling requirements, and on whether any other rule parts (*e.g.*, Part 90) should be changed to better accommodate wireless microphone use in other spectrum bands).

⁶ *TV White Spaces Second MO&O*, 25 FCC Rcd at 18671-77 ¶¶ 25-36; 47 C.F.R. § 15.707; see also 47 C.F.R. § 15.712(f)(2).

⁷ *TV White Spaces Second MO&O*, 25 FCC Rcd at 18675-76 ¶¶ 32-33; 47 C.F.R. § 15.713(h)(8)-(9).

⁸ *Incentive Auctions NPRM*, at ¶¶ 221-239.

⁹ *Incentive Auctions NPRM*, at ¶¶ 224-225. To enable more efficient use of the TV broadcast spectrum available for wireless microphones, the Commission sought comment on various ways it might reduce the co-channel separation distances between wireless microphones and television stations. *Id.* at ¶ 225. The Commission also sought comment on possible wireless microphone operations in the proposed guard bands so long as they use the same technologies required of white space device operations in these bands. *Id.* at ¶ 226.

Updating and Refreshing the Record

Considering the time that has passed since the Commission issued the *Wireless Microphones Further Notice*, and in light of the *TV White Spaces Second MO&O* and the recently issued *Incentive Auctions NPRM*, we ask that interested parties refresh and update the record on the following issues.

Expansion of Part 74 eligibility. In the *Wireless Microphones Further Notice*, the Commission sought comment on whether to revise its rules to provide for a “limited” expansion of eligibility under Part 74, Subpart H of the rules to provide additional categories of users eligible for licensed use of wireless microphones or other low power auxiliary stations.¹⁰ In the *Wireless Microphones Further Notice*, the Commission noted that wireless microphones and other low power auxiliary station devices had been recognized as necessary and beneficial to broadcast productions, and had expanded the list of entities eligible for a Part 74 license over time to include motion picture and television producers and certain cable television operators, reasoning that these entities had requirements similar to those of broadcast licensees.¹¹ The Commission asked extensive questions about whether to authorize licensed wireless microphone use at certain large theaters, entertainment complexes, sporting arenas, and religious facilities, because these venues might need the assurance of interference protections afforded Part 74 LPAS licensees.¹² The Commission underscored the need to balance the needs of potential new classes of wireless microphone licensees with those of other users in the TV bands and expressed particular concern that any “broad expansion” of eligibility could undercut that balance by significantly reducing the amount of spectrum available for other uses, such as by white space devices.¹³ The Commission also indicated that it would take into consideration whether it would be practical for any new licensees to comply with the requirement that Part 74 licensees coordinate frequencies and provide up-to-date information on venues and times of operations to the TV bands database system on an ongoing basis so that they do not otherwise block use to others at times when there is no need.¹⁴

In the subsequently released *TV White Spaces Second MO&O*, the Commission determined that only a small subset of unlicensed wireless microphone users would qualify for registration in the TV bands database system. Specifically, the Commission stated that “[a]s a general matter, we . . . find that it would be inappropriate to protect unlicensed wireless microphones against harmful interference from other unlicensed devices, and in particular TV bands devices” and observed that the “overwhelming majority” of wireless microphone use does not merit registration in the TV bands database.¹⁵ The Commission noted that in the vast majority of markets, or to the extent that the number of wireless microphones needed is relatively low, the operator of unlicensed microphones can avoid receiving harmful interference from TV white space devices by using the two reserved channels as well as the other channels in each market where white space devices are not allowed to operate. The Commission nonetheless provided that “[e]ntities operating or otherwise responsible for the audio systems at major events where large numbers of wireless microphones will be used and cannot be accommodated in the available channels at that location may request registration of the site in the TV bands databases.”¹⁶ The Commission further indicated that “major sporting contests” and “live theatrical productions/shows” are

¹⁰ See generally *Wireless Microphones Further Notice*, 25 FCC Rcd at 696-701 ¶¶ 124-139.

¹¹ *Wireless Microphones Further Notice*, 25 FCC Rcd at 696 ¶ 125.

¹² See generally *Wireless Microphones Further Notice*, 25 FCC Rcd at 696-701 ¶¶ 124-139.

¹³ *Wireless Microphones Further Notice*, 25 FCC Rcd at 699 ¶ 134.

¹⁴ *Id.* at 698-99 ¶¶ 132, 135.

¹⁵ *White Spaces Second MO&O*, 25 FCC Rcd at 18674 ¶ 31.

¹⁶ *Id.* at 18675 ¶ 32.

examples of major events that might qualify for registration.¹⁷ Such entities may request Commission approval so that they can register unlicensed microphones at particular venues and specified times in the TV bands database system and obtain the same protection from interference from unlicensed white space devices afforded licensed wireless microphone operations.¹⁸

We request that interested parties update and refresh the record on whether the Commission should expand license eligibility under Part 74, Subpart H for certain operators of unlicensed wireless microphones or other low power auxiliary devices at specified venues. We ask that commenters advocating an expansion of the eligibility requirements for Part 74 LPAS licensing be as specific as possible. To the extent that the Commission chooses to expand license eligibility only for certain users that have wireless microphone requirements substantially similar to those of broadcasters, precisely which class(es) of users and uses would fall into this category? More specifically, which type(s) or class(es) of entities and which type(s) of venues or events – whether by type of event, level of quality of service necessary for the event (*e.g.*, “professional quality”), number of microphones needed, number of seats in auditorium, or some other qualification or measure¹⁹ – should become eligible to hold a license. Should, for example, the Commission expand license eligibility for some or all of the users or entities that are permitted to register venues for unlicensed wireless microphone use in the TV bands database system?²⁰ Examples might include entities responsible for major production events that take place at such venues as Madison Square Garden or Broadway theaters in New York City, the Kennedy Center in Washington DC, and the Grand Ole Opry in Nashville. Consistent with this approach, what other concrete examples would qualify? If the Commission were to expand Part 74 license eligibility for all of these entities operating at such venues, how, precisely, would the Commission define or classify such class(es) of entities in our eligibility rules?

Should the Commission establish more specific criteria for eligibility for a low power auxiliary station license at a specified venue? For instance, the Commission could require that an entity applying for a license establish each of the following – (1) that the specified venue periodically hosts events that require the same level of “professional” high production-quality audio as the type needed for broadcast productions; (2) that these events involve a live production, with an audience in attendance, or a rehearsal for such events; and (3) that the venue size meets specified criteria depending on the type of venue or event (*e.g.*, for theaters used for professional productions or house of worship venues, a minimum of 1,000 fixed seats; for auditoriums or convention centers, a space capacity-rated for 3,000 people; for sports venues, a minimum of 10,000 seats for indoors, and 25,000 seats for outdoors)? We ask for comment on this or similar approaches. If the Commission were to take this type of approach, how would it determine which entities meet the first criterion regarding a need for “professional” quality production? To the extent the venue uses a professional production company or professional frequency coordinator, would this be sufficient to establish that the venue merits licensing? To what extent should the Commission consider the need to operate at Part 74 technical parameters (*e.g.*, higher power)? As for the third element, we ask that commenters be specific when discussing which categories of venue (*e.g.*,

¹⁷*Id.* at 18674-75 ¶ 31.

¹⁸ 47 C.F.R. § 15.713(h)(9). We note also that OET and WTB have announced the initial launch of the unlicensed wireless microphone registration system, and have provided guidance on aspects of the registration process. *See* Office of Engineering and Technology and Wireless Telecommunications Bureau Announce the Initial Launch of Unlicensed Wireless Microphone Registration System, Registration Open in East Coast Region: New York, New Jersey, Pennsylvania, Delaware, Maryland, Washington DC, Virginia, and North Carolina, ET Docket No. 04-186, *Public Notice*, DA 12-1514 (OET/WTB, released Sept. 19, 2012) (*Public Notice on Registration of Unlicensed Wireless Microphones*).

¹⁹ *See generally* *Wireless Microphones Further Notice*, 25 FCC Rcd at 696-701 ¶¶ 124-139 (asking many questions about how the Commission might determine whether certain types of entities might merit licensee status).

²⁰ *See generally* *Public Notice on Registration of Unlicensed Wireless Microphones*.

stadium or amphitheater) or capacity measurements (*e.g.*, number of seats) would be appropriate. To what extent should we also require that an entity show that it would have need for a specified minimum number of microphones (*e.g.*, 100 or more) at a venue? We seek comment on these various proposals.

We also seek comment on which type(s) of entities would hold the license for operations at a specified venue. Should the Commission only license specific venues? Under such an approach, a venue (or a responsible party for the venue) would be licensed, the venue could be registered in the TV bands database system, and the venue operator, or professional audio companies that act as agents under a venue's license when carrying out their engineering responsibilities, could then work directly with the TV database administrators to register the needed wireless microphone channels for particular events and times. Alternatively, might the Commission license professional production companies for operations at specified venues? We seek comment on these or other approaches.

Expanding eligibility for operations at nuclear facilities. In the *Wireless Microphones Further Notice*, the Commission also sought comment on possible expansion of license eligibility for the special case involving the use of low power auxiliary station operations at nuclear power plant facilities. Specifically, it sought comment on the possibility of expanding eligibility to allow nuclear power plant operators to obtain licenses under Part 90 to operate certain low power auxiliary station equipment, certificated for use under Subpart H of Part 74 of the rules, inside nuclear facilities.²¹ We take this opportunity to allow commenters to refresh the record on expanding eligibility to include such applications for these operators. For example, commenters may wish to address whether any additional means of meeting the operational communications needs of nuclear facilities have become available. If the Commission were to expand eligibility for Part 74 licensing to nuclear power plant owners and operators, should it restrict operation of the equipment to indoor use or should use be permitted anywhere within the plant's security perimeter? If outdoor use is permitted, should it be limited to particular plant operations such as fuel handling?

More efficient wireless microphones through technological advancements. As discussed above, in the *Wireless Microphones Further Notice*, the Commission expressed its intent to develop longer-term solutions that would help ensure that wireless microphones operate more efficiently and effectively on spectrum available for their use, and sought comment on potential technological innovations that would promote more efficient wireless microphone operations and thereby increase the availability of spectrum for wireless microphone and other uses.²² In the *TV White Spaces Second MO&O*, the Commission observed that wireless microphones generally have operated inefficiently, and noted that while wireless microphone users may believe they need access to more spectrum, any such needs "must be accommodated through improvements in spectrum efficiency."²³ In the *Incentive Auctions NPRM*, the Commission again noted the importance of more efficient wireless microphone operations, and sought comment on steps it should take to ensure that any broadcast spectrum available after repacking is used efficiently and effectively by wireless microphones.²⁴ We seek to refresh and update the record on potential longer term solutions to the operation of wireless microphones.

As the Commission observed in the *Wireless Microphones Further Notice*, the majority of wireless microphones that currently operate in the UHF TV bands are frequency modulated analog devices that operate with a bandwidth of up to 200 kHz. Because of a number of factors, including the need to avoid intermodulation interference among the devices, the maximum number of wireless

²¹ *Wireless Microphones Further Notice*, 25 FCC Rcd at 701 ¶ 139.

²² *See id.* at 702-03 ¶¶ 145-49.

²³ *TV White Spaces Second MO&O*, 25 FCC Rcd at 18674 ¶ 29.

²⁴ *Incentive Auctions NPRM*, at ¶¶ 224-225.

microphones that these analog devices can operate simultaneously in a 6 megahertz TV channel may be as few as six or eight. Accordingly, with the use of these analog wireless microphones, only between 1.2 and 1.6 megahertz of the 6 megahertz TV channel may be used while the remainder is effectively left fallow. This constitutes very inefficient use of valuable spectrum. As the Commission noted, most other radio communications services have shifted from analog to digital technology to improve spectrum efficiency and resistance to interference.²⁵

We ask that commenters update the record on advances in the wireless microphone technologies that are enabling more efficient use of spectrum. In particular, we ask that commenters provide detailed information on the use of more efficient advanced digital technologies. We note that Shure recently introduced digital wireless microphones that operate in the UHF band that can support up to 14-15 systems on a single 6 megahertz TV channel.²⁶ Sennheiser has similarly announced its new digital microphone for the UHF band, which uses technology that allows operation of up to 12 wireless microphones on a six megahertz channel.²⁷ We seek comment on the state of development of digital technologies from these and other wireless microphone manufacturers, and further development that is anticipated over the next few years. We ask that commenters present information on the production values, interference implications, and performance impact of these new microphones. What bandwidth efficiencies are achievable while still maintaining adequate performance for the specific use? What are the interference implications, particularly as they relate to intermodulation interference on packing more microphones into less bandwidth? Are there filters available to mitigate these effects? How does the fidelity and latency of these new microphones compare to existing equipment and are they adequate for professional musical and theatrical performances?

What steps should the Commission take to require or encourage further development of digital wireless microphones? For example, to accommodate more efficient use, should the Commission implement a requirement to reduce the bandwidth below 200 kHz over an appropriate period of time, and if so what timeframe would make sense from an equipment development and user transition point of view? We note that the Commission has adopted requirements to promote spectrum-efficient technology for other operations,²⁸ and we ask that in updating the record in this proceeding commenters address whether the Commission should adopt efficiency standards for wireless microphones to encourage spectral efficiency. If so, how should the Commission establish those standards, and what timeframes would be appropriate to transition to any such standards? We also seek comment on whether and how the Commission should facilitate a transition to digital wireless microphones.

²⁵ *Wireless Microphones Further Notice*, 25 FCC Rcd at 703 ¶ 148.

²⁶ Shure has recently introduced digital wireless microphones that support up to 14 to 15 systems on a single 6 megahertz channel. See “Wireless Mic Users Challenged by New Spectrum Limits,” TVTechnology, available at <http://www.tvtechnology.com/news/0086/wireless-mic-users-challenged-by-new-spectrum-limits/213016>.

²⁷ See “Sennheiser launches Digital 9000 wireless system at IBC,” Performer Magazine, Sennheiser Press Release (September 10, 2012), available at <http://performermag.com/2012/09/10/sennheiser-launches-digital-9000-wireless-system-at-ibc/>, <http://us2.campaign-archive2.com/?u=419dcda8b73a1b5e587b76c36&id=36c71d9fe0>; see also “Sennheiser, Digital 9000,” (2012), <http://en-de.sennheiser.com/9000-series/>.

²⁸ We note, for instance, that the Commission has adopted requirements for private land mobile radio licensees in the 150-174 MHz and 421-512 MHz bands to migrate to narrowband technology. See Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended, *Second Report and Order and Second Further Notice of Proposed Rulemaking*, WT Docket No. 99-87, RM-9332, 18 FCC Rcd 3034 (2003); Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended, *Third Memorandum Opinion and Order, Third Further Notice of Proposed Rule Making and Order*, WT Docket No. 99-87, RM-9332, 19 FCC Rcd 25045 (2004); Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended, *Order*, WT Docket No. 99-87, RM-9332, 25 FCC Rcd 8861 (2010).

Other issues. The *Wireless Microphones Further Notice* raised several other issues (e.g., authorizing unlicensed wireless microphone operations in the TV bands pursuant to particular rules, or taking steps additional to authorize wireless microphone operations outside of the TV band under other rules).²⁹ To the extent necessary or appropriate, commenters should feel free to refresh or update the record on other issues raised in the *Wireless Microphones Further Notice* that have been affected by more recent developments or by the two related proceedings if this would help ensure that the Commission can fully address the issues raised in the *Wireless Microphones Further Notice*.

Procedural Matters

This proceeding has been designated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules.³⁰ Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter’s written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission’s *ex parte* rules.

Pursuant to sections 1.415 and 1.419 of the Commission’s rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission’s Electronic Comment Filing System (ECFS). See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: <http://fjallfoss.fcc.gov/ecfs2/>.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission’s Secretary, Office of the Secretary, Federal Communications Commission.

- All hand-delivered or messenger-delivered paper filings for the Commission’s Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries

²⁹ See generally *Wireless Microphones Further Notice*, 25 FCC Rcd at 691-704 ¶¶ 107-151.

³⁰ 47 C.F.R. §§ 1.1200 *et seq.*

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For further information, contact Bill Stafford, Wireless Telecommunications Bureau, (202) 418-0563, or Alan Stillwell, Office of Engineering and Technology, (202) 418-2470.

Action by the Chief, Wireless Telecommunications Bureau, and the Chief, Office of Engineering and Technology.

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