

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
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

To: The Commission

REPLY COMMENTS OF SHURE INCORPORATED

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SUMMARY

The Commission received overwhelming support for a reasoned expansion of the class of parties eligible to obtain a Part 74 wireless microphone license and protection from interference from new devices entering the band. Many for-profit and tax exempt not-for-profit entities urged the Commission to protect what Shure would define as "Professional" wireless microphone operations, at enumerated locations, that are critical to entertainment and cultural events, business operations, religious worship activities and educational activities. Such Professional operations are customarily managed by trained personnel with the experience and mission to manage frequency selection for the periods needed to cover an event, avoid interference, and ensure superior audio. In addition to the location-based entities identified by Shure as viable for license eligibility expansion, audio visual companies, often charged with this responsibility, should be given the opportunity to obtain Part 74 licenses to cover qualified uses.

The Comments also show that low power operation under Part 15 should be available for recreational and nonprofessional wireless microphone uses but neither Part 15 operations nor operations under Part 90 can satisfy the needs of Professional users. Shure notes the dilemma raised by public safety concerns over Part 15 operations in channels 14-20 in light of the Commission's encouragement of itinerant and other wireless microphone operations in those channels and the fact that some users have made investments in new equipment operating in channels 14-20 in response to the Commission's policy to close 700 MHz to wireless microphones.

The Commission should reject arguments to restrict wireless microphone operations to particular portions of the TV band. No record evidence supports such a radical departure from decades of wireless microphone operations or taking such a step in light of ongoing policy discussions regarding future changes to the TV spectrum. The Commission should also reject the continued efforts of proponents for converting TV band frequencies to other uses to impose on wireless microphones technical requirements, including TVBD rules, suited for speech-grade or data device transmissions but wholly inappropriate for Professional wireless audio, under the guise of improving spectral efficiency. This reflects a gross misunderstanding of wireless audio technology and an effort to miseducate policymakers. Nonetheless, Shure recommends that the European Telecommunications Standards Institutes (ETSI) digital and analog emission masks be adopted to facilitate tighter spacing of wireless microphones operating together within a TV channel.

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REPLY COMMENTS OF SHURE INCORPORATED

Shure Incorporated ("Shure"), by its undersigned counsel, hereby submits these Reply Comments in response to the Further Notice of Proposed Rulemaking ("Further Notice") released January 15, 2010, in the above-captioned matter.

I. **The Comments Showed Overwhelming Support for Expanding the Class of Parties Eligible for Part 74 Licensing and Interference Protection**

In its Comments, Shure proposed that Part 74 wireless microphone license eligibility and interference protection be expanded to include professional uses at nine enumerated classes of locations.¹ "Professional" uses, as defined by Shure, would include wireless microphone uses that are integral to the performance or presentations of for-profit or tax-exempt not-for-profit entities, specifically excluding recreational and nonprofessional uses.²

¹ Shure Comments at 5-6. Specifically, Shure recommended that the Commission extend Part 74 licensing eligibility to: (1) Indoor and Outdoor Seated Facilities (including amphitheaters, arenas and stadiums), (2) Theaters, (3) Outdoor Entertainment Venues (including sites with lawn seating, amusement parks and fairgrounds), (4) Convention Centers and Business Conference Facilities, (5) Educational and Cultural Facilities (including schools and museums), (6) Governmental Facilities, (7) Houses of Worship, (8) Lodging Facilities and Entertainment Venues, and (9) Audio and Video Recording Studios.

² *Id.* at 6.

On the threshold issue of whether the Commission should amend the Part 74 rules to permit expanded eligibility, the record shows overwhelming support for the expansion of Part 74 licensing and interference protection to a broader class of eligibles. Consistent with Shure's view, no party addressing the issue argued that the Commission should allow *all* potential wireless microphone users to acquire licenses and interference protection. Further, consistent with Shure's view, none of the commenting parties supported licensing or interference protection for recreational or nonprofessional users. However, many organizations relying on wireless microphones and users from a wide range of perspectives urged the Commission to adopt rules that would expand licensing eligibility and protect their operations against interference from new devices using the same spectrum.³ In total, more than 300 for-profit and tax-exempt not-for-profit organizations and entities voiced support for expanded licensing to protect what Shure would define as Professional wireless microphone operations critical to entertainment and cultural activities, business operations (small and large), religious worship activities, and educational activities. Commenting parties include many Houses of Worship, music producers, well-known and developing musicians and performing artists, venue owners, including convention and conference center operators, hotels and resorts, major sports leagues, educational institutions, and theater groups.⁴

It is clear from the Comments that all of these uses make socially, culturally and/or economically valuable contributions to American society. Those involved -- whether they be congregants, paying audience members of music and other entertainment events, sports participants and spectators, business people and government staff attending conferences, etc -- all demand productions with mobility and high-fidelity audio that is clear, reliable and uninterrupted by interference. Given the importance of professional

³ See, e.g., Various Artists Comments at 1-2 (supporting expansion of Part 74 license eligibility and signed by over 170 professional recording artists, including the Black Eyed Peas, Billy Ray and Miley Cyrus, Dave Matthews, Jimmy Buffett, Joan Osborne, Jon Bon Jovi, Neil Diamond, The Dixie Chicks, Don Henley, Stevie Nicks, Sting, Weezer, and Alison Krauss); Office of the Commissioner of Baseball (MLB), National Football League (NFL), National Hockey League (NHL), National Collegiate Athletic Association (NCAA), and National Association for Stock Car Auto Racing (NASCAR) Comments at 1-3 (describing their "massive" use of wireless microphones and the need to ensure that Part 74 license eligibility is extended to sports leagues and professional and collegiate teams); MGM Mirage Comments at 1-4 (concerning its extensive use of wireless microphones and need to extend license eligibility and interference protection to hotel, resort and convention center complexes); Joel Osteen's Lakewood Church Comments at 1-3 (urging Commission to expand eligibility to ensure Houses of Worship, including Lakewood Church with its 30,000-person weekly congregation, receive full frequency protection). See also Coalition of Wireless Microphone Users at 6 (discussing wireless microphone needs of Broadway theaters).

⁴ See, e.g., Second Baptist Church Comments; The Archdiocese of Los Angeles Comments; Rickey Minor Comments; Phil Ramone Comments; The Recording Academy Comments; American Federation of Television and Recording Artists Comments; Grand Ole Opry Comments; Harrah's Entertainment Comments; American Airlines Center Comments; NFL, MLB, NHL, NCAA and NASCAR Comments; Miami Dade College Comments; The Association of Performing Arts Presenters Comments.

audio to these parties' activities, all customarily rely on skilled facilities, technology or frequency coordinators and technicians to manage their audio operations. These are people who have the training, experience, resources and professional mission to manage frequency selection for the periods needed to cover an event, avoid interference, and ensure superior audio performance. Both NAB/MSTV and the National Public Safety Telecommunications Council echoed a view similar to Shure's that licensed microphone systems will typically be installed, monitored and maintained by professional audio engineers or technicians whose purpose it is to avoid interference between wireless microphones and interference to other services.⁵ According to NAB/ MSTV, wireless microphones in "[t]heaters, live music productions, government bodies, and houses of worship" are typically in "controlled, professional facilities that are sufficiently distant from residential areas," are identifiable, and capable of coordinating with other TV band users.⁶

The support in the Comments for expanded licensing eligibility stretched beyond the various segments of the user community. Manufacturers of wireless microphone equipment⁷ and land mobile and white space devices,⁸ as well as NAB/MSTV also supported expanding Part 74 licensing.⁹ The record demonstrates that Shure's proposal to expand Part 74 eligibility based on enumerated locations and Professional uses, if adopted, would appropriately assure that interference protection is accorded to the wireless microphone user segments that most require it and that can responsibly meet licensing and database registration requirements.¹⁰

⁵ See The Association for Maximum Service Television, Inc. (MSTV) and the National Association of Broadcasters (NAB) Comments at 18 ("NAB/MSTV Comments"); National Public Safety Telecommunications Council (NPSTC) Comments at 3 ("NPSTC Comments").

⁶ NAB/MSTV Comments at ii.

⁷ See, e.g., Sennheiser Comments at 5-6; Audio-Technica Comments at 11-12; Lectrosonics Comments at 2.

⁸ See, e.g., Motorola Comments at 5-6.

⁹ See NAB/MSTV Comments at 17-18.

¹⁰ For the reasons set forth in the Comments, Shure does not support conditioning license eligibility on venue capacity. However, if the Commission determines that a minimum capacity measure is needed, Shure recommended that the Commission use the 50-person capacity referenced in the Americans With Disabilities Act. See 28 C.F.R. Part 36, Appendix A, § 4.1.3(19)(b); Shure Comments at 8. See also Sennheiser Comments at 5-6.

II. Audio Visual (AV) Rental Companies Should be Able to Acquire Part 74 Licenses for Qualified Uses

Many AV rental companies that service the needs of wireless audio users and several prominent frequency coordinators and producers supported expanded licensing eligibility beyond the traditional broadcast and other uses outlined in the current Part 74 rules.¹¹ Moreover, many parties agreed that AV rental companies, often the professionals who are most knowledgeable of the audio requirements for an event, should have the opportunity to obtain licenses for use in otherwise qualifying purposes and venues. It should be noted that the reach of AV rental companies into the nation's production environment is significant and touches even today's Part 74 license eligible entities. A large percentage of broadcasters and motion picture producers rely on AV rental companies to supply and operate the wireless audio equipment for their productions, not just for special events, but for regularly scheduled programs.¹² Extending license eligibility to these audio visual professionals is critical to ensure continuity of event and program production across a myriad of additional industries, including but not limited to conventions, business conferences, outdoor festivals and special events, live theater, and concert tours.

III. Part 15 Operations Cannot Support Professional Wireless Microphone Uses

Many commenters clearly stated that operation under Part 15 conditions would not provide the assurance against interference necessary for their Professional uses. The record is replete with statements by musicians, performers, religious leaders, and many others that random, unpredictable interference that is present under Part 15 or Part 90 operations ruins the essential purpose of the performance or presentation and must be avoided.¹³ Operations under Part 15 simply cannot substitute for existing Part 74 UHF operations.

¹¹ See, e.g., Video Equipment Rentals Comments at 1-3, PSAV Presentation Services Comments at 2, James Stoffo Comments at 1-2; Phil Ramone Comments at 1-2.

¹² See, e.g. Office of Commissioner of Baseball (MLB), National Football League (NFL), National Hockey League (NHL), National Collegiate Athletic Association (NCAA), and National Association for Stock Car Auto Racing (NASCAR) Comments at 1-3; Video Equipment Rentals at 1-2.

¹³ See, e.g., Live Nation Entertainment Comments at 1-5 (describing the "fatal" effect of interference on its extensive use of wireless microphones "as a major performance venue owner and operator in the United States, as well as the largest producer of live concerts in the world"); Texas State Senate Comments at 1-3 (describing heavy reliance on wireless devices and stating "their uninterrupted functionality is critical to the provision of open government proceedings to the people of the State of Texas"); Second Baptist Church Comments at 1-2 (stating that

The Commission should reject the arguments of Dell/ Microsoft and PISC that the Commission should not expand Part 74 licensing. They argue that *any* expansion of Part 74 licensing -- presumably even for Professional uses -- would obliterate prospective White Space operations and would be unnecessary because wireless microphone users “can be accommodated under other services using existing technology or could have access to TV bands under Part 15.”¹⁴ Dell/Microsoft and PISC repeat a number of specious arguments and offer misinformation¹⁵ that Shure and others have repeatedly addressed in this docket, WT Docket No. 08-166, -167 and ET Docket No. 04-186.¹⁶ Dell/Microsoft and PISC continue to ask the Commission to ignore technical and operational requirements of wireless microphones operations, principally by declaring that a “co-equal” status with TVBDs will be sufficient. Clearly, interference to a live audio signal has far more severe consequences, as there is no second chance to create the moment. Further, both Dell/Microsoft and PISC also ignore the White Space spectrum sharing scheme that the FCC has already worked out after five years of debate and technical testing.¹⁷ This flexible scheme is designed to allow new devices to enter the TV band to share spectrum with incumbent operations. Wireless microphones will be able to register frequencies in use for specific events; new TV band devices will be able to use the spectrum when not in use by TV, wireless microphones, public safety, cable head ends, and other incumbent services. The Commission should reject Dell/Microsoft’s attempt to relitigate its quest for spectrum and chip away at this scheme in this proceeding.

for its more than 53,000 members “even with minimal interference, wireless audio transmissions are, at best, ineffective and, at worst, dangerous”).

¹⁴ See Dell Inc. and Microsoft Corp. Comments at 3 (“Dell/Microsoft Comments”). See also Public Interest Spectrum Coalition (PISC) Comments at 5 (“PISC Comments”). See also Spectrum Bridge, Inc. Comments at 4.

¹⁵ See, e.g. Dell/Microsoft Comments at 8-9 (arguing digital systems are “significantly more spectrally efficient and less susceptible to interference”); PISC Comments at 5.

¹⁶ See, e.g., Shure Comments at 26-28 (explaining the inaccuracy and impracticality of Dell/Microsoft and PISC arguments for forcing digital transmissions on all wireless microphones); Comments of Shure Incorporated, WT Docket Nos. 08-166, 167 and ET Docket No. 04-186 at 4-6 (filed Jun. 29, 2009); Reply Comments of Shure Incorporated, WT Docket Nos. 08-166, 167 at 11-13 (filed Oct. 20, 2008).

¹⁷ See Dell/Microsoft Comments at 7 (arguing for elimination of white space device sensing requirements); PISC Comments at 8-9 (calling the sensing requirements “overly burdensome” and deeming the registration and reporting requirements “onerous and symmetrical”).

IV. Proposed Part 15 Operations in Channels 14-20

In its comments, Shure supported the adoption of rules that would provide for low power Part 15 operations to accommodate recreational and nonprofessional wireless microphone users.¹⁸ Certain public safety interests expressed concern over potential interference to public safety operations from Part 15 Wireless Audio Devices (“WAD”) in the 11 cities where public safety uses spectrum in channels 14-20.¹⁹ This concern apparently assumes Part 15 WAD devices may be developed for applications and uses that differ from historical wireless microphone applications and uses.²⁰ Wireless microphones have operated in channels 14-20 for many years and Shure is not aware of any instance in which public safety operations in the 11 cities experienced interference from a wireless microphone. Further, the public safety community voiced no concern over the Commission’s White Spaces order in which the Commission expressly encouraged (although did not require) itinerant and other wireless microphone users to make use of channels adjacent to assigned broadcast channels in channels 14-20.²¹ In shaping Part 15 rules for WADs, however, the Public Safety Council contends that Part 15 WADs should not be permitted to operate in channels 14-20 *anywhere* in the country “because there would be no practical way” to control their location in order to prevent operation in the 11 cities where public safety uses the same spectrum.²²

While Shure is certainly sensitive to public safety concerns, this position may create a serious dilemma on two fronts. First, a ban on wireless microphone use in channels 14-20 would constitute an abrupt policy reversal by the FCC insofar as the Commission in the White Spaces Order and in the 700 MHz order specifically *encouraged* wireless microphone users, particularly itinerant and *ad hoc*

¹⁸ Shure Comments at 19.

¹⁹ See, e.g., NPSTC Comments at 3-5; Association of Public-Safety Communications Officials-International, Inc. (APCO) Comments at 2-3; County of Los Angeles Comments at 1, 3.

²⁰ In this regard, Shure believes that amendment to the Commission’s rules should aim to preserve the status quo rather than to encourage an “influx of new wireless devices that are wholly unsuitable for the TV band” like baby monitors and toys. See also, NAB/MSTV Comments at i, 7.

²¹ See 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 Report and Order and Memorandum Opinion and Order*, 23 FCC Rcd 16807 at ¶ 151, 157 (rel. Nov. 14, 2008) (“*White Spaces Order*”) (concluding that “to preserve unoccupied TV channel space below channel 21 for wireless microphones is an appropriate solution for providing spectrum to meet wireless microphone needs” and “our decision to prohibit personal/portable TVBDs from operation on channels below channel 21 will generally ensure that an adequate number of UHF channels are available for interference free operation of these important itinerant wireless microphone uses”).

²² See NPSTC Comments at 4.

operations, to take advantage of adjacent channels free from TVBD interference in channels 14-20. Second, a wireless microphone prohibition in channels 14-20 would impose an unreasonable hardship on users who have dutifully responded to the Commission's expedited ouster of wireless microphones from the 700 MHz band, have shelved functional 700 MHz equipment, and made investments in new systems that operate in the low end of the TV band to replace their 700 MHz systems. A ban on wireless microphone operations in channels 14-20 would be a sudden about face in Commission policy that would effectively nullify such investments and certainly deal yet another significant financial blow to affected users.

Shure notes that concerns expressed by the public safety interests are limited to proposed Part 15 WAD operations and do not extend to licensed operations. Professionally managed microphone operations subject to FCC licenses do not present a similar risk. Such microphones have been operating in channels 14-20 for years and have successfully avoided interference with public safety. Professional microphone users, as defined by Shure, are motivated to avoid operating on public safety channels to avoid any impact on public safety and to avoid interference from higher power public safety radios to wireless microphone systems operating at a live TV show, music concert, sporting event, theatrical event, worship service, business conference or other professional event being supported. Licensed microphone operators registering in the database prior to operation in the 11 public safety cities would be reminded of the specific channels of public safety operations. As such, the concern expressed by public safety interests over Part 15 operations is another reason why it is critical that the license eligibility criteria be expanded to include the Professional uses, as defined by Shure.

If the Commission decides to ban all Part 15 wireless audio devices in channels 14-20, Shure urges the Commission to designate 4 UHF channels nationwide to support such operations free from TVBD interference.²³ The Commission earlier recognized that there is not sufficient spectrum in channels 14-20 to support itinerant wireless microphone operations and accordingly mandated in the White Spaces order that two channels be identified near channel 37 in the 11 public safety markets to support those operations.²⁴ However, existing equipment must be grandfathered and Shure submits that a transition

²³ Motorola likewise proposes that 4 TV channels per market area be identified for Part 15 WAD operations. See Motorola Comments at 2-4.

²⁴ See *White Spaces Order* at ¶ 157.

time of at least three years is needed. Users expect a minimum of three years, and more typically up to ten years of service, from their professional audio equipment. Additionally, many of these users have just purchased new equipment at significant expense in response to the Commission's order to vacate the 700 MHZ band.

V. The Commission Should Not Limit Wireless Microphone Operations to Specific Spectrum

Shure opposes suggestions that the Commission should limit wireless microphones to particular spectrum in this proceeding. CTIA, in particular, urges the Commission to limit microphones to lower portions of the TV band to “preserve opportunities for new and additional uses.”²⁵ Any decision to limit wireless microphones to particular frequencies at this point would not be supported by the record and would be outside the scope of this proceeding. Wireless microphones have been operating primarily in the UHF TV band for decades. Significant long-standing investments have been made in UHF operations by manufacturers and users. No party has identified any other suitable spectrum. Further, a decision to limit wireless microphone spectrum would be contrary to the public interest given the Commission's recent recommendation to broadly explore issues raised in reallocating a portion of the TV bands in connection with the National Broadband Plan. Concerns include: what mechanisms should be used to accomplish this, including possible incentive auctions; what, if any TV channel repacking will occur; what is the potential impact on wireless microphone users, etc.²⁶ The National Broadband Plan also contains a recommendation to explore designating spectrum for unlicensed use.²⁷ The timing and details of such spectrum changes, if any are made, are unknown at this time. Shure strongly cautions against any Commission action at this time that could force wireless microphone users to make investments that would be placed at risk by further changes in Commission policy.

²⁵ CTIA Comments at 2.

²⁶ See *Connecting with America: The National Broadband Plan*, Ch. 5: Spectrum at 72-98 (rel. Mar. 16, 2010) (Recommendation 5.8: “The FCC should make 500 megahertz newly available for broadband use within the next 10 years, of which 300 megahertz between 225 MHz and 3.7 GHz should be made newly available for mobile use within five years”).

²⁷ See *Id.* at 94 (Recommendation 5.11: “The FCC , within the next 10 years, should free up a new, contiguous nationwide band for unlicensed use”).

VI. Technical Parameters That Apply to Minimum Quality Telephone and Data Transmissions Are Fundamentally Inconsistent with Professional Wireless Audio

Dell/Microsoft and PISC describe wireless microphones as an inefficient and outdated technology that wastes spectrum.²⁸ Similarly, CTIA argues that digital technologies are more efficient and advanced in all cases and Commission policy should force wireless microphones to convert to digital transmissions.²⁹ This reflects a gross misunderstanding of wireless audio technology and an apparent desire to miseducate policymakers. These contentions have been addressed before in ET Docket No. 04-186, WT Docket Nos. 08-167, 166.³⁰ They appear to be nothing more than a further attempt to paint wireless microphone operations as a scourge on spectrum use in an effort to restrict wireless microphones and overcome the balanced spectrum sharing scheme developed in the White Spaces proceeding.

Dell/Microsoft's and PISC's view simply fails to acknowledge the facts: professional audio requires high-quality, real time transmission, which can be defined by the simultaneous achievement of 1) extremely low latency; 2) full bandwidth audio frequency response, and; 3) high signal to noise ratio. These requirements are fundamentally different than those of cellular phones, VoIP, and other speech-grade technologies that are cited for technology comparison. Failure to achieve *any* of these three requirements will render wireless microphones unsuitable for use in the production of live and recorded events. Alternatively, success in meeting these requirements has enabled the mobility benefits of wireless microphones to delight audiences of music performance, theater, presentation, worship, motion pictures, and high definition television broadcasts.

Due to increasing demand from audiences and producers, the audio quality trajectory of wireless microphones has been on a steady rise for many years and continues to this day. Additionally, reductions in available spectrum coupled with the desire to deploy more wireless microphones simultaneously in a single production have driven the wireless microphone manufacturers to achieve greater spectrum

²⁸ See fn. 14, *supra*. See also Adaptrum Notice of Ex Parte, ET Docket Nos. 04-186, 10-24, WT Docket Nos. 08-166, 08-167 (filed March 5, 2010) ("pointing out that today's wireless microphones generally use... an obsolescent technology that has been or is being phased out in most other applications").

²⁹ See CTIA Comments at 5-6.

³⁰ See fn. 15, *supra*.

efficiency in their designs. The wireless microphone manufacturers that filed comments in this proceeding may be united in their views regarding Part 74 expansion, but on a year to year basis they are in fierce competition in a global market that places a high value on spectral efficiency, while allowing no room for reduction of audio quality. To state that wireless microphone technology “has been stagnant for decades” is to simply ignore the realities of the professional audio marketplace.

Some parties in this proceeding have attempted to prescribe technical and policy “solutions” to reducing the spectrum requirements of the Professional wireless microphone user community in order to make more spectrum available for new services. These suggestions have ignored several important facts with regard to wireless microphone design and use.

- Digital techniques are not inherently superior to analog techniques when it comes to spectral efficiency. The fundamental purpose of wireless microphones is distinct from devices employed to connect two speakers or a user and a website. Wireless microphones are expected to deliver real-time, full fidelity audio. In contrast, minimum quality transmissions with latency are acceptable for cell phones and wireless data services.³¹ Comparing high-definition audio to a mobile phone is like comparing HDTV to a black and white picture from the 1950s. Professional wireless audio captures many times the frequency response of a mobile phone or Part 90 radio, and transmits that audio with a fraction of the latency exhibited by other technologies.
- Wireless microphones operate at low power levels and can be extremely effective at reusing frequencies within a campus, district, or venue. For example, several theatres in close proximity can actually operate co-channel because wireless microphone emissions are attenuated between the respective sites.³²
- By definition wireless microphones transmit program material from one (or a few) to many. Many new digital services are wideband and potentially require enormous amounts of spectrum to support even a single user, providing benefit to only that user. By the essential nature of the wireless microphone use, in a given time period and channel, more people benefit from wireless

³¹ See Sennheiser Comments at 11.

³² See “Broadway Frequency Spreadsheet” *attached to* Ex Parte Letter of David H. Pawlik, Counsel to The Coalition of Wireless Microphone Users, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 04-186, at 1-35 (Dec. 2, 2009) (demonstrating heavy frequency reuse is common on Broadway; for example, at least nine (9) wireless microphones on Broadway have center frequencies tuned +/- 200 kHz from 620 MHz).

microphone spectrum use. For example, millions of viewers watch and benefit from the ability to hear live events such as the Olympics, the Super Bowl, or a Presidential town hall meeting.

- Wireless microphones use spectrum for short periods of time in discrete areas and release it promptly. For example, while there is near 100% utilization of the unassigned UHF TV bands within the Las Vegas entertainment or Broadway theatre district during prime time evening shows, in the daytime hours this utilization is drastically reduced. The fundamental concept of the geolocation database is to flexibly take advantage of these periods of silence which, for many venues such as a House of Worship, can be the majority of a given week. Average wireless microphone spectrum use compares favorably with the far less efficient digital services approved in more recent rulemakings, many of which operate 24/7 and NEVER release frequencies (*e.g.*, WISP service) regardless of intensity of use.

Wireless microphone manufacturers and users are highly motivated to increase spectral efficiencies of wireless microphone products in order to meet growing demand for more wireless audio in the same spectrum. The Commission should generally refrain from imposing new technical requirements in an attempt to drive technology developments. Such requirements may not prove successful and in fact could hinder technical developments.³³

However, Shure reiterates its support for the adoption of the European Telecommunications Standards Institute (ETSI) digital and analog emission masks that dramatically reduce the permissible out-of-band emissions a wireless microphone can generate.³⁴ Adoption of these masks, already in use and in practice today, will promote more efficient wireless microphone spectrum use by reducing out-of-band emissions and facilitating tighter spacing of wireless microphones operating together within a TV channel. Compared to the Part 74 FCC mask, efficiency gains of 20-30% could be obtained by adopting the ETSI standard while still meeting the audio quality needs of today's production community.

³³ See Sennheiser comments at 11-12 (Commission should not impose new technical requirements on wireless microphones.)

³⁴ See Shure Comments at 29 (encouraging adoption of harmonized standards ETSI EN 300 422-1 VI.3.2 (2008-03) and EN 300 422-2 VI.2.2 (2008-03)).

VII. Existing Part 90 Rules Are Not a Viable Option for Wireless Microphones, and TVBD Requirements Are Inconsistent with Wireless Microphone Applications and Should Not Be Imposed

Some parties contend that wireless microphones should be operating under Part 90 in other spectrum bands.³⁵ Unfortunately, operation under existing Part 90 rules is not a viable option for wireless microphones. While the Part 90 licensing model could be implemented, the available frequencies and technical requirements set forth in Part 90 do not accommodate typical wireless microphone operations. Currently there are only eight (8) Part 90 frequencies designated for wireless microphones. These frequencies are shared with other General Mobile Radio Service (GMRS) licensees and are subject to unacceptable levels of interference. As stated in its comments, Shure abandoned its Part 90 product line some years ago due to this untenable interference situation.³⁶ The frequencies are also in the VHF band and therefore do not provide adequate support for wireless microphones due to noise and wavelength issues. Further, the frequencies are mostly incompatible, such that only three (3) are usable together at one location. In order for Part 90 to be viable, TV band frequencies would need to be added to the Part 90 wireless microphone frequencies. In addition, technical requirements would need to be made similar to Part 74. Most importantly, existing Part 90 frequencies have an occupied bandwidth limit of 54 kHz which results in unacceptable audio quality by today's standards.

Some parties have urged the Commission to impose TV band device requirements (i.e., database interconnectivity and spectrum sensing) on wireless microphones.³⁷ However, these requirements should not be imposed on wireless microphones as they undermine their fundamental purpose -- real time, high-fidelity audio transmission. TVBD rules would create unavoidable latency problems, carrying a penalty of several orders of magnitude of signal delay on the program material. As outlined above, latency is fundamentally at odds with the delivery and capture of a live event and cannot be tolerated. Shure urges the Commission to reject consideration of this requirement.

³⁵ See, e.g., Dell/Microsoft Comments at 12,14.

³⁶ See Shure Comments at 30.

³⁷ See, e.g., Motorola Comments at 4-5 ("Ideally, all future unlicensed wireless microphones would be compliant with the TVDB rules..."); Dell/Microsoft Comments at 8-9 ("Wireless Microphones Certified for TV Band Use Under Part 15 Should Follow Part 15 TV Band Rules"); PISC Comments at 7-9.

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