

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

In the Matter of)	
)	WT Docket No. 08-166
Revisions to Rules Authorizing the Operation)	
of Low Power Auxiliary Stations in the 698-806 MHz Band)	
Public Interest Spectrum Coalition, Petition for)	
Rulemaking Regarding Low Power Auxiliary)	WT Docket No. 08-167
Stations, Including Wireless Microphones, and)	
the Digital Television Transition)	
Amendment of the Commission’s Rules with Regard)	GN Docket 12-354
to Commercial Operations in the 3550–3650 MHz Band)	
Amendment of the Commission’s Rules to Prove)	
Spectrum for the Operation of Medical Body Area)	ET Docket 08-59
Networks)	
To: The Commission		

Comments of EIBASS

In response to the Commission’s October 5, 2012, public notice The Wireless Telecommunications Bureau and the Office of Engineering and Technology Seek to Update and Refresh Record in the Wireless Microphones Proceeding (DA 12-1570), Engineers for the Integrity of Broadcast Auxiliary Services Spectrum (EIBASS) hereby respectfully submits its “refresh the record” comments to the above-captioned Notices of Proposed Rulemaking (NPRMs) relating to Part 74, Subpart H, Low Power Auxiliary (LPA) stations. The comment deadline has been extended twice, to January 25, 2013, so these comments are timely filed.

I. LPA Stations Remain a Critical Part of Today’s Broadcast Operations

1. Over the history of broadcasting, both radio and TV, the trend in the past twenty years has been to replace wired microphones, earphones, and intercom systems with wireless systems. Today just about every video and audio production facility uses wireless LPA devices of some sort. While this is not an exhaustive survey of LPA use, recent events in the San Francisco Bay Area included the Americas Cup Regatta that used 74 UHF wireless microphone frequencies and the Mountain Dew DEW Action San Francisco Extreme Sports event that used 69 UHF wireless

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microphone frequencies. San Francisco also hosted the 2012 Major League Baseball Playoffs that used 135 UHF wireless microphone and intercom frequencies.

2. The National Football League (NFL) reports a typical game will use in excess of 100 UHF wireless microphone frequencies. A large game may require 250-400 wireless microphone frequencies. Super Bowl is a study unto itself. Over 2,000 LPA frequencies ranging from 26 MHz to 698 MHz were logged into the database for Super Bowl XLVI. LPA users are coordinated not just by frequency diversity. In some cases the same frequency is coordinated to different licensees based on the scheduled time of use. Frequencies at the Super Bowl are so tight that use is prioritized based on FCC Rules.¹ Some types of users are denied frequencies if their purpose is merely for convenience not necessity.

3. Political conventions and other major events with media interest face the same challenges to increased LPA use. The FCC itself has recognized a designated event frequency coordinator for the past five political conventions, two Olympic games, the 2012 NATO Summits, and various other events beyond the Super Bowl, all due to increased use of wireless media.

4. Virtually every broadcast production ranging from a casual news stand-up using just two UHF wireless microphone frequencies, to an event like Americas Cup or the Super Bowl, employing every possible and carefully coordinated UHF wireless microphone frequency, is an essential back stage element of today's broadcasting.

II. Limited Expansion of Eligibility for LPA Licenses Is Still Needed to Protect Broadcast Uses

5. As documented in its December 22, 2009, *ex parte* letter to this proceeding, EIBASS opposes the expansion of eligibility of spectrum used by broadcasters to non-broadcast related entities such as churches, theaters, local governments, nuclear power plant (NPP) operators, or any other type use. Historically, Part 74 Subparts D (Remote Pickup), Subpart E (Aural BAS), Subpart F (TV BAS) and Subpart H (LPA) stations have been used in support of Part 73 Broadcast Radio and TV services. Most of the Part 74 subparts are in one way or another directly connected with broadcasting. There are only two clearly-defined exceptions: One for cable television system operators (CTSOs) and the other for motion picture producers (MPPs). EIBASS continues to believe that the eligibility categories that do not directly support Part 73,

¹ Namely, Sections 74.403(b) and 74.832(h) of the FCC Rules.

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Part 74 LPFM or LPTV, or network operations should *not* be expanded for reasons we will go into in detail herein.

6. EIBASS is not opposed to non-broadcast-related wireless microphone use, just to the nature of such use within the broadcast wireless microphone environment. Non-broadcast wireless microphone use is simply not compatible with the process of managing and coordinating reliable, high-quality and interference-free wireless microphone transmission. As mentioned above, wireless microphone coordination is now a well-understood essential component of broadcast planning. It makes about as much sense for EIBASS to endorse sharing wireless microphone spectrum with non-broadcast users as it would in the Old West to allow sheep and cattle to graze the same land, or allow scooters and skateboards on Interstate highways.

7. In its March 1, 2010, comments, EIBASS proposed one carefully limited expansion of eligibility for LPA licenses. EIBASS proposed adding a sixth eligibility criteria for radio production producers (RPPs).² Thus, the universe of entities eligible to hold an LPA license would become:

- B = broadcast station licensee³
- BNE = broadcast network entity
- CTSO = cable television system operator
- MPP = motion picture producer
- TPP = television program producer
- RPP = radio production producer (added sixth category).

8. Thus, EIBASS opposes expansion of LPA licensing to non-broadcast related entities in any manner. Doing so would only open up a traffic jam of new LPA licensees, thereby vastly complicating management and coordination of broadcast-related wireless microphones, and would increase the likelihood of interference to broadcast operations.

² The earlier EIBASS comments used the term Radio Production Entity (RPE); EIBASS now believes that the term Radio Production Producer (RPP) would be a more consistent term, and would avoid confusion with the commonly used radiation pattern envelope abbreviation.

³ EIBASS notes that two classes of broadcast stations appear to be inadvertently missing from the current wording of Section 74.832(a)(1) of the FCC Rules: Subpart G Low Power FM (LPFM) Broadcast Stations and Subpart J Class A Television Broadcast Stations. EIBASS suggests that when a WT Dockets 08-166/08-167 Second R&O is issued, that these two additional classes of broadcast stations be added. Further, removal of eligibility for TV translator licensees would be appropriate, as they are not entitled to originate programming except for brief financial support solicitations.

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III. White Spaces Devices and Incentive Auctions Will Aggravate the Shortfall in TV Channels Available for Licensed Wireless Microphone Use

9. The deployment of Part 15, unlicensed White Spaces Devices (WSDs), and a seemingly inevitable further reduction in the number of UHF TV Channels due to the Incentive Auctions (General Docket 12-268) rulemaking, will only make it harder for licensed LPA stations to operate in support of on-air broadcasting of all types⁴. While the Commission's decision to "temporarily" declare up to 50 mW effective radiated power (ERP) wireless microphones also as unlicensed Part 15 stations, EIBASS believes that the vast majority of such users are unaware that their use is secondary to licensed LPA stations; that is, Part 15 unlicensed use must not cause interference to, and must accept interference from, any licensed use. The many years of little or no FCC enforcement against the use of unlicensed wireless microphones is now adversely impacting licensed users. Particularly in large metros, where many studio operations have gone wireless, licensed users are now receiving interference from unlicensed users near their studios. These interfering users can include, but are not limited to, other tenants operating in the same building.

10. EIBASS wishes to remind the Commission that within the overall voluntary and unfunded efforts related to Part 74 frequency coordination, wireless microphone coordination has become an integral component of these efforts. As the National Football League (NFL) recognized seventeen years ago, and many major sports organizations have since, organized frequency coordination is necessary at special events. Introducing a class of "clueless users" puts further strain on the overall coordination effort and is akin to air traffic controllers being told they now have to deal with a new airline they cannot communicate with and whose pilots take off, fly, land, taxi and gate whenever and wherever they feel like it.

IV. More Efficient Wireless Microphone Use Through Technological Advances

11. The Commission asks commenting parties to "...take into consideration recent industry developments, including advances in wireless microphone technologies..." EIBASS believes that while significant technical advances have been made, we are still at the mercy of existing concepts based on the so-far immutable laws of physics, and the similarly existing attributes of human nature that lead some to want to take advantage of situations when there is little or no enforcement.

⁴ EIBASS recognizes that the definition of what we have previously called "on-air broadcasting" is evolving and expanding and now must include live and delayed broadcasts of streaming audio and video using the transport layer the FCC and others refer to as "Broadband."

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12. Conventional analog FM wireless microphones are still the first choice for support of broadcasting services; any other form of modulation either suffers latency issues or employs greater occupied bandwidth as a fix for reducing latency to acceptable levels. While the Land Mobile industry has shown that 12.5-kHz wide channels are intelligible and that one 12.5-kHz guard channel is all that is needed between dispatch-quality voice channels using filters designed for narrow band communications, wideband receivers are necessary for the greater bandwidth necessitated by program-grade audio. The type of protection required between co-located program-quality operating systems is an order of magnitude greater than that necessary for land mobile radio. Often only eight digital or analog LPA devices capable of providing program-quality audio can typically be slotted in a single 6 MHz TV channel.

13. Digitized audio with latencies in excess of about 10 ms could confuse talent listening to themselves.⁵ Latency is also an issue for lip sync problems between audio and video. While some digital microphones latencies are just a few milliseconds, that latency reduction comes with a price: Greater occupied bandwidth. One manufacturer's digital wireless microphone with encryption capability needs 600+ kHz spacing, compared to just 400 kHz spacing for FM analog wireless microphones. In addition, the receivers used by digital microphones are using more complex (*i.e.*, "fragile") modulation schemes than analog receivers and therefore require greater channel spacing for proper, non-interfering operation. Greater channel spacing means less efficiency resulting in fewer digital devices operating without interference within the ever-shrinking amount of available bandwidth. Although EIBASS expects the greater bandwidth for digital signal processing to decrease as better encoders are developed and hopes manufacturers will improve the selectivity and front-end overload resistance of digital receivers, EIBASS believes that the industry is years away from those types of advancements because of the narrow and consequently less lucrative market for professional grade wireless microphones.

14. EIBASS notes, however, that Section 74.861(e)(5) of the FCC rules limits the bandwidth of an LPA device to 200 kHz, which constrains the amount of digital coding that can be used.

⁵ According to the International Telecommunications Union (ITU-T) G.114 Recommendation (May 2003), *International telephone connections and circuits— General Recommendations on the transmission quality for an entire international telephone connection*, speech latencies of 150 mSec or less are acceptable, and latencies of 400 mSec or greater are unacceptable. Therefore a latency of 100 mSec or less is a conservative threshold. However, at 2007 Audio Engineering Society (AES) paper, *The Effects of Latency on Live Sound Monitoring*, found that latencies of as little as 10 mSec could become problematic. Therefore, a 10 mSec latency benchmark is being conservatively applied.

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V. Steps Needed to Ensure More Efficient Use of Wireless Microphones

15. **Issue another Enforcement Advisory cautioning against use of wireless microphones on former TV Channels 52–69.** At the recent Republican National Convention (RPC), Democratic National Convention (DNC) and at several Super Bowls, frequency coordinators found LPA devices operating in bands no longer allowed for such use. About 50 of those wireless microphones were on frequencies above 698 MHz.⁶ Some were on TV Channel 37⁷, purchased in the United Kingdom, and brought into the U.S. by a foreign news organization. These units were then used on a daily basis in Washington DC as well as other locations. Two wireless microphones were found on 835 MHz and 844 MHz (former U.S. TV Channels 74 and 76), and were causing interference to cellular radio communications. At the Super Bowl, one entertainer was found to be traveling from city-to-city with an entire compliment of foreign made devices operating on 800 MHz cellular frequencies. This entertainer was also unaware that their operations would disrupt cellular operations.

16. EIBASS notes that in 2012 Special Temporary Authority (STA) was issued for use of wireless microphones on former TV Channels 62 and 67, for a five-day period, for the Black Entertainment Television (BET) Awards in Los Angeles.⁸ EIBASS further notes that this same licensee holds a nationwide LPA license for UHF wireless microphones.⁹ Finally, EIBASS notes that this licensee has pending STA applications for wireless microphones on former TV Channels 62 and 67 for the 2013 Academy Awards and the 2013 Grammy Awards, both in Los Angeles.¹⁰

17. While EIBASS commends this LPA licensee for properly applying for STAs rather than fake experimental licenses,¹¹ all three applications claim a “perfect storm” situation, justifying a

⁶ Frequencies above 698 MHz (former TV channels 52-69) are known as the “700 MHz band” and have been reallocated from Part 73 Broadcast and Part 74 LPA use to Public Safety and Cellular. Many Cellular providers and Public Safety 700 MHz committees are struggling with how to clear interference from what are now illegal LPA devices due to the reallocation.

⁷ TV Channel 37 = 608–614 MHz. These frequencies are reserved for Radio Astronomy use, and limited low power medical telemetry use. For these reasons Part 74 LPA use has never been allowed on TV Channel 37 in the U.S.

⁸ Call sign WQPM399, for June 27 through July 1, 2012, at the Shrine Auditorium in Los Angeles. The Southern California Frequency Coordinating Committee (SCFCC) has advised EIBASS that it was not contacted regarding this use of wireless microphones.

⁹ Call sign WQMP707.

¹⁰ FCC application numbers 00056002030 (for the Academy Awards) and 0005601996 (for the Grammy Awards). SCFCC again has not been contacted.

¹¹ In this regard, see the EIBASS comments and reply comments to the ET Docket 10-236 rulemaking, concerning updates to the Part 5 Experimental Radio Service rules.

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rule waiver. One perfect storm is a good waiver justification; two perfect storms is stretching things. Three or more perfect storms are just a back-door request for indefinite, on-going waivers. These STA applications also reveal that wireless microphones are still widely used on former TV Channels 52–69 by the entertainment industry.

18. Although the Commission issued an Enforcement Advisory¹² cautioning wireless microphone users not to operate those devices on former TV Channels 52 through 69, the advisory did not mention that wireless microphones purchased in other countries and brought into the U.S. might be operating on frequencies that have not been permitted in the U.S. for many years; that is, former TV Channels 70 through 83. EIBASS urges that another Enforcement Advisory be issued, pointing out both prohibitions. The updated advisory should be sent to the major U.S. news bureaus.

19. ***Stepped up enforcement.*** EIBASS would hope that a few widely-publicized enforcement actions would bring these abuses to a quick end.¹³ Only when wireless microphone users believe that illegal use carries a high risk of being detected and punished will compliance improve. EIBASS submits that the Commission owes such action to parties that have properly licensed their wireless microphones and other LPA stations, and pay regulatory fees to the Commission for enforcement. It would also help the new users of 700 MHz band spectrum, both commercial mobile radio service (CMRS) and public safety licensees, by reducing the number of LPA devices still operating on former TV Channels 52–69.

20. ***Ensure that only eligible entities are granted authorizations for LPA devices specifying other than TV channel frequencies.*** Section 74.832(d) of the FCC Rules restricts CTSOs, MPPs and TPPs to wireless microphones only on bands allocated to TV broadcasting. That is, wireless microphone and other LPA devices using frequencies at 26 MHz, 162 MHz, 450/455 MHz and 950 MHz are not available to these entities. Yet EIBASS is seeing LPA grants for these other-than-TV-channel frequencies to parties that do not appear to be the licensee of a radio or TV station or a BNE. Besides ensuring that no new inappropriate LPA licenses are granted, the Commission should do an audit of its existing LPA licensees to weed out and

¹² DA 10-1053, dated June 9, 2010, titled *Wireless Microphones*.

¹³ EIBASS notes that at page 14 of the December 2012 issue of *Broadcast Engineering* magazine, an article titled *Silent Mics?* reports that the FCC itself uses unlicensed wireless microphones in the room used for Commission meetings. The Commission should, of course, ensure that its own house is in order before embarking on an enforcement program aimed at reducing the number of unlicensed users of wireless microphones.

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rescind inadvertent grants.¹⁴ EIBASS further recommends that the Universal Licensing System (ULS) be modified to prevent LPA applications for ineligible frequencies from the start; that is, unless the applicant has a parent broadcast station facility identification number, or submits an exhibit showing it is a qualified BNE (and not a CTSO, MPP, RPP or TPP), the ULS should prohibit an applicant from being able to request a non-TV channel frequency.

VI. Incentive Auction Uncertainty Looms Ahead For Wireless Microphone Users

21. The Commission is introducing another level of uncertainty as to the future of wireless microphone spectrum with its Incentive Auctions NPRM adopted on September 28, 2012, where the Commission proposes to repack television stations. The Commission accurately predicts that the Incentive Auction process will “reduce the spectrum available in the TV bands for secondary use by licensed and unlicensed wireless microphones....”. EIBASS believes that this reduction of available spectrum for wireless microphones and unlicensed white spaces devices will put further pressure on an already pressure-filled spectrum environment.

22. EIBASS believes uncertainty will persist after the first incentive auction. First-round hold-outs might be tempted to offer their channels on second and subsequent rounds. The Wireless microphone industry and Part 74 LPA users cannot afford an uncertain future of “musical chairs spectrum” with an end game of too few chairs and too many users.

23. One possible answer is for the Commission to (1) admit in this proceeding that certainty has to be introduced into the equation and (2) work with wireless microphone users to identify new spectrum for what is arguably a vital support function for on-air broadcasting of all types. One idea: Keep the existing wireless microphone bands available to only “core,” broadcast-related wireless microphone use, but allow expanded wireless microphone use in the 3,550–3,650 MHz band proposed in General Docket 12-354. That is, allow “non-core” wireless microphone users such as churches, theaters, local governments, NPPs, or other industrial users, to deploy wireless microphones at 3.6 GHz.

24. The GN Docket 12-354 Notice of Proposed Rulemaking (NPRM) suggests using the same types of protection scheme proposed for WSDs in the ET Docket 04-186 rulemaking: Namely, monitor and avoid, plus geo-positioning. EIBASS argued against WSDs because it felt

¹⁴ For example, on December 17, 2012, the Commission sent a letter to Walt Disney World Company, licensee of LPA Station WPUL328 with 26, 162, 450/455 MHz frequencies incorrectly specified. Walt Disney World Company had filed for renewal, and further asked for 944-952 MHz frequencies, in addition to its TV Channel 2 through 51 frequencies. The Commission declined to add the 950 MHz frequencies, and issued a renewal that did not include any 26, 162, 450/455 or 950 MHz frequencies.

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those tools would be inadequate to protect critical core-function wireless microphones used by broadcasters.¹⁵ However, less critical wireless microphone uses, especially at fixed locations where they can be coordinated among other 3.6 GHz devices, might be able to tolerate such a scheme for 3.6 GHz wireless microphones. Opening the 3.6 GHz band to an expanded universe of wireless microphone users would also avoid crowding new “non-core” wireless microphone users into a shrinking pool of VHF and UHF TV channels.

25. Another possibility would be to open the lower data return link (DRL) band at 2,025.0–2,025.5 MHz, and the upper DRL band at 2,109.5–2,110.0 MHz, to a limited universe of wireless microphone users: Namely, only to licensees of Part 74, Subpart F, TV Pickup stations. These two 500-kHz wide bands could help alleviate crowding by “core” wireless microphone users. To the best of EIBASS’ knowledge, the DRL bands have not yet been used for their originally intended purpose, which was to improve the efficiency of 2 GHz electronic news gathering (ENG) operations by providing a mechanism for automatic transmitter power control of ENG transmitters.¹⁶ Perhaps that envisioned efficiency increase can alternatively be obtained by allowing an admittedly small expansion of frequencies open to an intentionally limited subset of core wireless microphone users.

VII. MBANs Should NOT Be Expanded to TV Channels

26. In the ET Docket 08-59 rulemaking, the Commission adopted rules¹⁷ allowing Medical Body Area Networks (MBANs) at 2,360–2,390 MHz, as a Part 95 MedRadio service. Because those frequencies did not involved BAS spectrum, EIBASS did not submit comments. However, on January 7, 2013, a Petition for Rulemaking dated January 1, 2013, appeared in the Electronic Comment Filing System (ECFS). The petitioner was Mr. Ben Bartlett, identifying himself as a law student at University of California Hastings. In his petition Mr. Bartlett proposes using TV White Spaces channels for MBANs instead of 2.4 GHz spectrum. Mr. Bartlett argues that MBANs at 2.4 GHz would be subject to interference¹⁸ and have limited range.

¹⁵ See the EIBASS ET Docket 04-186 comments dated February 9, 2010 and November 28, 2011. Also see the timely-filed March 19, 2009, *Petition for Reconsideration* of the November 14, 2008, ET Docket 04-186 Report & Order, filed by Mr. Dane Ericksen and Mr. Richard Rudman, now the Co-chairs of EIBASS.

¹⁶ See ATSC A/82, *Automatic Transmitter Power Control (ATPC) Data Return Link (DRL) Standard*.

¹⁷ ET Docket 08-59 Report & Order dated May 24, 2012. According to an FCC public notice dated October 31, 2012, three timely Petitions for Reconsideration have been filed regarding the R&O, by the American Society for Healthcare Engineering of the American Hospital Association; by Phillips Healthcare, and by the Aerospace and Flight Test Radio Coordinating Council (AFTRCC).

¹⁸ Bartlett petition, at page 8.

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27. EIBASS takes no position on the suitability of 2.4 GHz spectrum for MBANs. However, EIBASS opposes use of TV channels for MBANs, because this would mean more devices that could cause interference to, or receive interference from, licensed and therefore higher priority Part 74, Subpart H, LPA wireless microphones and wireless intercoms. In its ET Docket 09-36 comments regarding medical micro-power network service (MMNS) devices that would be co-channel with 450–455 MHz Part 74, Subpart D, Remote Pickup (RPU) stations, EIBASS gave multiple reasons why frequencies for medical use need their own, primary, and protected spectrum.¹⁹ It continues to be the EIBASS position that it is reckless, irresponsible, and possibly even a violation of medical ethics to use frequencies for medical applications that would have secondary status, which is the case for all White Spaces Devices (WSDs). If an application involves a medical function that is in any way critical, that medical use needs to be on a protected basis. This rules out WSDs for MBANs.

¹⁹ EIBASS ET 09-36 comments dated August 19, 2011; July 15, 2011; May 19, 2011; August 26, 2010; June 15, 2010; and May 14, 2010.

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VIII. Summary

28. Wireless microphones remain a critical part of the infrastructure supporting today's broadcast operations. Latency problems limit the acceptability of new digital technologies for core, broadcast-related use. Eligibility for LPA licenses should be narrowly expanded to add just RPPs. The Commission needs to start enforcing its rules requiring licenses for higher-power wireless microphone use. Expanded eligibility for "non-core" wireless microphone use should take place at 3.6 GHz, rather than trying to cram thousands of new users into a shrinking number of VHF and UHF TV channels. Finally, the proposal for MBANs as WSDs is a bad idea that should not be pursued.

Respectfully submitted,

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