

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

In the Matter of)	
)	
Amendment of Part 15 of the Commission's)	ET Docket No. 14-165
Rules for Unlicensed Operations in the)	
Television Bands, Repurposed 600 MHz Band,)	
600 MHz Guard Bands and Duplex Gap, and)	
Channel 37, and)	
)	
Amendment of Part 74 of the Commission's)	
Rules for Low Power Auxiliary Stations in the)	
Repurposed 600 MHz Band and 600 MHz)	
Duplex Gap)	
)	
Promoting Spectrum Access for Wireless)	GN Docket No. 14-166
Microphone Operations)	
)	
Expanding the Economic and Innovation)	GN Docket No. 12-268
Opportunities of Spectrum Through Incentive)	
Auctions)	

OPPOSITION AND REPLY OF CTIA® TO PETITIONS FOR RECONSIDERATION

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OPPOSITION AND REPLY OF CTIA® TO PETITIONS FOR RECONSIDERATION

I. INTRODUCTION AND SUMMARY.

CTIA® hereby submits this Opposition and Reply to the Petitions for Reconsideration filed by various parties in the above-captioned proceedings. In two separate Orders, the Commission adopted technical rules for secondary users in the post-incentive auction 600 MHz band.¹ The goal of these proceedings was to permit use of the 600 MHz band by unlicensed devices and wireless microphones while fulfilling the Spectrum Act’s requirement that licensed

¹ *Amendment of Part 15 of the Commission’s Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, and Amendment of Part 74 of the Commission’s Rules for Low Power Auxiliary Stations in the Repurposed 600 MHz Band and 600 MHz Duplex Gap*, Report and Order, 30 FCC Rcd 9551 (2015) (“*Part 15 Report and Order*”); *Promoting Spectrum Access for Wireless Microphone Operations*, Report and Order, 30 FCC Rcd 8739 (2015) (“*Wireless Microphones Report and Order*”).

600 MHz services not receive harmful interference from these secondary uses.² CTIA believes that the Commission properly adopted technical limits on secondary operations and urges the Commission to reject reconsideration requests that would undermine the protections guaranteed by the Spectrum Act. Specifically, CTIA opposes the requests by various wireless microphone manufacturers to alter the technical limits governing wireless microphones in the 600 MHz band and to obtain access to extensive amounts of additional spectrum. Meanwhile, CTIA supports portions of the petitions filed by the National Association of Broadcasters (“NAB”) and GE Healthcare, which raise issues associated with the quality and accuracy of data in white space device databases. Specifically, CTIA asks the Commission to take the following actions in response to the petitions for reconsideration:

- The Commission should not alter the out-of-band emission (“OOBE”) and power limits for wireless microphones. The technical changes proposed by wireless microphone manufacturers would violate the Spectrum Act’s requirement that these devices not cause harmful interference to primary licensed services.
- The Commission should reject calls by wireless microphone manufacturers to make extensive amounts of spectrum in the 1425-1535 MHz band available for wireless microphones. The amount of spectrum sought by wireless microphone manufacturers is significantly in excess of that presently available to them. Further, the Commission should limit the amount of spectrum made available for these devices to ensure their spectral efficiency.
- The Commission should ensure the accuracy of data in white space device databases to protect licensed 600 MHz services in accordance with the Spectrum Act.

By taking these actions, the Commission will help promote a robust 600 MHz ecosystem that permits a diversity of uses while also complying with the provisions of the Spectrum Act.

² Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6407(e) (codified at 47 USC §1452), 126 Stat. 156 (2012) (“Spectrum Act”).

II. THE COMMISSION SHOULD REJECT REQUESTS TO WEAKEN THE TECHNICAL RULES PROTECTING LICENSED 600 MHZ SYSTEMS FROM INTERFERENCE CAUSED BY WIRELESS MICROPHONES.

In their petitions for reconsideration, wireless microphone manufacturers are seeking changes to the OOB limits³ and power levels⁴ governing wireless microphone use in the 600 MHz band. As explained further below, the Commission should reject these requests and retain the existing rules.

A. OOB Limits for Wireless Microphones Should Not Be Further Relaxed.

The Commission should reject calls by wireless microphone manufacturers to relax the OOB limits for wireless microphones. Specifically, these parties argue that the Commission should have solely followed ETSI standards, rather than have adopted additional independent requirements for wireless microphones. The Commission's decision was based in part on extensive testing information provided by CTIA and its members, and the Commission concluded that the requirements it adopted were necessary to ensure compliance with the Spectrum Act. The Commission should uphold this conclusion.

In its *Part 15 Report and Order*, the Commission required wireless microphones to comply with the same emission masks as licensed Part 74 wireless microphones.⁵ Specifically, the Commission required that emissions from analog and digital unlicensed wireless

³ Petition for Reconsideration of Audio-Technica U.S, Inc., GN Docket Nos. 12-268 and 14-166, ET Docket No. 14-165 at 2-5 (filed Dec. 17, 2015) ("Audio-Technica Petition"); Petition for Reconsideration of Sennheiser Electronic Corporation, GN Docket Nos. 12-268 and 14-166, ET Docket No. 14-165 at 6-7 (filed Dec. 17, 2015) ("Sennheiser Petition"); Petition for Reconsideration of Lectrosonics, Inc., GN Docket No. 14-166, at 2-3 (filed Dec. 17, 2015) ("Lectrosonics Petition"); Petition for Reconsideration of Shure Incorporated, GN Docket Nos. 14-166 and 12-268, at 2-7 (filed Dec. 17, 2015) ("Shure Microphones Petition").

⁴ Audio-Technica Petition at 7-8; Petition for Reconsideration of Shure Incorporated, GN Docket Nos. 14-165 and 12-268, at 7-10 (filed Dec. 17, 2015) ("Shure Unlicensed Petition").

⁵ *Part 15 Report and Order* ¶ 101.

microphones comply with the ETSI emission masks.⁶ At the time, the Commission found that “[r]equiring wireless microphones to meet these tighter emission requirements will protect authorized services in adjacent bands from harmful interference, and will improve spectrum sharing by wireless microphones.”⁷ The Commission also required that outside of the frequency range where the ETSI masks are defined (one megahertz above and below the wireless microphone carrier frequency), emissions must comply with the same limit as the edge of the ETSI masks.⁸

Wireless microphone manufacturers argue that the Commission’s requirement is more stringent than the ETSI standard, as it specifies that all out-of-band emissions must meet the -90 dB level, something that the ETSI standard does not require.⁹ These manufacturers argue that the Commission’s adopted OOBE requirement will have significant negative financial consequences and is perhaps not technically feasible.¹⁰ Manufacturers also argue that ETSI standards are in use in the European Union and that these standards have been sufficient to protect broadcasting, LTE, and other services abroad.¹¹

⁶ *Id.* See Section 8.3 of ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); *Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1: Technical characteristics and methods of measurement*. This standard is available at www.etsi.org.

⁷ *Id.*

⁸ *Id.*

⁹ Audio-Technica Petition at 3; Sennheiser Petition at 7; Lectrosonics Petition at 2.

¹⁰ Audio-Technica Petition at 3-4; Sennheiser Petition at 7; Shure Microphones Petition at 4-6.

¹¹ Audio-Technica Petition at 5.

CTIA notes that not only are the Commission's adopted OOB limits not overly restrictive, but they are actually *less* stringent than those determined through independent testing to be necessary to protect 600 MHz LTE operations. In this proceeding, CTIA and its members provided the Commission with extensive test data demonstrating the necessity of strict OOB limits for wireless microphones to protect 600 MHz licensees from harmful interference.¹² Specifically, the V-COMM tests concluded that an OOB limit of -89 dBm/100 kHz would be necessary to adequately protect LTE equipment from interference.¹³ The Commission took this data into account when it developed its OOB limits, yet still failed to provide the degree of OOB protection deemed to be necessary by the V-COMM testing.

The wireless microphone manufacturers have not adequately justified their request for reconsideration of OOB limits. First, they provide no technical details or information to demonstrate that the Commission can relax OOB limits as requested and still comply with the Spectrum Act's requirement to protect 600 MHz licensees from interference. Instead, petitioners rely solely upon financial considerations and unsubstantiated claims of possible technical infeasibility to justify their positions. Second, petitioners incorrectly assert that the Commission misunderstood the proper application of the ETSI emission mask.¹⁴ As the Commission's *Part 15 Report and Order* makes clear, the Commission carefully considered the requirements of the ETSI standard and adopted its OOB limits to ensure that licensed 600 MHz services would be fully protected.¹⁵

¹² Comments of CTIA – The Wireless Association®, ET Docket No. 14-165, GN Docket Nos. 14-166 and 12-268, Appendix B at 82 (Feb. 4, 2015) (“CTIA Comments”).

¹³ *Id.*

¹⁴ Sennheiser Petition at 7.

¹⁵ *Part 15 Report and Order* at n. 342.

For these reasons, CTIA urges the Commission to reject petitioners' requests to relax OOBE protections for wireless microphones in the 600 MHz band. The wireless industry has demonstrated through real-world testing that the limits *already* in place are insufficient to fully protect licensed 600 MHz operations. Indeed, if the Commission were to consider any changes to OOBE limits, the record supports *strengthening* the requirements to be consistent with the testing data provided by the wireless industry. At a minimum, however, the Commission should uphold the requirements adopted in the *Part 15 Report and Order*.

B. The Commission Was Correct to Limit Wireless Microphones to 20 Milliwatts of Output Power Within the Duplex Gap and Guard Bands.

The Commission should uphold its 20-milliwatt Effective Isotropic Radiated Power (“EIRP”) limit for wireless microphones operating in the duplex gap and guard bands. Wireless microphone manufacturers assert, without providing technical data, that they will be forced to re-design all wireless microphone models and/or design a new wireless microphone model for operation in these frequency bands. Not only have wireless microphone manufacturers failed to offer data in support of their assertion that wireless microphones can operate at higher power levels and still comply with the Spectrum Act, but petitioners also merely restate arguments already considered and rejected by the Commission in the *Part 15 Report and Order*. As such, their arguments should be dismissed.

Petitioners generally assert that the Commission's 20 milliwatt EIRP limit is insufficient to permit use of wireless microphones in the 600 MHz band.¹⁶ Instead, they argue that power limits should be increased to 50 milliwatts EIRP.¹⁷ Petitioners argue that a 20-milliwatt EIRP limit would force the complete re-design of all wireless microphone models so that they: (1) will

¹⁶ Shure Unlicensed Petition at 8-9; Audio-Technica Petition at 7-8.

¹⁷ Shure Unlicensed Petition at 8; Audio-Technica Petition at 7-8.

automatically reduce power if operated in the duplex gap or guard bands; or (2) will require manufacturers and end users to utilize a second model to operate in these spectrum bands (which would be costly and inefficient).¹⁸ Once again, petitioners rely only on claims of hardship and do not provide any technical data in support of their request for relief. In any event, absent data that this higher power limit would provide protections to licensed services that comply with the Spectrum Act's non-interference requirements, the Commission must reject petitioners' proposal.

In addition, CTIA notes that these petitions for reconsideration merely restate arguments previously considered and rejected by the Commission in this proceeding.¹⁹ The Commission adopted a 20-milliwatt power limit because it was permitting such operations without any frequency separation between these devices and wireless downlinks in the licensed 600 MHz band.²⁰ It adopted this power limit and specifically rejected the arguments of wireless microphone proponents, who sought a higher power limit in the guard bands and duplex gap. The Commission's rules state that petitions for reconsideration may be dismissed or denied if such petitions merely recast arguments already made in a proceeding.²¹ Wireless microphone manufacturers' petitions have included no new technical information or any information that was not provided to the Commission during its consideration of this issue. As such, petitioners have not raised any new fact or argument that has not already been considered by the Commission, and their petitions for reconsideration should accordingly be rejected.

¹⁸ Shure Unlicensed Petition at 7-10; Audio-Technica Petition at 7-8.

¹⁹ *See Part 15 Report and Order* ¶ 138.

²⁰ *Id.* ¶ 149.

²¹ 47 C.F.R. § 1.429(1)(3).

III. THE COMMISSION SHOULD NOT EXPAND ITS ALLOTMENT OF 30 MEGAHERTZ OF SPECTRUM FOR WIRELESS MICROPHONES IN THE 1.4 GHZ BAND.

The Commission should reject calls by wireless microphone operators to make the entire 1435-1525 MHz band available for wireless microphone use. In the *Wireless Microphones Report and Order*, the Commission concluded that a 30-megahertz limit would satisfactorily accommodate wireless microphone uses while protecting other operations from interference.²² Specifically, the Commission observed that the 30-megahertz requirement would facilitate coexistence in the band by ensuring that all wireless microphones would be able to coordinate around Aeronautical Mobile Telemetry (“AMT”) operations and promoting the development of spectrally efficient technologies.²³ Petitioners inaccurately assert that this spectrum access limit has no basis in the record and should be eliminated.²⁴

Further, the 30-megahertz limit is well-supported by the record and falls squarely within the Commission’s stated policy objectives of promoting spectral efficiency and frequency agility for wireless microphones. The Commission broadly sought comment on whether and how to allow access to the 1435-1525 MHz band while promoting incumbent uses and ensuring that any wireless microphones operating in the band be spectrally efficient and frequency-agile.²⁵ In response to this statement, CTIA argued against permitting wireless microphones to access the

²² *Wireless Microphones Report and Order* ¶ 118.

²³ *Id.*

²⁴ Audio-Technica Petition at 5-6; Sennheiser Petition at 3-6; Lectrosonics Petition at 3-5; Shure Microphones Petition at 7-10.

²⁵ *Promoting Spectrum Access for Wireless Microphone Operations; Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, 29 FCC Rcd 12343, ¶¶ 178, 180 (2014) (“*Wireless Microphones NPRM*”).

entire 1425-1535 MHz band, noting that such a result would directly contradict the Commission's stated spectral efficiency goals.²⁶ As the *Wireless Microphones Report and Order* makes clear, the Commission reasonably weighed the comments in the record and permitted some access to the 1425-1535 MHz band while rejecting calls for access to the entire band.²⁷ In adopting the 30-megahertz limit, the Commission noted that while its intent was to accommodate the spectrum needs of wireless microphones, the Commission only envisioned limited use of this band and did not propose to open it for either widespread or itinerant use throughout the nation.²⁸ Importantly, to provide flexibility to wireless microphone operators-- and to the extent that existing allocations and this additional 30 megahertz of spectrum is not sufficient -- the Commission created a Special Temporary Authority ("STA") process to address extraordinary situations or special events requiring more spectrum access.²⁹

Thus, the Commission's decision to limit wireless microphone spectrum access to 30 megahertz in the 1425-1535 MHz band was based upon a full record and developed to ensure that new wireless microphones are as spectrally efficient as possible. As such, CTIA encourages the Commission to reject arguments to modify this existing limitation.

IV. THE COMMISSION SHOULD ENSURE THE ACCURACY OF INFORMATION IN THE WHITE SPACE DATABASES.

Under the regime adopted by the Commission, white space databases will play an essential role in ensuring that unlicensed white space devices do not cause harmful interference

²⁶ Letter from Scott K. Bergmann, CTIA, to Marlene H. Dortch, Federal Communications Commission, ET Docket No. 14-166, GN Docket Nos. 14-165 and 12-268 (dated July 10, 2015).

²⁷ *Wireless Microphones Report and Order* ¶ 107.

²⁸ *Id.*

²⁹ *Id.* ¶ 119.

to licensed 600 MHz operations. CTIA stresses that for this regime to be effective, white space databases must contain accurate information regarding the technical parameters and location of white space devices. To that end, CTIA echoes the concerns raised by the National Association of Broadcasters (“NAB”) regarding the accuracy of white space database information. CTIA also agrees with GE Healthcare’s criticisms of the TM 91-1 propagation model adopted by the Commission, which provides a methodology to determine the geographic separation distances between protected, licensed services and secondary services in the 600 MHz band.

To protect the rights of 600 MHz licensees in accordance with the Spectrum Act, the Commission should make every effort to ensure the quality and accuracy of data in the white space device databases. In its petition, NAB argues that the Commission should require white space devices to incorporate automatic geolocation capability.³⁰ CTIA agrees that the framework adopted by the Commission to ensure compliance with the Spectrum Act requires highly accurate and reliable data in white space databases, and with NAB’s basic premise that automatic geolocation capability would serve that goal. The Commission therefore should make every effort to bolster the robustness of the white space database.³¹ As NAB observes, “[i]f the location information of the TV white space device in the database is unreliable or invalid, the entire TV white space approach fails.”³² For this reason CTIA agrees with NAB that the Commission should require white space devices to incorporate automatic geolocation capability.

³⁰ Petition for Reconsideration of the National Association of Broadcasters, ET Docket No. 14-165 and GN Docket No. 12-268, at 4 (filed Dec. 23, 2015) (“NAB Petition”).

³¹ CTIA is encouraged that the Commission took recent action to adopt an Order and NPRM in response to the NAB petition. *See Amendment of Part 15 of the Commission’s Rules for Unlicensed White Space Devices*, Notice of Proposed Rulemaking and Order, FCC 16-23 (2016).

³² *Id.* at 2.

In its petition, GE Healthcare also raises concerns regarding the TM 91-1 propagation model used by the Commission to predict interference.³³ CTIA also raised significant concerns regarding the TM 91-1 model in its comments in this proceeding, and it agrees with GE Healthcare that use of this model is highly problematic.³⁴ GE Healthcare observes that the TM 91-1 model is ill-suited for predicting path loss and protection distances³⁵ and that the Commission committed material errors in its application of the TM 91-1 model to calculate protection distances: it neglected to include a factor for the signal-to-noise ratio required by WMTS radios, it ignored the potential for multiple interferors, and it made inaccurate assumptions regarding antenna height.³⁶ As GE Healthcare also points out, the Commission noted that the TM 91-1 model's predictions for path loss were out of line with real-world examples.³⁷ CTIA suggests that the Commission again consider if TM 91-1 is the correct propagation model to determine the protection distances between white space devices and licensed 600 MHz operations. Instead, the Commission should investigate the use of the Longley-Rice model, which is a better predictor of interference from white space devices and wireless microphones.³⁸ In light of the issues identified by GE Healthcare, CTIA urges the Commission to reconsider its use of the TM 91-1 propagation model to predict interference in the 600 MHz band.

³³ *Id.* at 21-26, 33-36.

³⁴ CTIA Comments at 31-33.

³⁵ GE Healthcare Petition at 21.

³⁶ *Id.* at 23-26.

³⁷ *Id.* at 33-36.

³⁸ CTIA Comments at 32, Appendix C.

V. CONCLUSION.

Protection of licensed 600 MHz mobile wireless services from harmful interference caused by secondary uses is more than just a laudable policy goal – it is required by the Spectrum Act. The Commission should uphold its protections for 600 MHz wireless licensees, which are necessary to ensure a robust 600 MHz mobile ecosystem. The Commission should also uphold its conclusions regarding spectrum access for wireless microphones, consistent with its policy goals of spectral efficiency. Finally, by taking steps to ensure the accuracy of information in the white space databases, the Commission can further protect the rights of 600 MHz licensees and promote coexistence of diverse operations in the 600 MHz band.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I, Patricia Destajo, do hereby certify that on this 29th day of February, 2016, I caused copies of the foregoing Opposition and Reply of CTIA to be served on the following, First-Class

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