

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

In the Matter of)	
)	
Promoting Spectrum Access for Wireless Microphone Operations)	GN Docket No. 14-166
)	
Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions)	GN Docket No. 12-268
)	

**PETITION FOR RECONSIDERATION
OF LECTROSONICS, INC.**

Lectrosonics, Inc.¹ respectfully petitions the Commission to reconsider certain rule changes made by the *Report and Order* in the above captioned Docket 14-166 proceeding. Lectrosonics supports the Commission’s goal of efficiently accommodating wireless microphone operations in the available spectrum. We recognize the effort the Commission has exerted to consider a large and complex record in these proceedings and request only reconsideration of a few limited items.

I. Introduction

On August 11, 2015 the Commission released an order² which made sweeping changes to the rules governing operation of wireless microphone systems. Among these changes were new spurious emission requirements for wireless microphone transmitters, modifications to RF power limits in certain bands, and limits on spectrum availability in the 1435-1525 MHz band for wireless microphone operations. It is these changes which we wish the Commission to reconsider, with our arguments presented below.

¹ Lectrosonics, Inc. is a manufacturer of professional wireless microphone and IFB (interruptible foldback) cueing and control systems used in TV production, filmmaking, and live sound performances. <http://www.lectrosonics.com>.

² *Promoting Spectrum Access for Wireless Microphone Operations R&O*, 80 FR 71702 (*Wireless Microphone R&O*).

II. The -90 dBc spurious emission limit outside of the ETSI mask is impractical and unnecessary for wireless microphone operations outside of the 600 MHz band

The Commission adopted new occupied bandwidth and spurious emission rules for Part 74 wireless microphones. Emissions must now conform to the ETSI emission mask³, and emissions outside this mask (± 1 MHz from the carrier) must be limited to -90 dBc under the new rules.⁴ These requirements are adopted in all permitted frequency bands.

We see that the -90 dBc limit is a factor in the Commission's estimation in a related proceeding of potential interference to wireless handsets by wireless microphone operation in the 600 MHz guard bands and duplex gap.⁵ Here the goal is suppression of spurious emissions in a range some tens of MHz away from the carrier. However, extending this limit across the full frequency measurement range in compliance testing is unnecessary and greatly complicates the design of wireless microphone transmitters. The difficulty in meeting the -90 dBc requirement lies not in the vicinity of the ETSI emission mask but in the more distant frequency range where harmonics of the carrier frequency fall. These are very difficult to attenuate by greater than 90 dB relative to the carrier given the size, power and cost constraints according to which we must design wireless microphone transmitters. If this limit stands it will certainly delay the introduction of new transmitter models for professional users operating under Part 74 rules.

We ask the Commission to reconsider the -90 dBc spurious emission limit outside the edges of the ETSI mask. We propose that the Commission adopt instead the ETSI spurious emission limits given in ETSI EN 300 422-1.⁶ These are:

VHF and UHF bands: 4 nW

Other frequencies below 1000 MHz: 250 nW

Frequencies above 1000 MHz: 1uW

³ ETSI EN 300 422-1, *Electromagnetic compatibility and Radio spectrum matters (ERM); Wireless microphones in the 25 MHz to 3 GHz range; Part 1: Technical characteristics and methods of measurement*. Available at www.etsi.org.

⁴ See 47 C.F.R. § 74.861(d)(4).

⁵ See *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 R&O*, 80 FR 73043 at 141-144.

⁶ See ETSI EN 300 422-1, § 8.4.3, Table 3.

The ETSI in band limit of 4nW limit translates to -74 dBc for our 100 mW transmitters, which is still very strict but within the reach of current practical design.⁷ Out of band the limit is stepped upwards to allow for a reasonable balance between spurious emission levels and practicality of transmitter design. These limits can be incorporated into the rules by reference in the same manner as the ETSI emission mask. We believe that the ETSI limits are sufficient to realize the gains in spectral efficiency needed in the future. These limits should be adopted for wireless microphones certified under Part 74 rule for operation in the 174.000-216.000 MHz band, the UHF broadcast TV band, the 941.500-952.000, 952.850-956.250 and 956.450-959.850 MHz bands, the 1435-1535 MHz band and the 6875.000-6900.000 and 7100.000-7125.000 MHz bands.

III. The specification of transmitter output power in the 54-72, 76-88 and 174-216 MHz bands as EIRP complicates the design of IFB, IEM and Assistive Listening systems and conflicts with their need for flexible antenna options

The Commission changed the power limit for auxiliary transmitters in the 54-72, 76-88 and 174-216 MHz bands from 50 mW conducted power to 50 mW EIRP.⁸ Several reasons were given for this change.⁹

One reason was a desire to improve the efficiency of wireless microphone operations in applications where transmitters are worn on the body and full size antennas are not practical. The idea was specify the power limit as EIRP, so that conducted power could be increased to compensate for the low antenna efficiency. Unfortunately this is short sighted. We must also consider the opposite case, where the transmitter is in a fixed location and the *receiver* is worn on the body. The former case is that of a wireless microphone application, the latter case is that of Interruptible Fold-back (IFB), In Ear Monitor (IEM), or Assistive Listening applications. Here an EIRP limit is unnecessarily restrictive because it implies that transmitter antennas be integral (non-detachable), or use nonstandard connectors. This is impractical for these applications, where the transmitter is enclosed in a rack or equipment closet and the antenna must be located elsewhere, connected by a coaxial cable. This arrangement is necessary to allow the signal to propagate and also to prevent interference to receivers and other electronic

⁷ Although challenging, we are able to meet this requirement in the products we market in the European Union, which must comply with the ETSI standards.

⁸ See 47 C.F.R. § 74.861(c)(1)(i).

⁹ See *Wireless Microphone R&O* at 23-24.

equipment located in close proximity to the transmitter in the rack or equipment closet. Depending on the circumstances, either omnidirectional or unidirectional antennas may be needed to satisfy coverage requirements. Further, it is typical in many such applications to combine the outputs of multiple transmitters and feed a single antenna. The need for flexibility in configuring these systems requires detachable antennas and the use of standard RF connectors and coaxial cable to interconnect the component parts. All of this would be impossible unless a conducted power limit could be referenced in compliance testing.

Another reason given was to address concerns that wireless microphone operations might increase the potential for interference to TV broadcasts.¹⁰ While we understand that an EIRP limit ensures uniformity in radiated power, we must note that the previous 50 mW conducted power limit was never a cause for concern in the past. Based on this experience we do not believe there will be problems with broadcast TV interference in the future at this power level.¹¹

We ask the Commission to reconsider the change to power limit for these bands. We believe the limit should be specified as 50 mW conducted power *or* 50 mW EIRP, with the option to measure it either way in compliance testing. The 50 mW EIRP limit is retained as an option for body-worn transmitters with integral antennas, to help overcome the low antenna efficiency problems it was meant to address.

IV. The 30 MHz limit for wireless microphone spectrum usage in the 1435-1525 MHz band is unnecessary and conflicts with the restriction that access is limited to fixed venues with large numbers of wireless microphones (100 or more)

In the *Promoting Spectrum Access for Wireless Microphone Operations R&O* the Commission indicates that wireless microphones operating in a particular area may access no more than 30 MHz in the 1435-1525 MHz band.¹²

One reason given for this limit was to ensure that wireless microphones are able to coordinate around AMT operations. However, because the Commission mandates that wireless microphone equipment coordinate with AFTRCC via an automated mechanism, there should be

¹⁰ *Ibid.*

¹¹ Although in Comments Lectrosonics argued for a tiered separation distance in connection with a proposal to increase the power limit in the 174-216 MHz band to 250 mW, it would not be necessary if the limit remains at 50mW.

¹² See *Wireless Microphone R&O* at 118.

no problem with determining how much spectrum is available.¹³ The amount of spectrum available to wireless microphones will be defined by the actual needs of AMT operations as determined by AFTRCC at any given place and time. Any remaining spectrum should be available for wireless microphone operations.

We ask the Commission to reconsider the 30 MHz limit on spectrum use by wireless microphones in the 1435-1525 MHz band. We believe that it should be removed.

Respectfully submitted,

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¹³ See *Wireless Microphone R&O* at 119.