

**Before the
Federal Communications Commission
Washington, D.C. 20554**

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| In the Matter of |) | |
| |) | |
| 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 |
| |) | |

REPLY COMMENTS OF AUDIO-TECHNICA U.S., INC.

Audio-Technica U.S., Inc. (“A-T”) submits these reply comments in response to the Commission’s *First Report and Order and Further Notice of Proposed Rulemaking* released on October 18, 2006, in the above-captioned proceeding.¹ In this proceeding, the Commission has proposed, *inter alia*: 1) to allow unlicensed wireless systems to operate on unused core the television channels between channels 5-36 and 38-51 (“TV Bands”), subject to a requirement that such operations do not interfere with licensed communications on those channels; and 2) to establish technical standards relating to unlicensed devices (“UDs”)² and interference protection that will allow equipment certification and testing to begin later this year.³

¹ *In the Matter of Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04-186, 02-380, First Report and Order and Further Notice of Proposed Rulemaking, 21 FCC Rcd 12266 (2006) (“*First Report and Further Notice*”).

² A-T acknowledges that the Commission is still considering whether to adopt a licensed or unlicensed regime for these devices and the reference to “unlicensed devices” reflects only that such devices are not currently licensed.

³ *First Report* at ¶ 16.

I. INTRODUCTION

A-T has been dedicated to advancing the art and technology of electro-acoustic design and manufacturing since 1962. From a beginning in state-of-the-art phonograph cartridges, A-T has expanded over the years into high-performance headphones, microphones, mixers and electronic products for home and professional use. In each new area, the goal has been to create innovative, problem-solving products. The results of these engineering and production efforts can be seen in the effective use of A-T products in a broad spectrum of applications. Audio-Technica microphones, for example, are found in daily use in major broadcast and recording studios, and relied upon by top touring musicians. A-T microphones are chosen for important installations and major events, such as the U.S. House of Representatives, the U.S. Senate, presidential debates, the Super Bowl, World Cup Soccer and the Olympics.

Audio-Technica is concerned that the proposed introduction UDs in the TV bands based on the current state of technology will have potentially disastrous consequences on wireless microphone use. The many professional wireless microphones that already operate in the TV bands are a ubiquitous and irreplaceable tool for the entertainment and broadcast/production industries that stand to be rendered unusable by introduction of UDs. Because professional wireless microphones are so reliable and transparent, it has become easy to overlook the fact that contemporary televised sporting events, live musical performances, Broadway theater productions, news programming, religious services, and many other sources of media content that define American culture to the world, cannot be enjoyed by the public on a large scale without them. Therefore, it is of the utmost importance that the Commission proceed cautiously and carefully in allowing UDs to operate in the TV Bands and take concrete steps ensure that

wireless microphones can continue to function without interference before any new devices are allowed to operate in the TV bands.

II. THE COMMISSION MUST PROTECT WIRELESS MICROPHONES.

Although the Commission has recognized that the need for interference protection is not limited to television station operations and has indicated that it will protect “other licensed services”⁴ in the TV bands, the *First Report and Further Notice* stops short of providing sufficient assurance that there will be full protection for wireless microphones from the potential interference created by unlicensed devices. Indeed, one commenter, New America Foundation (“NAF”), argues that wireless microphones should not be licensed and should be transitioned from licensed to unlicensed status.⁵ The Commission should unequivocally reaffirm that broadcast auxiliary services, including wireless microphones that are an indispensable tool in media production, must be protected from interference caused by UDs.

II. INTERFERENCE STANDARDS SET PRIOR TO THE DTV TRANSITION WILL BE INADEQUATE TO FULLY PROTECT LICENSED SERVICES.

The *First Report and Further Notice* seeks to establish a timeline for the development of technical standards and equipment certification procedures by the end of 2007. The Commission indicates, however, that certified devices “will not be available for sale until after the DTV transition ends on February 17, 2009.”⁶ A-T agrees that given the highly dynamic nature of the digital transition, the Commission must proceed cautiously and deliberately, and it wisely chose to delay introduction of UDs into the TV Bands until after the digital transition has

⁴ *First Report and Further Notice* at ¶ 13.

⁵ Technical Comments of New America Foundation (January 31, 2007) at pp. 19-22.

⁶ *Id.* at ¶ 16.

been completed. However, the deployment delay in and of itself is not sufficient to ensure that the particular interference vulnerabilities of low power broadcast auxiliary services, including wireless microphone services, are taken into account and fully protected. By establishing technical and operational standards now, before completion of the digital transition, the Commission runs a very real risk that any standards it adopts will not accurately account for the RF environment that will exist once the digital transition has been completed, and all wireless devices may then experience difficulty. The future environment uncertainty also applies to newly proposed unlicensed devices. All products developed in today's environment may perform quite differently once many devices are in use in a crowded RF environment. There is potential for an airwave "traffic jam with many collisions" as the density of wireless device operation increases. This scenario would be commercially harmful to everyone, including potential UD manufacturers, and to the consumers who desire wireless "freedom."

Presently, DTV stations have not yet moved to their core channels or have not maximized their facilities. The Commission is also accepting applications for new digital low power television ("LPTV") stations in the core channel band and has not yet established a deadline for the digital transition as it applies to LPTV and translator stations. Furthermore, every day new products utilizing WiFi, Bluetooth, and similar technologies, both licensed and unlicensed, are being introduced into the market. Many of these are unlicensed and it is fair to say that product innovation and consumer acceptance of these products will only see this trend continue and accelerate. These factors virtually ensure that the RF environment in 2009 will be different than

what it is today and, for this reason, A-T believes that it is not actually possible for the Commission to devise a totally effective plan for protection at this time.⁷

The Commission itself has recognized and expressed concern about the possible additive effects that even low levels of RF may cause and the potential negative impact that raising the general RF noise floor could have on existing users.⁸ Indeed, the effective power levels proposed for unlicensed devices in this proceeding are significantly higher than the restrictions placed on Ultra-Wideband Signals (“UWB”) where the Commission voiced such concerns and, as was the case during the examination of viability interference issues posed by for UWB deployment, it is not currently possible to make an accurate technical assessment of the operating RF environment which will exist after DTV transition is complete. Without such an assessment, it is not possible for the Commission to accurately define interference mitigation solutions designed to protect important wireless microphone operations or broadcast TV operations prior to the 2009 transition deadline.

III. THE COMMISSION SHOULD PROCEED CAUTIOUSLY AND NOT SACRIFICE SCIENTIFIC RIGOR FOR EXPEDIENCY OR AN UNREALISTIC TIMETABLE.

The fact that the final RF landscape after the digital transition is completed in 2009 will be very different than it is today does not mean that the Commission should delay its

⁷ Indeed, IEEE 802.18, the Radio Regulatory Technical Advisory Group (“IEEE”) has acknowledged in its comments that even on a theoretical level, potential for interference with licensed services exists at the current 4W power levels under consideration for unlicensed devices. IEEE Comments at pp.9-10. A-T believes that actual operating experience in the RF environment will show that these theoretical concerns will understate the interference problems that will arise.

⁸ See generally, *Revision of Part 15 of the Commission’s Rules Regarding Ultra-Wideband Transmission Systems*, 17 FCC Rcd 7435 (February 14, 2002) (“*UWB Report and Order*”).

investigation into new technologies, such as spectrum sensing, that may well prove a very useful tool to avoid interference, especially when utilized in conjunction with other approaches under consideration, such as locally-based beaconing and geo-location/database solutions.⁹ A-T supports current efforts to “approximate” whether or not interference will occur, but has not yet seen any approach that includes developing accurate, repeatable, and practical (in environment) methods for characterizing the propagation properties, resistance to interference, and ability to detect and set the threshold and need for avoidance when set in the true “noise floor” of an environment that will be very different after an additional two years of DTV deployment and rapid wireless device growth.

A-T supports the constructive work of such entities as the IEEE 802.22 Working Group and Shure, Incorporated (“Shure”) to establish workable technical standards and testing procedures that will ultimately allow UDs to operate in the TV Bands without causing harmful interference to wireless microphones and other licensed services. Such testing is crucial to the Commission’s stated goal of ensuring that UD’s do not interfere with licensed services. However, the Commission must not sacrifice scientific rigor for the sake of expediency or a desire to adhere to a timetable that may be unrealistic.¹⁰ The Commission must look beyond the unsubstantiated claims and self interests of the various participants in this proceeding and adhere

⁹ In addition, we recognize that the filtering, battery power and digital technologies that are available today are not representative of the technologies that will be available in 2009. A-T believes that after 2009, it will be much more feasible to construct devices that more accurately represent “the state of the art” needed to accomplish co-existence in a crowded and hostile RF environment.

¹⁰ In this regard, A-T shares the view expressed by Shure in its comments that the Commission’s timetable may well be too aggressive and that this timetable may need to be revised based on actual testing and environmental changes. Shure comments at pp. 24-26.

to methods and testing that are scientifically sound and can be replicated both in the laboratory and in the field.

In this regard, A-T suggests that the FCC should follow the same cautious approach that it utilized in authorizing the use of UWB devices. A-T applauds the caution, reason, efforts and technical methods that were followed by the FCC to ensure that the introduction of UWB devices would not cause harmful interference to existing wireless devices and implores the Commission to treat the issue of UDs operating in the TV bands with at least the same caution and scientific process.¹¹ In its consideration of UWB, the Commission recognized that the operation of many devices, even at extremely low power (operating well below the part 15 limits) created a very real possibility of interference to existing wireless services. The levels being discussed in the *Further Notice* are orders of magnitude higher, so clearly the opportunity for interference in the present case calls for the same cautious measured approach.

Such an approach would recognize that the threat to licensed services is not simply the power levels at which individual UDs are allowed to operate, but rather the fact that such devices, for which the bandwidth and signal characteristics are not defined will be introduced into the TV Bands very rapidly and in large numbers. Large numbers of users, especially in dense areas present a real danger of interference to wireless microphone use unless the Commission establishes standards that take into account the ambient RF noise floor as it will exist at the end of the digital transition and the ability of UDs to erode the sensitivity of wireless

¹¹ Specifically, the Commission should refer to “Ultra-Wideband Signals for Sensing and Communication: A Master Plan for Developing Measurement Methods, Characterizing the Signals and Estimating Their Effects on Existing Systems” developed by the Office of Spectrum Management within the National Telecommunications & Information Administration for guidance regarding the development of measurement methods, characterizing and defining signal limits, and estimating the effects of new wireless devices on existing wireless devices. This document may be found at <http://www.ntia.doc.gov/osmhome/uwbtestplan>.

microphones and other auxiliary service receivers. While it may not be practical to control UD density in a given area (by virtue of the fact that these devices are not licensed) it is possible to develop standards that would take into account the cumulative effect of such devices by prohibiting such devices from eroding the sensitivity of wireless microphones and other auxiliary equipment below some as yet undetermined percentage when operating within a defined distance. Such an approach is far more likely to protect existing licensed services than an approach that simply allows UDs to operate at power levels of up to 4W regardless of how many such stations are in operation in a geographically proximate area.

IV. THERE ARE SEVERAL STEPS THE COMMISSION SHOULD TAKE TO MITIGATE THE INTERFERENCE POTENTIAL OF UDs.

There are a number of steps the Commission should take to ensure the continued reliable operation of licensed wireless audio products until such time as operational experience demonstrates that UDs can operate in the TV Bands without causing harmful interference to licensed services. First, the Commission must set aside spectrum where wireless microphones will be able to operate free from UDs, to create a mechanism that will guarantee the availability of the spectrum needed for crucial wireless microphone operations at live events such as the Super Bowl or Grammys, where literally hundreds of microphone channels are needed. In this regard A-T supports Shure's proposal to set aside adjacent television channels in urban markets and a combination of UHF and VHF channels in rural markets where wireless microphones can operate free from the threat of interference from UDs.¹²

Second, the Commission must establish meaningful rules that require UD manufacturers to demonstrate that spectrum sensing works properly in the operating environment that will exist

¹² Shure comments at pp. 11-14.

after DTV implementation in 2009. To this end the Commission should withhold introduction of fixed UDs in the TV Bands until after 2009 as it has proposed. But beyond that, the Commission should closely monitor fixed UD deployments for at least one full year thereafter and adjust any technical standards and operating restrictions applicable to UDs to take into account the real world RF environment as it exists following the end of the digital transition.

Finally, the Commission should defer consideration of the complex interference issues raised by personal/portable devices until after positive experience is gained with fixed devices. To this end, the Commission should not allow personal/portable devices to be introduced into the TV Bands for at least two years after the initial introduction of fixed UDs. This should provide sufficient time to create reliable detect/avoid and interference mitigation strategies for portable devices.

V. CONCLUSION

Based on the foregoing, A-T respectfully requests that the Commission recognize the particular interference vulnerabilities of wireless microphone services and take those vulnerabilities developing a plan to allow unlicensed devices to operate in the TV Bands. The Commission must recognize that the standards and processes presently under consideration cannot take into account the true operating environment or available technology in two additional years. The Commission should follow the cautious approach taken in its UWB proceeding and be prepared to re-examine and revise its standards and procedures as needed

once the digital transition is complete and the operational environment in the TV Bands has stabilized.

Respectfully submitted,

Audio-Technica U.S., Inc.

By: 

Jacquelyn A. Green
V.P. R&D/Engineering
Audio-Technica U.S., Inc.
1221 Commerce Dr.
Stow, OH 44224
(330) 686-2600

By: 

Howard S. Shapiro
Bennet & Bennet, PLLC
10 G Street N.E., Suite 710
Washington, DC 20002
202-371-1500
Its Attorneys

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