BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
Washington D.C. 20554

In the Matter of	)	
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Unlicensed Operation in the TV Broadcast Bands	)	**ET Docket No. 04-186**
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	)	
Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band	)	**ET Docket No. 02-380**
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***EX PARTE* COMMENTS OF SHURE INCORPORATED**

Shure Incorporated ("Shure"), by its undersigned counsel, and pursuant to 47 C.F.R. Section 1.41, hereby respectfully submits these *ex parte* comments in the above-captioned proceeding. This proceeding is now at a critical stage where promises of technical solutions and verbal assurances of interference protection of wireless microphones must give way to public scrutiny of hard data from complete and objective testing. Appropriate field testing, in addition to laboratory testing, is critical to developing effective interference solutions.[1] Public participation in such testing and public review of the results is essential and will serve the public interest in developing rules that will meet the Commission's commitment to protect incumbent services from interference. The Commission should not rush to judgment under pressure from manufacturers eager to gain access to new spectrum regardless of the adverse impact on existing users.

I. THE COMMSSION SHOULD DISREGARD EFFORTS TO SHORTCHANGE APPROPRIATE TESTING AND ANALYSIS

The stakes are high in this proceeding. The TV bands are not "white" spaces and today these frequencies support many important public uses including authorized wireless microphones

[1] In this regard, Shure echoes the recent request to the Commission by Representative Eliot Engel (D-NY) recommending that the Commission conduct field tests in New York City of proposed "white spaces" devices in light of the significant risk of interference to DTV receivers. *See* House Subcommittee on Telecommunications and the Internet "Oversight of the Federal Communications Commission (Part II)," July 24, 2007.

that are used in news gathering, sports, motion picture, music, theater, religious, corporate and educational productions. The ultimate end users of these services are millions of Americans who demand and expect high-quality audio today and will increasingly do so from their newly purchased High Definition televisions.

The Commission has expressly committed that it will only allow unlicensed devices to operate in the TV bands "subject to the development of final technical rules that will prevent harmful interference to the authorized services."[2] In addition to interference concerns regarding proposed new fixed operations in the TV bands, the Commission has acknowledged that wireless microphones are at increased risk of interference from personal/portable unlicensed device operations.[3] In light of the complexity of developing technical requirements in this context, the Commission should disregard attempts by the coalition of computer and peripheral equipment manufacturers (the "Coalition") pressing to allow unlicensed devices ("UDs") in the TV band to accelerate the Commission's proceeding. Effective spectrum sensing in the TV band that equally protects all incumbents is still more of a hope than a reality. As discussed below, Coalition members have submitted several sets of development platform gear to the Commission for testing -- gear that may be a first step but falls short of the anticipated prototype devices[4] that would address all of the unanswered questions raised by their proposal. Despite urging the public and Commission to rely on their proposed spectrum sensing technology to prevent interference, no Coalition member has provided *any* actual prototype or test results for public review that verifies their claims.

While Intel and other UD proponents initially endorsed alternative interference avoidance mechanisms,[5] the UD proponents now promote spectrum sensing as a fool-proof and completely comprehensive interference avoidance mechanism. Many parties with unassailable engineering

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[2] *Unlicensed Operation in the TV Broadcast Bands*, First Report and Order and Further Notice of Proposed Rulemaking, ET Docket Nos. 04-186, 02-380, FCC 06-156, at ¶ 1 ("*FNPRM*").

[3] *FNPRM* at ¶ 18 (portable devices "generally pose a greater risk of harmful interference to authorized operations than fixed devices").

[4] A "prototype" is commonly thought of as the "first full scale model of a new type or design of machinery." *See Webster's Third New International Dictionary*, Merriam-Webster Inc., at 1825. The equipment submitted to the Commission does not approach the hoped for "prototype."

[5] *See* Comments of Intel Corporation filed in ET Docket Nos. 04-186 and 02-380 on November 30, 2004 at 14-20 (noting that control signals and professional installations were "effective ways" to avoid interference).

and technical expertise have challenged these assertions.[6] Nonetheless, the Coalition steadfastly asserts that the technology is "proven [and] well understood."[7] In fact, it appears that the technology is quite undeveloped for the purpose of this proceeding as demonstrated by the Coalition's inability to submit anything close to a stand-alone prototype or testing data to the Commission.[8]

With the record virtually devoid of facts that verify the promises of interference protection, the Commission is left in the unenviable position of conducting testing and relying on development stage gear to generate data that can inform the public discussion. Any shortcut in this critical process will shortchange any chance for thoughtful testing and analysis and risk devastating interference that will harm important existing operations. Given the complexity of the technical issues raised and the dearth of existing data, the Commission may find that laboratory and field testing should be completed in phases. Shure is aware that proponents of the UD proposal are eager for the Commission to hurry up and "close the book" on any testing and analysis. The Commission, however, should not lose sight of its priority commitment to avoid interference to important existing services. It is absolutely critical that the Commission's testing program fully evaluate interference protection "prototypes" and ensure that the technology

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[6] *See generally*, Comments of IEEE 802.18, filed in ET Docket Nos. 04-186 and 02-380 on January 31, 2007, at p. 6 ("IEEE Comments") (stating that "sensing alone is insufficient to adequately and completely assure the required level of interference protection" for incumbents); Comments of Motorola, Inc., filed in ET Docket Nos. 04-186 and 02-380 on January 31, 2007, at p. 18 ("Motorola Comments") (noting that it is "premature to rely on [spectrum sensing] because of difficulties involved in implementing sensing technology in [the white spaces] environment"); Comments of QUALCOMM Incorporated, filed in ET Docket Nos. 04-186 and 02-380 on January 31, 2007, at p. 3 ("QUALCOMM Comments") (noting that the "record in this proceeding does not support a conclusion that mobile/portable devices can operate in the TV White Space without causing substantial interference to the presently authorized services"); *Ex Parte* presentation of Shure Incorporated, filed in ET Docket Nos. 04-186 and 02-380 on June 13, 2007 (demonstrating how an unlicensed device enabled with -114 dB sensing threshold will interfere with wireless microphones in excess of a kilometer beyond its sensing range).

[7] *See* Comments of Dell Inc., Google, Inc., The Hewlett-Packard Company, Intel Corp., Microsoft Corp., and Philips Electronics North America Corp. ("Coalition Comments") filed in ET Docket Nos. 04-186 and 02-380 on January 31, 2007, at p. 3. The Coalition recently suggested that Shure's products use spectrum sensing today. *See*, White Spaces Coalition *Ex Parte* presentation, filed in ET Docket Nos. 04-186 and 02-380 on July 16, 2007, at p. 3 ("Coalition *Ex Parte*"). Indeed, certain Shure products do employ a limited scanning capability that is intended for use by professional frequency coordinators to assist in the set up of their wireless microphone systems on compatible channels. This limited scanning feature does not approach the spectrum sensing solutions touted by the Coalition. Certainly, if the Coalition's proposed spectrum sensing solution equates to this limited scanning feature, it will offer little, if any, meaningful interference protection to incumbent services.

[8] The fact that spectrum sensing is a technology that has been developed to permit spectrum sharing at 5 GHz where high power military radar is the principal user to protect is not evidence that spectrum sensing is an effective interference avoidance mechanism suitable for the unique RF environment that exists in the TV band "white spaces," where many different incumbents intermingle, and a huge number of receivers either exist on the outer, weak contour of a powerful fixed transmission, or, alternatively, receive an intentionally engineered low-powered transmission.

comprehensively protects incumbents, including wireless microphones, with absolute reliability. If necessary, after it releases an initial analysis, the Commission should exercise flexibility to continue its testing and analysis of any outstanding issues requiring further study.

II. THE COMMISSION'S TESTING AND ANALYSIS MUST BE APPROPRIATELY DESIGNED TO ASSESS THE EFFICACY OF PROMISED INTERFERENCE PROTECTIONS TO WIRELESS MICROPHONES

Real-world data from properly designed tests must be given priority over the unsubstantiated promises of UD proponents eager to gain access to TV spectrum. The Commission has recognized that the interference issues raised by unlicensed devices operating in the TV band are both "complex and novel," and has acknowledged that developing comprehensive technical rules to prevent interference cannot be done without a variety of laboratory and field tests.[9] Other parties, such as the IEEE, have also recognized that appropriate test design and protocol are key to gathering meaningful data that will aid the Commission in developing rules that fulfill its commitment to protect existing services from interference.[10] Even the Coalition has supported testing.[11]

As a means of enabling the Commission to conduct meaningful interference testing, Shure presented a draft test plan to the Commission in January, 2007.[12] In that plan, Shure proposed various tests that could be used to establish whether the device under test could successfully detect a wireless microphone and move to a different TV channel to avoid causing interference. At the request of staff, Shure also provided two complete wireless microphone systems to be used in the testing by the Commission. Those systems are professional audio systems of the kind typically used by high profile television network program producers.

Further, in *ex parte* meetings, Shure offered to participate -- *along with any other interested party in this proceeding* -- in live, real-world tests at diverse locations designed to

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[9] *FNPRM*, at ¶ 15.

[10] *See* IEEE Comments, at p. 26. The IEEE observed that a "comprehensive testing and certification plan is essential to assure that the Commission only authorizes devices for use in the TV bands that will truly coexist with the incumbent" services. The IEEE set forth a series of test protocols and encouraged the Commission to incorporate them directly into its test program.

[11] *See* Coalition Comments, at p. 18 (stating that the Coalition "enthusiastically endorses the Commission's commitment to perform lab testing to determine the true potential for harmful interference [by UDs]" and further noting that "[r]ules for operation in the TV white spaces should be guided by how actual prototype devices perform in a series of objective and unbiased tests").

[12] *See Ex Parte* Presentation of Shure Incorporated, filed in ET Docket Nos. 04-186 and 02-380 on January 24, 2007 (providing a comprehensive test plan presented to OET engineers).

determine whether the interference protection claims of the UD proponents can be substantiated. Shure informally proposed locations and events whose productions rely on wireless microphones systems today, such as the recent National Independence Day Celebration in Washington, D.C., a large event at the Kennedy Center, a television broadcast with a live audience, and a high profile sporting event. Field testing at these or similar productions needs to reflect the various typical uses of wireless microphones (*e.g.*, by live on-the-scene reporters with a television ENG crew, by the principal talent in sports, music or theater contexts, by the principal speakers at religious gatherings or political conventions, motion picture production, cueing from stage managers, etc.), indoor and outside applications, hand-held and bodypack applications, and the various types of wireless microphone equipment (*e.g.*, in-ear monitors, wireless intercoms, wireless assist video devices, and wireless cuing (IFB)). Sensing ranges of the UD platform must be assessed as well as performance of spectrum sensing at different power levels, including the maximum power levels advocated by the Coalition.[13] Every day there are thousands of high-profile events taking place across the country that rely on wireless audio systems that would present an appropriate real-world test environment.

To date, the only response to these offers has been the Coalition's predictable objection to allowing any third party to participate in any testing of the gear submitted.[14] If the Coalition is confident of its interference protection claims, it should welcome the opportunity to demonstrate to the Commission its efficacy in a reasonable real-world environment.

III. EFFECTIVE INTERFERENCE PROTECTION OF INCUMBENT SERVICES, INCLUDING WIRELESS MICROPHONES, REQUIRES THAT PROPOSED TECHNICAL SOLUTIONS HOLD UP TO PUBLIC SCRUTINY.

The Commission has actively encouraged all stakeholders to participate in the testing process.[15] Numerous parties each with divergent interests, including, for example,

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[13] Assurances that UDs will not usually operate at full power are meaningless safeguards against interference for the purpose of existing operations designed to transmit absolutely interference-free live audio. *See, e.g.*, Coalition *Ex Parte at 4* (asserting that in real world conditions UDs will protect against interference because they will "employ transmit power control to use the minimum power necessary").

[14] *See id.*

[15] *See FNPRM*, at. ¶ 15.

MSTV/NAB[16] and even New America Foundation,[17] have strongly encouraged the Commission to conduct thorough and open testing after seeking input from interested parties and before drafting rules regulating unlicensed operations in the "white spaces." Although Shure stands ready to participate in any test of proposed UD devices, the Commission is the *only* entity that has been provided access to proposed unlicensed spectrum sensing devices for testing and analysis. Without access to the technical "solutions" that the Coalition is proposing, there is no practical means for any other entity to evaluate the Coalition's claims. Although no true self-contained "prototype" has been provided to the Commission to date, Philips Electronics North America Corp. ("Philips") and Microsoft Corp. ("Microsoft") have submitted development platform equipment with rudimentary spectrum sensing capability for inclusion in Commission testing.[18] The Microsoft and Philips submissions appear to be cobbled together from a variety of spectrum analyzers, low-powered transceivers and personal computers. These platforms are not representative of the intelligent portable devices that the Coalition has promoted as future products that will operate without interference to important existing services. Furthermore, had these devices been able to actually provide the required protection to incumbents, the Coalition would have surely submitted experimental data for interested parties, such as the IEEE and broadcast engineers, to scrutinize in a public setting.

Without publicly available data to substantiate the Coalition's device claims, the Commission is the sole party outside of the UD proponents with the ability to evaluate this technology. As such, it must be equipped to conduct comprehensive testing and seek input from interested parties with insight on spectrum sensing issues that might affect unlicensed operations in the "white spaces."

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[16] *See* MSTV, Inc. Comments, filed in ET Docket Nos. 04-186 and 02-380 on January 31, 2007, at p. 24 (urging the Commission to "publish and seek public comment on its testing program and the measurement procedures for these TV band devices").

[17] *See* Comments of New America Foundation, *et al*., filed in ET Docket Nos. 04-186 and 02-380 on January 31, 2007, at p. 74 ("OET should issue a public notice soliciting comment on what experiments and studies it should conduct, and… [i]deally,… also conduct one or more meetings with stakeholders to solicit suggestions and other feedback ").

[18] *See* Coalition Ex Parte Notice, filed in ET Docket Nos. 04-186 and 02-380 on March 14, 2007 (describing the various components that in aggregate form the "Microsoft TV White Spaces Development Platform Version 1"); *see also* Coalition Ex Parte Notice, filed in ET Docket Nos. 04-186 and 02-380 on May 3, 2007 (describing a second set of components that in aggregate form the "Microsoft TV White Spaces Development Platform Version 2"); Coalition Ex Parte Notice, filed in ET Docket Nos. 04-186 and 02-380 on May 21, 2007 (describing sensing equipment submitted by Philips Electronics North America Corp.).

IV. THE PUBLIC INTEREST REQUIRES THAT THE COMMISSION DEVELOP PROTECTIONS BASED ON OBJECTIVE DATA THAT CAN BE GENERATED TODAY AND NOT DEPEND ON PROMISED FUTURE TECHNOLOGY DEVELOPMENTS

Shure has worked constructively with the FCC, the IEEE, and other interested parties for more than three years to develop innovative solutions that will allow new unlicensed services to operate in the TV spectrum without disrupting wireless microphones and other types of professional wireless audio equipment. Shure's recommendations that unlicensed devices not operate on adjacent channels is supported by TV set manufacturers, broadcasters, and the IEEE.[19] IEEE also agreed with Shure that sophisticated spectrum sensing, including distributed sensing, must be required to avoid interference.[20] The IEEE, Motorola and others recognize the need for a beacon system to protect specific operations.[21] NCTA shared Shure's concern with proposed power levels and agreed that power levels of proposed personal/portable unlicensed devices must be reduced to 10 - 20 mW to avoid interference, in that case to cable set-top boxes.[22]

The Commission has a prime opportunity to test and validate the efficacy of technical solutions held out to be the safeguard against devastating interference to existing services, including wireless microphones and TV broadcasting. Appropriate field testing is critical to developing meaningful protections. The Commission must not be rushed to accelerate its process and should open the process to public participation and scrutiny. It is imperative that the Commission "get it right" now and not depend on future development of solutions. After-the-fact recalls of disruptive unlicensed devices amount to no protection at all. Live news, entertainment, sports, religious and other productions ruined by interference cannot be redone.

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[19] *See, e.g.*, Reply Comments of LG Electronics USA, Inc., Panasonic Corporation of North America and TTE Corporation, filed in ET Docket Nos. 04-186 and 02-380 on May 15, 2007, at p. 4 ("DTV manufacturers agree with MSTV and NAB that all new devices must operate outside the contour of both the co- and adjacent channels"); *see also* IEEE Comments, at pp. 8-9 (recommending a prohibition on unlicensed operations on "first adjacent channels to a channel occupied by a DTV station").

[20] *See* IEEE Comments, at p. 6 (recommending distributed sensing).

[21] *See, e.g.*, IEEE Comments, at p. 10 (advocating a beacon capable of creating a "bubble of protection" around Part 74 devices); *see also* Motorola Comments, at p. 19 (recommending a protective beacon to protect wireless microphones).

[22] *See* Comments of the National Cable & Telecommunications Association, filed in ET Docket Nos. 04-186 and 02-380 on January 31, 2007, at p. 13 (urging the Commission to restrict output power for unlicensed devices to a range from 10 - 20 mW).

Shure strongly opposes the view of a few parties that wireless microphone uses are trivial and invalid. Undoubtedly, the millions of Americans who demand high-quality audio in news, entertainment, sports, movies, music, theater, religious, political, educational, corporate, and other contexts would agree.

Respectfully submitted,

/s/

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Dated: July 26, 2007