

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
Washington D.C. 20554**

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	)	ET Docket No. 02-380
3 GHz Band	)	

**EX PARTE COMMENTS OF SHURE INCORPORATED**

On July 4, 2010, a research team from the University of Minnesota (“UM”) filed an *ex parte* presentation (“UM Study”) that discusses proposed “best practices” for deploying rural TV Band Devices (“TVBDs”) without creating interference for incumbent users, including wireless microphones.<sup>1</sup> Shure Incorporated (“Shure”) appreciates the UM Team’s efforts to begin the process of evaluating use models for the outdoor operation of TVBDs in rural settings. The fundamental conclusions reached by the UM team, however, were derived from analyses that wrongly interpreted Part 74 rules regarding wireless microphone operations, wrongly interpreted Part 15 rules regarding TVBD use, and made incorrect assumptions about real-world wireless microphone operations. Shure, by its undersigned counsel, files these brief *ex parte* Comments to correct the record.

**I. Faulty Data Regarding Wireless Microphone Frequencies And Operating Limits Do Not Justify Elimination of the Minimum Antenna Height Requirements**

The UM Study recommends the FCC eliminate the ten (10) meter minimum antenna height for a fixed TVBD under the FCC rules, explaining that “[t]here are several sound reasons

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<sup>1</sup> See Ex Parte Letter from Christopher Smith, CEO-in-residence, Office of Technology Commercialization, The University of Minnesota, to Marlene H. Dortch, FCC, Secretary, ET Docket No. 04-186, dated July 4, 2010 (“*UM Study*”).

for the requested modification to the proposed rules.”<sup>2</sup> Several of the “sound reasons” provided by the UM research team are related to wireless microphone operations, are factually incorrect and reveal a mistaken or incomplete understanding of basic microphone operating parameters.<sup>3</sup>

The UM Study wrongly asserts that “wireless microphones will be assigned to a limited number of designated channels between channels 14 and 20 ... which will sufficiently protect this class of incumbent.”<sup>4</sup> Despite UM’s assertion, there are no reserved or assigned channels for wireless microphones between channels 14 and 20, and no guarantee that frequencies on these channels will be available for wireless microphone use. In fact, in certain large metropolitan areas two to three TV channels between 14 and 20 are set aside for public safety radio operations, and microphone operations are expressly *prohibited* on these channels.<sup>5</sup> Further, in channels 21-51 wireless microphones are only able to operate on a secondary basis to locally assigned TV channels (except on Channel 37, which is reserved exclusively for radio astronomy and medical telemetry operations). In fact, contrary to the UM Study’s assumption, there are no channels reserved for wireless microphones anywhere in any of the bands mentioned from channels 14 through 51.<sup>6</sup> Wireless microphones do not have priority over TV or public safety

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<sup>2</sup> *UM Study* at 2.

<sup>3</sup> For example, the UM Study incorrectly states that wireless microphones are limited to 50 milliwatts (“mW”) of effective radiated power (“ERP”). *UM Study* at 3. While many microphones have maximum output between 10 and 50 milliwatts, wireless microphones are permitted under Part 74 of the Commission’s Rules to transmit with up to 250 mW of ERP. *See* 47 C.F.R. §74.861(e)(1)(ii). Of course, in the real world, body attenuation can dramatically reduce the signal strength of a wireless microphone, particularly for a microphone worn on the body. It is unclear if the UM research team incorporated any loss for body attenuation into its calculations.

<sup>4</sup> *UM Study* at 3.

<sup>5</sup> *See* 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, *Second Report and Order and Memorandum Opinion and Order*, 23 FCC Red 16807, 16862, at ¶¶ 1, 152 (rel. Nov. 14, 2008) (“*White Spaces Order*”).

<sup>6</sup> The sole limited exception is in the markets in which public safety has been authorized to use frequencies between channels 14-21. The Commission recognized that there is likely insufficient interference-free spectrum for wireless microphone operations in those markets and directed that two UHF channels surrounding

operations and are often faced with shortages of spectrum necessary to support public and private events such as sporting events, music concerts, theater performances, cultural and religious gatherings and government and business meetings. Given the lack of a spectrum “safe harbour,” it is critical to have strong, proven and comprehensive protection against interference from new TVBDs that enter the band under the Commission’s new rules.

Also significant is the apparent lack of understanding by the UM research team of the “hidden node” problem with respect to wireless microphone operations. The UM research team assumes that so long as wireless microphone transmitters and receivers are within 500 feet of each other there is no potential hidden node problem. The report mistakenly concludes that the relative proximity between a wireless microphone transmitter and its receiver “eliminates virtually all occurrences of hidden nodes.”<sup>7</sup> This is simply not true. In real-world environments, interference due to hidden nodes can occur over distances of only a few meters, even when the transmitting microphone has an ERP of 250 mW. Two issues are present here: first, a wireless microphone may not be sensed by a TVBD if the path between them is obstructed. Second, the TVBD may be much closer to the wireless microphone receiver than the transmitting microphone and will likely cause interference. This result can occur in productions using stationary wireless microphone receivers, and it is even more likely in the deployment of portable wireless microphone receivers such as those used in itinerant ENG operations.

If the TVBD identifies the channel occupied by the microphone as vacant and begins to transmit, the TVBD will create interference that disrupts the microphone. Under the current rules, it may be a full minute before the TVBD rescans the frequency and identifies the higher

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channel 37 that are not locally assigned to television be made available to support wireless microphone operations. See *White Spaces Order*, at ¶ 157.

<sup>7</sup> *UM Study* at 3.

priority microphone.<sup>8</sup> Were the disrupted microphone involved in a live broadcast, any disruption, and certainly a full minute of interference (or silence), would be catastrophic. Any further research conducted by UM on “white space” related issues should correct wireless microphone operating frequencies and parameters and reflect real-world hidden node scenarios.

## **II. Geolocation Database Reservations Are A Principal Protection For Incumbents And Cannot Be Overridden By Spectrum Sensing**

The UM Study states that sensing will enable TVBDs to “promote spectral efficiency in currently unused or vacant ‘pockets’” of spectrum. Although this statement is somewhat vague and not further elaborated, one interpretation is that UM believes spectrum sensing can be used to *override* a geolocation database reservation. If the UM research team is in fact arguing that the Commission’s Rules should, or already do, enable TVBD devices to override a wireless microphone registration, such a rule application would likely result in disastrous interference for wireless microphone users. The Commission’s Rules do not and should not provide for spectrum sensing priority, and such an interpretation has not been placed before the Commission for consideration in the pending reconsideration petitions.

The Commission’s Rules were fashioned so that database registration and sensing would provide necessary complementary protections to incumbent signals. The seven (7) year record in this proceeding is replete with technical submissions by well-respected incumbents *and* TVBD proponents discussing the advantages of a geolocation database, and a database’s ability to overcome certain limitations related to sensing technology that cannot be engineered around. In particular, interference protection through registration in the geolocation database is not susceptible to the hidden node issues discussed above.

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<sup>8</sup> See 47 C.F.R. § 15.711(c)(4).

Moreover, wireless microphones do not operate continuously even when in full use in a production or broadcast.<sup>2</sup> Under current rules, TVBD sensing devices are only required to scan for frequency occupancy once every 60 seconds. Therefore, if a TVBD is permitted to ignore a registration in the database, it could easily rely on a false sensing reading that channels are unoccupied and cause interference to wireless microphones that had turned on during this period.

### III. Objective Modeling And Propagation Calculations Do Not Support A Reduction In The Commission's -114 dBm Sensing Threshold

The UM Study “recommends a sensing threshold level of -107 dBm and strongly believes this threshold would protect incumbents,” although it offers no scientific analysis of its own to support a relaxation of the sensing threshold.<sup>10</sup> As Shure and many other commenters have elaborated, a relaxation of the current -114 dBm sensing threshold will not provide meaningful protection for incumbents without comprehensive changes to the Commission’s Rules for TVBD operations (*e.g.*, reduction in TVBD signal strength to compensate for their inability to sense nearby incumbents that would have been detected at -114 dBm).<sup>11</sup> It is noteworthy that after extensive modeling and analyses, Ofcom, the FCC’s counterpart in the United Kingdom, recently determined that -126 dBm was the minimum sensing threshold needed to properly protect wireless microphones from co-channel interference created by cognitive radios it has proposed for its UHF TV band frequencies.<sup>12</sup>

Shure respectfully disagrees with the UM Study’s conclusion that it will be “very difficult to design a product” that meets the Commission’s -114 dBm sensing threshold.

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<sup>2</sup> Regardless of the type of production, it is often the case that wireless microphones are turned off to conserve battery life until the moment that the talent or speaker needs the microphone.

<sup>10</sup> *UM Study* at 4.

<sup>11</sup> *See, e.g., Petition for Reconsideration of Shure Incorporated*, ET Docket No. 04-186, at 10-12 (Mar. 19, 2009).

<sup>12</sup> *See Ofcom, Digital Dividend: Cognitive Access, Consultation on License-Exempting Cognitive Devices Using Interleaved Spectrum*, at 23 (2009) (“*Cognitive Access Consultation*”).

Microsoft indicated to the Commission as far back as 2007 that it had developed technology capable of sensing a “-114 dBm or stronger [signal] with 100% accuracy.”<sup>13</sup> Following the first round of white spaces prototype testing, the White Spaces Coalition confirmed to the Commission that the tests demonstrated the feasibility of sensing at -114 dBm and urged that the Commission proceed to craft final rules on the basis of these tests.<sup>14</sup> Philips Electronics, a long-term participant in the “white spaces” proceeding, and a company with significant experience in the mass manufacture of consumer electronics, recently confirmed that it has made significant strides in refining its sensing technology and urged the Commission to retain the sensing obligations in the existing FCC rules.<sup>15</sup> Accordingly, the criticisms by the University of Minnesota of the sensing level established in the Commission’s Rules are not borne out by the record in this proceeding and should not be given weight.

Respectfully submitted,

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<sup>13</sup> See Ex Parte Letter from Edmond J. Thomas, Senior Technology Policy Advisor, Microsoft Corporation, to Marlene H. Dortch, FCC, Secretary, ET Docket No. 04-186, dated Sep. 25, 2007.

<sup>14</sup> See Comments of the White Space Coalition, ET Docket No. 04-186, at 3 (filed Aug. 15, 2007) (commenting on the results of the first round of FCC white space prototype testing: “These results should put to rest any lingering claims in this proceeding by some parties about the ability to detect signals as low as -114 dBm as proposed by the Coalition.”).

<sup>15</sup> See Ex Parte Letter from David R. Siddall, Counsel to Philips Research North America, to Marlene H. Dortch, FCC, Secretary, ET Docket No. 04-186, dated June 30, 2010.

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Dated: July 27, 2010