

Before the  
**Federal Communications Commission**  
Washington DC 20554

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

**COMMENTS OF  
SENNHEISER ELECTRONIC CORPORATION**

Sennheiser Electronic Corporation (“Sennheiser”) files these comments on certain of the Petitions for Reconsideration in the above-captioned proceeding.<sup>1</sup>

Sennheiser Electronic Corporation is a wholly-owned subsidiary of Sennheiser electronic GmbH & Co. KG, headquartered in Germany. The parent company is a global leader in microphone technology, RF-wireless and infrared sound transmission, headphone transducer technology, and active noise cancellation. The U.S. subsidiary, based in Old Lyme, Connecticut, represents Sennheiser products in the United States and distributes a variety of other professional audio lines.

**A. TV BAND WIRELESS MICROPHONES ARE IN THE PUBLIC INTEREST.**

This proceeding will reduce the spectrum available for wireless microphones in order to accommodate TV Band Devices (TVBDs). The decision amounts to a policy determination on the relative values of wireless microphones *versus* TVBDs. Several of the reconsideration petitions attack this outcome from both sides. (Other petitions, not at issue here, concern the rules intended to protect broadcast TV from TVBDs.)

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<sup>1</sup> Petitions for Reconsideration of Action In Rulemaking Proceeding, ET Docket Nos. 04-186, 02-380, Report No. 2886 (released April 6, 2009).

Decades of successful use have established the public interest in wireless microphones. TVBD devices, in contrast, exist only as PowerPoint slides and laboratory prototypes. Their supposed benefits make for good press release copy, but are wholly speculative.

In dividing up vacant TV spectrum as between wireless microphones and TVBDs, the Commission should keep in mind the microphones' highly successful track record. These products are licensed to virtually all broadcast, cable, and motion picture content production operations. They are also reportedly in wide use in Broadway theaters, music venues, sports arenas, houses of worship, business centers, and convention sites, among other places.<sup>2</sup> Annual U.S. sales average about 600,000 units (although some of these become components in larger systems). Their popularity comes despite relatively high costs. Prices for a small system can range from several hundred to thousands of dollars. But people who need high-quality microphones buy these devices because they work. A well-engineered unit delivers high audio fidelity, useful range, effective penetration of walls and other obstacles, and long battery life.

Wireless microphones are essential to the production of virtually all non-studio broadcast events (and many studio-produced programs as well). These include professional and college team sports, from local college broadcasts up to the Super Bowl, the World Series, the Final Four, and the Stanley Cup; the Democratic and Republican political conventions; the Oscar, Emmy, and Grammy shows; events such as the Olympics, NASCAR races, the Kentucky Derby, and major golf and tennis tournaments; and news reporting from the scene. These broadcasts routinely attract millions of viewers.

The U.S. public has come to expect the very highest standards of production quality in all forms of television, radio, film, and live entertainment. Driven by these demanding expectations,

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<sup>2</sup> Sennheiser does not sell directly to any of these markets.

U.S. news and entertainment content is globally acknowledged as the best in the world. Thanks to widespread popularity of these products, entertainment content has become one of the nation's leading exports.

Wireless microphones are one of the production tools that fuel this success. With the impending loss of the 698-806 MHz band for use by wireless microphones,<sup>3</sup> the introduction of TVBDs into remaining TV spectrum further exacerbates the shortage. This has real consequences. A major TV production often uses over 100 wireless microphones. At approximately eight microphones per vacant TV channel, a single production can easily overflow the limited spectrum closed to TVBDs.

There is no adequate substitute for UHF TV-band frequencies. Unlike typical consumer products, wireless microphones are made to demanding technical standards, permitting only negligible latency (delay in throughput) and no dropouts (interruptions in transmission). Unlicensed microphone products are available in the 49 MHz, 902-928 MHz, and 2.4 GHz bands, but these are generally unsuited to professional applications. The low available power and high interference levels make them unreliable, while the narrow bandwidth of most units impairs audio quality. One manufacturer offers an unlicensed microphone using ultra-wideband technology. In principle it should be capable of high audio quality, but is necessarily limited in range and wall penetration.<sup>4</sup>

Given the proven value of wireless microphones, the high demand for spectrum, and the lack of alternative frequencies for their operation, the Commission should address the

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<sup>3</sup> *Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band*, 23 FCC Rcd 13106 (Notice of Proposed Rulemaking and Order) (2008).

<sup>4</sup> Commission rules tightly restrict the power of ultra-wideband devices, and require them to operate at frequencies high enough that building materials cause significant attenuation. *See* 47 C.F.R. Sec. 15.517.

reconsideration phase of the proceeding with an eye to ensuring that microphones have enough bandwidth to operate properly, even if this entails restricting the channels available to TVBDs.

**B. SENNHEISER SUPPORTS THE PETITION FOR RECONSIDERATION FILED BY SHURE INCORPORATED.**

Sennheiser agrees with all elements of Shure’s petition, including:

- the need for rigorous and transparent certification testing for all types of TVBDs;
- the need for elimination of TVBDs on channels adjacent to operating TV stations;
- the need for toughened standards for TVBDs and sensing to protect wireless microphones; and
- the need for more frequent updates of and access to the geolocation database.

Sennheiser particularly agrees with Shure in its emphasis that TVBDs, being authorized under Part 15 of the Commission’s Rules, must protect *all* licensed wireless microphones from harmful interference, regardless of application, power level, or status in the database.<sup>5</sup> Part 15 devices, including TVBDs, are dead last in the interference food chain, and should remain so.

Sennheiser also agrees with the Society of Broadcast Engineers that sensing-only TVBDs cannot adequately protect wireless microphones.<sup>6</sup>

**C. SENNHEISER OPPOSES CERTAIN PETITIONS THAT WOULD UNJUSTIFIABLY IMPAIR WIRELESS MICROPHONES.**

Sennheiser opposes the following points raised in Petitions for Reconsideration:

- Public Interest Spectrum Coalition – request to drop channels reserved for wireless microphones in markets where channels 14-20 are used for public safety,<sup>7</sup> and to ease the certification process for sensing-only TVBDs.<sup>8</sup>

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<sup>5</sup> “ Operation of [a Part 15 device] is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station . . .” 47 C.F.R. § 15.5(b).

<sup>6</sup> Society of Broadcast Engineers at 16-17.

- Public Interest Spectrum Coalition, Wi-Fi Alliance, Motorola, Dell/Microsoft, and Adaptrum – request to abandon sensing technology for protecting wireless microphones.<sup>9</sup>
- *IEE 802* and Dell/Microsoft – request to raise the sensing threshold for wireless microphones.<sup>10</sup>
- Dell/Microsoft – request to decrease protection for wireless microphones when TVBDs operate at lower power.<sup>11</sup>

Each of these petitioners seeks to gain an advantage for TVBDs, in terms of spectrum or equipment cost, at the expense of wireless microphones. In view of the strong demand for wireless microphones and the high public interest in their use, relative to the unproven benefits of TVBDs, the Commission should reject all such requests.

Respectfully submitted,

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<sup>7</sup> Public Interest Spectrum Coalition at 17-19.

<sup>8</sup> Public Interest Spectrum Coalition at 19-22.

<sup>9</sup> Public Interest Spectrum Coalition at 5-9; Wi-Fi Alliance (pages not numbered); Motorola at 8-11; Dell/Microsoft at 2-3; Adaptrum at 2.

<sup>10</sup> IEEE 802 at 5-6; Dell/Microsoft at 3-5.

<sup>11</sup> Dell/Microsoft at 4-5.

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