

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

In the Matter of	)	
	)	
Revisions of Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band	)	WT Docket No. 08-166
	)	
Public Interest Spectrum Coalition, Petition for Rulemaking Regarding Low Power Auxiliary Stations, Including Wireless Microphones, and the Digital Television Transition	)	WT Docket No. 08-167
	)	
Amendment of Parts 15, 74 and 90 of the Commission's Rules Regarding Low Power Auxiliary Stations, Including Wireless Microphones	)	ET Docket No. 10-24

**SUPPLEMENTAL REPLY COMMENTS OF  
SENNHEISER ELECTRONIC CORPORATION**

Sennheiser Electronic Corporation ("Sennheiser"), by its attorneys, files this limited reply to address the comments of certain public safety entities and Motorola to the Further Notice of Proposed Rulemaking ("Further Notice") in the above-captioned proceeding.<sup>1</sup>

In the Further Notice, the Commission proposed the expansion of the use of wireless microphones in several ways, including permitting unlicensed operation of wireless microphones pursuant to Part 15 in the core television spectrum, Channels 2-51.<sup>2</sup> This proposal would permit operation of wireless microphones (termed Wireless Audio Devices, or "WADs") by entities not eligible to operate under Part 74 of the

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<sup>1</sup> *Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band*, WT Docket Nos. 08-166, 08-167, ET Docket No. 10-24, Report and Order and Further Notice of Proposed Rulemaking, 2010 FCC Lexis 300 (rel. Jan. 15, 2010) ("Further Notice").

<sup>2</sup> Further Notice at ¶ 110.

Commission's rules, while limiting operations of WADs to a power level of up to 50 mW.<sup>3</sup>

Sennheiser supported the proposals in the Further Notice in large part, while recommending some modifications to the proposed rules.<sup>4</sup> In terms of Part 15 operations, Sennheiser supported the use of analog or digital modulation; a prohibition on transmissions to the PSTN or to wireless systems or networks; a prohibition on video transmissions; and a ban on after-market RF transmitter amplifiers. Sennheiser also proposed permitting transmission of battery status to the transmitter and permitting two-way operations to an in-ear monitor in one unit, and it opposed requiring separate certification for unlicensed devices.<sup>5</sup>

Several hundred comments were filed in response to the Further Notice, many indicating the importance of wireless microphones to American life, particularly in providing entertainment, sports telecasts, worship services, convention services and business conferences. Four parties – APCO, Motorola, the County of Los Angeles, and the National Public Safety Telecommunications Council – oppose the operation of Part 15 wireless microphones on TV Channels 14-20 (the “Opponents”). The Opponents offer no technical analysis to support their opposition, and banning wireless microphones would be an unnecessary hardship on the many civic and religious organizations that use them. Therefore, Sennheiser urges the FCC to adopt its proposal to allow Part 15 operation of wireless microphones on the entire core TV band spectrum, thereby providing for the great demand for high-quality wireless microphone sound while eliminating previous unlawful use of these devices.

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<sup>3</sup> Further Notice at ¶¶ 109 and 116.

<sup>4</sup> Comments of Sennheiser Electronic Corporation (filed March 1, 2010).

<sup>5</sup> *Id.* at 12-13.

## DISCUSSION

Notwithstanding the growing demand for use of wireless microphones, by June 12, 2010, the devices must transition off of 108 MHz of spectrum on the 700 MHz band, a full one-third of what has been available, to make way for other users, including public safety. As Sennheiser demonstrated in its initial comments, there is no adequate substitute for UHF TV frequencies for the use of wireless microphones.<sup>6</sup> Therefore, it is very important that unlicensed operations be allowed on the entire remaining UHF TV band and that wireless microphone users do not lose an additional 42 MHz of spectrum, which coupled with the transition out of 700 MHz would result in a loss of more than 45% of the spectrum previously available to wireless microphones.<sup>7</sup>

The Opponents object to Part 15 unlicensed operations of wireless microphones in the 470-512 MHz band (TV Channels 14-20) on the basis that the rule change will endanger life and safety by causing interference with public safety use of the spectrum - interference that the Commission sought to avoid by moving wireless microphones out of the 700 MHz band.<sup>8</sup> Motorola goes so far as to seek to ban Part 15 wireless microphone use on Channels 14-20 "anywhere in the country,"<sup>9</sup> even though public safety use occurs in only 13 markets. Motorola provides no justification for this overreaching policy.

No Opponent, however, provides any technical analysis showing that unlicensed wireless microphone operations actually would pose a threat of interference to public safety radios. None provides interference studies, or, for example, any information on

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<sup>6</sup> Comments of Sennheiser at 4.

<sup>7</sup> In fact, other comments suggest that Part 15 WADs be limited to Channels 14-20, or just to the set-aside channels surrounding Channel 37 in areas in which public safety operates. *See* Comments of PISC at 5-6. Should the Commission adopt these restrictions along with the Opponents' proposal, there would be almost no spectrum left for lawful wireless microphone use.

<sup>8</sup> Comments of The County of Los Angeles at 3; Comments of APCO at 2.

<sup>9</sup> Comments of Motorola at 4.

the operations of public safety devices so that their interference claims can be analyzed objectively.

Despite the operation of wireless microphones on Channels 14-20 for decades, Sennheiser is not aware of a single instance of disruption to public safety communications by a wireless microphone operation, or to land mobile communications or TV reception, notwithstanding a history of more than two decades of operation in the TV bands, including at higher power levels than what would be allowed under Part 15 operations. Unlicensed wireless microphones, limited to 50 mW, are harmless compared to other devices that also use the band. Clearing wireless microphones from this band would do nothing to protect public safety against interference considering the operation of land mobile radios used by commercial entities, which operate at a much higher power (of 1 W or more) and with just as much frequency agility as wireless microphones, or fixed unlicensed TVBDs, which will be allowed to operate at up to 4 W EIRP.

Others concur. Shure states that “[n]o prohibition or further interference restriction to wireless microphones is necessary or advisable.”<sup>10</sup> Audio-Technica explains that, despite a large embedded base of wireless microphones, there is no history of interference, including to adjacent channel licensed operations.<sup>11</sup> Indeed, the Commission recognized in the Further Notice that its “longstanding” Part 15 wireless device rules “have proved highly successful in permitting the use of low-power wireless devices.”<sup>12</sup>

Public safety use of the TV bands occurs in only a few metropolitan areas of the country, perhaps encompassing less than 10% of the U.S. land mass, yet the Opponents

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<sup>10</sup> Comments of Shure, Inc. at 25.

<sup>11</sup> Comments of Audio-Technica U.S., Inc. at 7. *See also* Comments of Thomas C. Smith at 2 (“There is enough history to show that these devices do not create a large amount of interference.”) and Comments of Josephson Engineering, Inc. at p. 1-2 (because the power level is only a few decibels higher than general Part 15 rules, “the change to the interference picture will be minimal.”).

<sup>12</sup> Further Notice at ¶ 1.

seek to ban WADs throughout the country based on the unsupported supposition that they will create a risk of interference. There is no interference potential from wireless microphones on the TV channels. The locations where wireless microphones are used are limited, and given their short range and where they operate, the chance of interference with public safety devices would be extremely unlikely.

Due to their very low effective radiated power, the range of UHF wireless microphones in the TV bands under free field (outside) applications is typically limited to less than 250' (80 m). For the more common indoor use – and given the proposal allowing more Part 74 licensed use, Sennheiser envisions that nearly all Part 15 wireless microphone use will occur indoors – each wall on average attenuates the signals by approximately 10 dB, reducing the effective range to around 120' (40 m) for a single wall and successively more where additional walls assist to confine the wireless microphone signals to levels that present no risk of interference. Therefore, virtually all envisioned Part 15 applications will take place indoors with the mitigating effects of the enclosing building's boundaries, and certainly will not pose a risk of interference to public safety.

APCO and the County of Los Angeles claim that the Part 15 proposal could create the same type of interference that the Commission sought to eliminate in the 700 MHz proceeding.<sup>13</sup> The analogy to the Commission's 700 MHz ruling is not apt. Public safety operations on the TV bands are at much higher power levels than what is proposed for 700 MHz operations, and thus the interference analysis on which the 700 MHz decision is based is inapplicable to public safety devices operating on frequencies in TV Channels 14-20. The 700 MHz analysis is based on mathematical models of interference potential between wide band FM wireless microphones employing 250 mW effective radiated power and digital 4G systems operating at 200 mW. To the best of Sennheiser's knowledge, public safety equipment operating on the TV Channels 14-20 uses analog FM narrow band modulation at power levels greatly in excess of those used

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<sup>13</sup> Comments of APCO at 2; Comments of the County of Los Angeles at 3.

by wireless microphones. Moreover, decades of interference-free coexistence with itinerant wireless microphone systems demonstrates that the Opponents' interference concerns are unfounded.<sup>14</sup>

Finally, Sennheiser notes that the Opponents ignore the fact that there are many thousands of wireless microphones already in operation that can be tuned down to Channels 14-20. Given their record of interference-free operation, the Commission must not entertain any proposal to exclude them from Channels 14-20.

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<sup>14</sup> Moreover, as noted in other filings, Sennheiser supports a narrow definition for WADs so as to exclude the spurious applications that concern other users of the TV band. *See, e.g.* Sennheiser Reply Comments at 5 (outlining a suggested revision to the WAD definition to address concerns of other users).

## CONCLUSION

Sennheiser supports ensuring reliable public safety communications. Given that public safety will be getting its own dedicated spectrum on 700 MHz, and given that the Opponents here have failed to proffer any specific reasons why unlicensed wireless microphone use would pose a risk to public safety operations in the TV bands, however, the Commission should adopt its proposal to allow Part 15 operations for WADs.

Respectfully submitted,

SENNHEISER ELECTRONIC CORPORATION

A handwritten signature in black ink that reads "Henry Goldberg". The signature is written in a cursive style with a large, prominent "H" and "G".

By: \_\_\_\_\_

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