

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

In the Matter of)
)
Unlicensed Operation in the TV) **ET Docket No. 04-186**
Broadcast Bands)
)

To: The Commission

Consolidated Reply to Oppositions to Petitions for Reconsideration

The Society of Broadcast Engineers, Incorporated (SBE), the national association of broadcast engineers and technical communications professionals, on behalf of its more than 5,000 members internationally, hereby respectfully submits its Consolidated Reply to the Oppositions to certain of the Petitions for Reconsideration filed in the captioned proceeding. The Petitions were filed in response to the November 14, 2008, *Second Report & Order* in this proceeding, relating to unlicensed, high power Part 15 operation on "unused" TV Broadcast channels. This reply is timely filed pursuant to the revised timetable set forth in the Commission's *Order*, DA 09-900, released April 22, 2009.

1. Rather than address each point in each of the Oppositions with which SBE takes issue, it is useful to review some broader concepts that should trouble the Commission with respect to the arguments of proponents of fixed white space devices operating in television broadcast spectrum (referred to herein as "TVBDs"). Principal among these is the argument that the interference protections for broadcast television reception and wireless microphone operation called for in the Reconsideration Petitions of SBE and others, and some of the provisions of the Second Report and Order in this proceeding, are not necessary because they are not based on "a showing of interference." This premise is inherent in the Opposition of the Public Interest

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Spectrum Coalition (PISC).¹ The Commission in this proceeding cannot proceed on the basis that unlicensed TVBDs are to be permitted in spectrum heavily occupied by licensed services unless the incumbent licensees demonstrate, *ex ante*, that there will be interference. The Commission instead must proceed carefully in order to insure that interference to broadcast, and broadcast auxiliary services, will *not* occur. That is the Commission's obligation under both Sections 301 and 302(A) of the Communications Act of 1934, as amended. PISC would put the cart quite significantly ahead of the horse. Furthermore, attempting to address interference to licensed services after the unlicensed devices are in the field and being operated by non-technical persons is a task doomed at its inception.

The Commission has, over the years, appropriately adopted rules cautiously at the outset, to ensure that unlicensed devices do not risk harmful interference. The best recent example of this is *Ultra-Wideband Transmission Systems*. In that proceeding, the Commission set restrictions on the use of ultra-wideband (UWB) devices "to ensure that UWB devices can coexist with the authorized radio services without the risk of harmful interference."^{2/} Likewise, when it revised Part 15 in 1989, it declined to ease restrictions on unlicensed devices' power levels because that would create an "increased potential" of interference with licensed services.^{3/}

¹ PISC argues, *inter alia*, that reserved channels for wireless microphones are "unnecessary"; that expanded protections for wireless microphones are unwarranted and that the geolocation database is sufficient; that requiring TVBDs with database access to sense at -114 dBm is "unnecessary"; that interference protection to cable headends is unjustified without a showing of interference; that adjacent channel protections are unnecessary; and that the certification process for TVBDs should not be open to public comment.

^{2/} *Revision of Part 15 of the Commission's Rules Regarding Ultra Wideband Transmission Systems*, 19 F.C.C.R. 24,558 (2004), ¶ 5.

^{3/} *Revision of Part 15 of the Rules*, 4 F.C.C.R. 3493 (1989). *See also, e.g.*, *Spread Spectrum Transmitters*, 12 F.C.C.R. 7488 (1997) ("The technical standards for Part 15 transmission systems are designed to ensure that there is a low probability that these devices will cause harmful interference to other users of the spectrum."); *Operation of Biomedical Telemetry Devices*, 12 F.C.C.R. 17,828, at ¶ 27 (1997) (adopting rules to prevent biomedical telemetry devices from causing harmful interference to licensed services); *Additional Frequencies for Cordless Telephones*, 10 F.C.C.R. 5622, at ¶ 16 (1995) (adopting requirements for cordless phones to mitigate risk of interference); *Additional Frequencies for Auditory Assistance Devices for the Hearing Impaired*, 7 F.C.C.R. 2256, at ¶ 8 (1992) (permitting new unlicensed auditory assistance devices

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Even where unlicensed devices are used for important purposes such as public safety, the FCC has stressed that their operation cannot cause harmful interference.^{4/} This consistent interpretation of the Commission’s obligation with respect to unlicensed devices overlaid in spectrum presently occupied by incumbent services is impossible to square with (1) the idea that TVBDs are proven “in concept” but *not* in current field trials; or (2) as PISC urges, that the incumbents must wait until interference appears and licensed communications are disrupted before attempting to corral the offending devices by enacting rules *post hoc*. Instead, the Commission should do here as it did with respect to Ultra-Wideband devices and proceed cautiously at the outset. Appropriate restrictions on TVBDs are set forth in SBE’s Petition for Reconsideration, and reflect the philosophy that the Commission appropriately utilized in the *Ultra Wideband* proceeding. PISC and the other proponents of TVBDs cannot shift the burden that exists inherently (by statute) when authorizing an unlicensed technology in bands occupied by licensed services. This is true no matter how urgently the Commission desires to foster broadband services as a policy matter.

Another fundamental conceptual error is found in the Oppositions of PISC and Dell/Microsoft. Each argues that wireless microphones are due less interference protection than that afforded by the *Second Report and Order* in this proceeding. PISC defines the universe of protected wireless microphones as those operating only pursuant to a license, and both PISC and Dell/Microsoft believe that the 1 kilometer protection zone for wireless microphones from

because they would cause harmful interference with licensed land mobile transceivers); Operation of Low Power Communication Devices, 102 F.C.C.2d 1042, at ¶ 7 (1986) (describing purpose of field-strength limits for consumer products as to protect licensed radio services from interference).

^{4/} See, e.g., Spread Spectrum Transmitters, 12 F.C.C.R. 7488, at ¶ 14 (1997) (warning “utilities, cellular stations, public safety services, government agencies and others that employ Part 15 transmission systems to provide critical communication services” that they will be required to correct any interference they cause “even if such correction requires the cessation of operation of the Part 15 transmitter. The Commission will

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interference from geolocation-enabled TVBDs is “enormous” and is unjustifiably large. Shure had argued, appropriately, that high powered TVBDs should have to protect wireless microphones within an exclusion zone that reflected the interference range of high powered fixed TVBDs. The fact is that the entire concept of a fixed exclusion zone for wireless microphones is flawed, because it is based on a complete misunderstanding of the means by which broadcast auxiliary spectrum is utilized. Wireless microphones are deployed by broadcasters on a ubiquitous, itinerant basis. They are not used in any narrow geographic range. They are used for Electronic News Gathering that is market-wide for many broadcast licensees, and nationwide for networks and video production companies that rely on them. They are used when the unpredictable events that the public needs to know about occur, and where they occur. The entire database concept is flawed in terms of interference protection.

The Wireless Internet Service Providers Association (WISPA) states that the “record is clear that spectrum sensing is not necessary or advisable for protecting licensed wireless microphones” and that licensed wireless microphones are adequately served by the 1 kilometer “circle around designated coordinates.” Actually, what is clear from the record is not that spectrum sensing is unnecessary or inadvisable; it is instead that it simply doesn’t work. That is the inconvenient truth here: TVBDs are incapable of protecting broadcast auxiliary licensees from interference through spectrum sensing. The 1 kilometer “protection zone” for registered wireless microphones is, as discussed above, a fiction that allows the Commission and apparently WISPA to feel good about the rules enacted without creating any actual interference protection, because wireless microphones are not used for electronic news gathering in a static, immobile environment, and the database cannot be maintained adequately in real time to address

not exempt Part 15 devices from this latter requirement because of the application for which the Part 15

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the ubiquitous deployment of wireless microphones. The one-kilometer protection area is virtually meaningless in terms of interference avoidance. And, as WISPA concedes, nothing the Commission has done can protect unlicensed wireless microphones from interference from TVBDs. While PISC and WISPA blithely equate those devices with Part 15 devices, the Commission is going to have to be a bit more pragmatic. SBE is as unhappy about the years of unlicensed wireless microphone operation as is anyone else, but the reality is that those devices are deployed extensively and it would be irresponsible for the Commission to simply overlay interference-causing TVBDs in environments where interference will inevitably result. Even where no entitlement to interference protection has existed, the Commission has refused to overlay any service in a rulemaking proceeding where it knows that interference will result.⁵

The TVBD proponents really must wean themselves from the idea they seem to espouse that broadcast auxiliary spectrum is akin to fixed location transmitters. They have failed to deal with the fact that what they are attempting to justify is mobile, itinerant sharing between a licensed service that by definition must have spectrum priority⁶ and an unlicensed technology with no allocation status and no entitlement to operate whatsoever, except on an at-sufferance

transmitter is employed.”).

⁵ The Commission protected the interests of unlicensed Part 15 users against interference from licensees in the Location Monitoring Service (“LMS”). See Report and Order, *Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems*, 10 FCC Rcd 4,695 (1995). LMS was a new licensed service created after “millions of Part 15 devices,” such as cordless telephones, were already operating in the bands in question. See *id.* at ¶ 32. In a pending proceeding, the Commission is considering relaxing some of its restrictions on LMS licensees, but has been tempered by the intervening growth in Part 15 uses of the band. See Notice of Proposed Rulemaking, *Amendment of the Commission's Part 90 Rules in the 904-909.75 and 919.75-928 MHz Bands*, FCC 06-24 at par. 13-15 (2006). The Commission is in a similar situation here; it cannot reasonably authorize TVBDs to start operations in a band where predictable, substantial interference will result, even though the incumbents include numerous unlicensed operations not entitled under the rules to interference protection.

⁶ There is also an argument found in PISC’s Opposition that TVBDs are a more important use and provide a more efficient use of the spectrum than do wireless microphones for broadcast program production. If TVBDs are deserving of any sort of priority over licensed incumbent services, then the Commission has no choice but to license them. That is the paradigm into which TVBDs must fit in order to claim any entitlement to operate where harmful interference is predictable. SBE would suggest, however, that the

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basis. Overprotecting the licensed service is not a problem. Underprotecting the licensed service is a big problem. Since the Commission has no evidence in the record whatsoever that justifies allowing any current generation TVBD to operate on a co-channel or adjacent channel basis without predictable harmful interference to wireless microphones, the Commission has two choices, basically: either it must create a meaningful number of reserved channels for wireless microphone operation where no TVBDs are allowed in each market ⁷, or else expand the protected zone on all channels for wireless microphones to the entirety of a broadcast television station's market. Even this second method of protecting licensed services against interference is flawed because of the completely itinerant licensed use of wireless microphones by networks and video production entities, which must have unfettered access to the already substantially reduced wireless microphone spectrum on television broadcast channels wherever the events to be covered happen to occur, nationwide.

On page 17 of the Dell/Microsoft Opposition, the argument is made that SBE's Petition for Reconsideration, which urges in part the registration of personal/portable TVBDs, a reasonable timeframe for daily updates of the proposed database, and database information being conveyed through multiple devices, are unjustified. Instead, Dell/Microsoft asserts, the *Second Report and Order*, in addressing these issues, "reflect[ed] a balance between providing incumbents with the protection to which they are entitled and placing unnecessary burdens on innovative services..." This is a fundamental conceptual error. There is not, and there cannot be

public's expectation of having on-scene news in real time, sports and event broadcasts, cablecasts and satellite video delivery from the scene of those events is extraordinarily important.

⁷ Google suggests the expansion of the prohibition of TVBD operation on the first available channel on either side of channel 37 in 13 major metropolitan areas to include all markets. This, Google states, is preferable to the spectrum sensing requirement. It does, however, constitute a significant restriction on wireless microphone operation that does not now exist, and is tantamount to an admission that the TVBDs cannot operate in licensed spectrum without causing interference to licensed services; an obvious reason to re-

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a balancing test between providing interference protection to licensed services and allowing unlicensed devices. The burdens on unlicensed “innovative services” that are necessary to avoid interference *ex ante* to licensed services are an absolute obligation of the Commission under Section 301 of the Communications Act. And where, as here, the Commission has no record evidence that any such unlicensed devices are capable of avoiding interference to licensed services, the burdens on the “innovative services” that Dell/Microsoft touts must of necessity increase. Given the crucial nature of interference protection technology as a factor in the Commission’s decision to permit the operation of TVBD technology, the Commission is obligated to impose, at least initially, interference protection criteria that are sufficient to overcome the results of the studies submitted that show that the unlicensed technology has failed in valid tests to prevent interference to television receivers and wireless microphones. Consistent with the Commission’s legal rationale for allowing unlicensed devices under section 301, the Commission’s principal obligation with respect to such devices is to ensure their operation will ***predictably not interfere with licensed radio services***. SBE’s proposed interference safeguards are entirely consistent with this obligation, since the Commission has decided to authorize TVBDs based on the vague, unjustified presumption that the TVBD testing has satisfied some unspecified and unquantified “proof of concept.”

Google’s Opposition makes the argument that the “Commission has undertaken an exhaustive review of white space technology and concluded that WSDs can operate safely and without interfering with TV broadcasts or other licensed operations.” That statement is incorrect. The Commission’s review, far from being “exhaustive” reflects a proceeding rushed to judgment. The Commission has in recent years exhibited a proclivity to authorize broadband

evaluate the entire concept of TVBDs, which all of a sudden appear not to have established any “proof of

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delivery mechanisms based on political considerations without without the prerequisite analysis of the interference potential or other technical impediments that are revealed in the record. The report that the Commission relied on does not support Google's conclusion. As SBE noted earlier, there are numerous technical errors in this proceeding. Among these are the following:

(a) The Commission erred in applying the UHF DTV threshold to calculating the required sensitivity for TVBDs operating at VHF high band and VHF low band; (b) The Commission failed to consider the dipole factor that applies at UHF; (c) There are no criteria for what constitutes "professional installation" (without which the requirement that fixed TVBDs be professionally installed is meaningless); (d) Using the horizontal plane (HPLANE) azimuth pattern in the CDBS for DTV stations will give inaccurate results for DTV stations employing mechanical beam tilt; (e) The assumption of 3 dB of polarization discrimination is not valid, since a portable TVDB can physically have any orientation; (f) The lack of a height limit for portable TVBDs will result in abuses and will make it quite difficult to track down interference to licensed services; and (g) in arriving at the adjacent channel power level, the Commission relied on the wrong desired-to-undesired (D/U) ratio (-33 dB rather than the standard of protection (-26 dB and -28 dB for upper and lower adjacent channels that it specifically stated that it intended to use). Each of these purely technical and objective issues, which are flaws in the Commission's reasoning in the *Second Report and Order* in this proceeding, should be revisited on reconsideration. In the aggregate, they amply justify review and reconsideration of the *Second Report and Order*. As to the height limit, and SBE's proposed change from AGL measurements to HAAT measurements for the maximum height for fixed TVBDs, the only response Google offers is that the change would "require more sophisticated calculations,

concept".

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impeding prompt and effective [TVBD] deployment...with no offsetting advantages.” In reality, the advantage would be a meaningful interference determination. While such may not be important to Google, which limits its apparent concern to the speed of deployment of TVBDs, it would be quite important to the licensed services that TVBDs must protect.

Finally, the Oppositions of PISC and Motorola address SBE’s suggestion that the sensing technologies should be able to monitor levels lower than – 114 dBm. The simple fact is that spectrum sensing does not work. However, if it is to be used as a placebo in order to attempt to justify adding an incompatible unlicensed service atop licensed broadcast and broadcast auxiliary services in the same spectrum, there should at least be rules in place that make some technical sense in terms of the signals to be sensed. The -114 dBm threshold is inadequate and arbitrarily determined by the Commission, because it was adopted without reference to any particular type of antenna and antenna height. As the SBE originally argued and as the Coalition of Wireless Microphone Users noted, the only recognized standard that exists is from the Office of Communications of the United Kingdom (OFCOM), which specifies -126 dBm.⁸ Clearly, the Commission must revisit the standard for sensing technology overall, and in the course of doing so must address specifically the arbitrary -114 dBm threshold. Under no circumstances should this threshold be reduced; the evidence establishes that it should be substantially increased.

SBE reasserts the points made in its Petition for Reconsideration. The Commission has erred substantially in its overzealous effort to justify TVBDs as an additional broadband mechanism. In doing so, it has failed to adequately protect licensed television broadcast and critically important broadcast auxiliary operations that the viewing public has come to expect.

⁸ The Commission has recently been admonished in a remand order from the Court of Appeals for summarily failing to utilize empirical data (coincidentally also studies conducted by OFCOM) that exists in the record, and

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Wireless microphone operation is critical to the electronic news gathering efforts of television broadcasters and protection of this vital function is given short shrift in the *Second Report and Order* in this proceeding. The Commission must revisit it consistent with SBE's Petition for Reconsideration and the points made herein.

Respectfully submitted,

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instead adopting a contrary standard that is justified only in a cursory and conclusory manner. See, *American Radio Relay League, Incorporated v. FCC and USA*, 524 F.3d 227 (D.C. Cir. 2008).