

**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 Opposition 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 Opposition 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.

1. As an initial matter, SBE would reiterate that the availability of "white spaces" in the remaining television channels below Channel 52 cannot be assumed nor quantified; SBE suggests that there are no available vacant TV channels in the large metropolitan areas, and very few such channels in even medium-sized communities. Only in remote areas are there available vacant TV channels; and even those channels are limited. Further, the October 15, 2008, OET Report documented that the interference avoidance design of fixed white space devices operating in television broadcast spectrum (referred to herein as "TVBDs"), quite simply, does not insure, *ex ante*, against interference to broadcast, and broadcast auxiliary services. The Report's conclusion that TVBDs can protect licensed services is at odds with the Report's contents. In any case, it is not a fair reading of the contents to conclude, as does the *Second Report and Order*,

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that the Report "proves the concept." The Commission is prohibited from promulgating rules on the basis of inadequate data. *Portland Cement Ass'n v. Ruckelshaus*, 486 F. 2d 375, 393 (D.C. Cir. 1973). Where the data submitted in the record of a rulemaking proceeding is at substantial odds with the vague conclusion of the Commission that the failed technology nonetheless has somehow "proven the concept," the Commission is inviting a remand. Given the crucial nature of the interference protection technology as a factor in the Commission's decision to permit the operation of TVBD technology, the Commission's rejection of data submitted in the record (at the Commission's own invitation) is untenable. The vague conclusion that the tests prove the concept of TVBDs is substantially at variance with the test results, and in any case, the summary conclusion cannot substitute for a reasoned explanation of the Commission's action. *AT&T Corp. v. FCC*, 236 F.3d 729, 737 (D.C. Cir. 2001). The Commission must give a reasoned explanation for rejecting the results of the studies submitted that show that the technology has failed in valid tests to prevent interference to television receivers and wireless microphones.

2. The Commission's claim that it will enforce its rules against TVBDs causing interference to TV/DTV reception is unconvincing; the Commission has for years failed and, in some cases, specifically refused to attempt to police interference to non-safety of life services from unlicensed devices.¹ The Commission specifically advises complainants that it does not undertake such enforcement. There is no chance that interference from TVBDs will be resolved *ex post*. It is patently obvious that the Commission must enact rules preventing, and its entire jurisprudence must continue to be based on regulation of, interference causing devices *ex ante*.

¹ For this, the Commission's Enforcement Bureau is not to be blamed; the entire concept of unlicensed devices (most often consumer devices), operated in general by non-technical personnel (most often the general public) is premised not on *ex post* enforcement after the point of sale, but rather on the *ex ante* rules governing the operation of the device in the first place. If the Commission does not insure against interference in the rules authorizing the device, it is a sure bet that there cannot be any effective *ex post* interference resolution. Pandora will be out of the box by then.

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The entire concept of enforcement after the fact with Part 15 devices presupposes that the Commission can authorize Part 15 devices with a significant interference potential to licensed radio services. This, it simply cannot do, and the interference potential is exposed by the very studies that the Commission has in the record in this proceeding, and which, in an interpretation, (the logic of which is difficult to grasp) it claims proves the “concept”.

3. Radio spectrum is a finite resource, and multiple users of spectrum can interfere with each other. Recognizing this, in 1934 Congress charged the Commission with refereeing competing uses of spectrum for communications.^{2/} The principal tool for that control is the requirement in section 301 of the Communications Act of 1934 that anyone who wishes to operate a device that emits radio frequency (“RF”) energy first obtain a license from the Commission. 47 U.S.C. § 301. The Commission uses that tool to allocate spectrum among services and to license operators in each service.

4. Section 301’s licensing requirement contains no exceptions. It forbids the “use or operat[ion of] any apparatus for the transmission of energy or communications or signals by radio [in or affecting interstate commerce], except . . . with a license[.]” Nevertheless, since 1938 the Commission has permitted the use without a license of certain devices that radiate extremely low levels of RF energy, as long as that use does not cause harmful interference to licensed operations.^{3/} The Commission’s rationale for allowing unlicensed operations is that a device that transmits too little RF energy to interfere with licensed uses does not constitute an

^{2/} See 47 U.S.C. §§ 152, 301. Prior to 1934, this responsibility rested in the Federal Radio Commission. See Radio Act of 1927 § 4(c). Pub. L. No. 632 (1927).

^{3/} See Certain Low Power Radio Frequency Electrical Devices, 3 Fed. Reg. 2999 (December 14, 1938).

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“apparatus for the transmission of energy” under section 301.^{4/} But the Commission cannot fairly draw that conclusion with TVBDs.

4. The Commission’s rules governing the use of unlicensed devices are codified in Part 15 thereof [47 C.F.R. pt. 15]. Those rules prescribe technical standards for particular types of unlicensed devices.^{5/} These are prefaced by the overarching command that unlicensed devices may be operated *only* to the extent that they do not harmfully interfere with licensed operations. This command is embodied in three rules. First, “operation of a [Part 15] device is subject to the condition[] that no harmful interference is caused.” 47 C.F.R. § 15.5(b). Second, Part 15 devices operate on an at-sufferance basis: their operators must accept any interference “that may be caused by the operation of an authorized radio station.” *Id.* Finally, “[t]he operator of a [Part 15] device shall be required to cease operating the device upon notification by a Commission representative that the device is causing harmful interference.” *Id.* at § 15.5(c). 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.*^{6/}

^{4/} See Ultra-Wideband Transmission Systems, 19 F.C.C.R. 24,558, at ¶ 68.

^{5/} E.g., 47 C.F.R. part. 15.B (unintentional radiators); *id.* part. 15.C (intentional radiators).

^{6/} The only exception is where the Commission authorizes a new licensed use in a frequency band that had been previously allocated to, and is heavily used by, unlicensed operations. In one such instance, the Commission protected the interests of unlicensed Part 15 users against interference from licensees in the new 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 by the FCC *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).

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3. The Commission's presumption that the TVBD testing has satisfied some unspecified and unquantified "proof of concept" is premised, in part, by certain 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. 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*.

4. Notwithstanding the technical errors in the *Second Report and Order*, some TVBD advocates nevertheless suggest even fewer limits on TVBDs than the inadequate rules set forth in the *Second Report and Order*. Such is clearly unwise. Adaptrum⁷ for example, asks the Commission to reconsider and to eliminate the wireless microphone sensing requirement. It suggests that only legally operating (i.e. actually licensed) wireless microphones should be entitled to interference protection. It suggests that the 40 mW power level for portable TVBDs is too little power, and asks for 100 mW power for portable TVBDs when there is an adjacent-

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channel protected station, and 250 mW for portable TVBDs where there is no adjacent-channel protected station. However, SBE estimates that there are likely to be 8 dB more [(i.e., $10\log(250\text{ mW}/40\text{ mW})$] TVBDs operating near a licensed LPA wireless microphone than Adaptrum thinks might be the case. Especially for portable TVBDs, where all practical control and enforcement ability is lost once the device is sold and placed in operation (and the devices can be easily transported), there is no reliable way for any party, not Adaptrum, not the Commission, and not the broadcast industry, to know. Thus, the Commission must err on the side of caution, and not allow any power increase for portable TVBDs, if in fact TVBDs are to be allowed at all, portable or otherwise.

5. Dell, Inc. and Microsoft, Corp. (Dell/Microsoft) also want the wireless microphone sensing requirement eliminated. They also want restrictions on the use of TV Channels 14-20 removed. They also claim that cable headends receiving TV signals outside of a station's protected contour shouldn't have to be protected for any distance beyond the station's protected contour. Dell/Microsoft appear not to understand the fundamental obligation of Part 15 devices to not cause interference to any licensed service. Cable headends may well obtain a useable TV or DTV signal outside of the station's protected contour. This is because, first, cable headends often employ receiving antennas of greater than 30 feet AGL; Second, they are often located on hills with good line-of-sight characteristics; and third, they often employ professional-quality, high-gain receiving antennas and/or mast-mounted preamplifiers. Thus, the FCC protected TV signal contour cannot be used as a reliable metric when it comes to cable (or DBS) headends. The Wireless Internet Service Providers Association (WISPA), as a variation on the same theme, asks the Commission to reconsider and adopt less rigorous sensing requirements. WISPA asks

⁷ Adaptrum filed a timely Petition for Reconsideration on March 18, and then a corrected version on March

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that a fixed TVBD be afforded more than 2 seconds in which to vacate a newly occupied TV channel (e.g., by the initiation of wireless microphone operation). It too seeks greater height for fixed TVBDs. Finally, it seeks more than 4 watts EIRP for fixed TVBDs in order to permit larger separation distances.

6. The Wi-Fi Alliance asks that the Commission reconsider and not require daily database checks for fixed TVBDs. It should, the Alliance states, eliminate all sensing requirements if a fixed TVBD has real-time internet access. It wants 250 mW operating power for portable TVBDs, instead of the 40 mW power permitted by the Commission. Finally, IEEE 802 Local and Metropolitan Area Networks Standard Committee (IEEE802) also seeks to eliminate all sensing requirements if a fixed TVBD has Internet access. All fixed TVBDs should, IEEE802 suggests, be permitted greater height than 30 meters, and height should be HAAT rather than AGL. It asks that wireless microphone sensitivity should be reduced from -114 dBm to -107 dBm. SBE disagrees on all points, except that the fixed TVBD limit should be 30 meters HAAT, not 30 meters AGL. The fact is that there are no compatibility showings made by any of these petitioners that could justify the additional *ex ante* harmful interference potential from these Part 15 devices. The operating parameters suggested by these petitioners are completely inconsistent with unlicensed operation for the reasons stated below. Because of this significant, predictable interference potential to licensed services, the Commission is without jurisdiction to permit the interference potential from these unlicensed devices that would be created by the changes suggested by these petitioners for reconsideration.

7. Shure Incorporated (Shure), a major manufacturer of Part 74, Subpart L, Low Power Auxiliary (LPA) wireless microphones, urges stricter protection for wireless microphones. It

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asks for a 2-km radius protection circle around wireless microphone venues, not just a 1-km radius. SBE agrees that stricter protection is needed for wireless microphones, but respectfully disagrees that protection circles, of either 1-km radius or 2-km radius, are appropriate. As a licensed service, wireless microphones are entitled to protection from interference when operating anywhere in their operational areas shown in the Commission’s Universal Licensing System (ULS) database. This is true for each and every licensed LPA wireless microphone. To limit interference protection to a fixed radius is contrary to the entire concept of Part 15 regulation, and would allow an unlicensed device to interfere with a licensed service under certain circumstances. This is contrary to the entire paradigm for Part 15 regulation and is *ultra vires* the Commission’s authority under Section 301 of the Communications Act of 1934. Section 301 declares that any person who uses or operates “*any* apparatus for the transmission of energy or communications or signals by radio” must have a “license . . . granted under the provisions of [the Communications Act].”^{8/} This licensing requirement is the chief statutory mechanism to “maintain the control of the United States over all the channels of radio transmission.” *Id.*

8. Despite section 301’s categorical language, the Commission from the beginning has read the section to allow some unlicensed emissions — namely, where they are so limited that they will not cause harmful interference to licensed communications. The Commission has very recently and, SBE believes accurately, reasoned that a device that transmits so little radio energy that it does not harm licensed users is not an “apparatus for the transmission of energy” within the meaning of section 301, but that “A [more] reasonable reading of Section 301, consistent with Congress’s intent and subsequent legislation, would limit the licensing requirement to *any*

^{8/} 47 U.S.C. § 301 (emphasis added).

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apparatus that transmits enough energy to have a significant potential for causing harmful interference.^{9/} Ever since the Commission first authorized unlicensed devices in 1938, the touchstone for permissibility has been that they not risk harmful interference to licensed operations; a device that *does* risk interference must be licensed.^{10/} In this case, the Commission's own studies reveal that there is a significant risk of interference to licensed services from TVBDs.

9. Based on the Commission's consistent reading of section 301, the Commission has over the years adopted rules (codified in Part 15 of its regulations, 47 C.F.R. pt. 15) to ensure unlicensed devices do not risk causing harmful interference. In *Ultra-Wideband Transmission Systems*, for example, 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."^{11/} 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.^{12/} Even where unlicensed devices are used for

^{9/} *Ultra-Wideband Transmission Systems*, 19 F.C.C.R. 24,558, at ¶ 68 (emphasis added). The FCC's rules define "harmful interference" to mean "interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunications service operating in accordance with these international Radio Regulations." 47 C.F.R. § 2.1.

Some early decisions suggested that the reason why such devices do not need licenses is that they have no interstate effects. *See, e.g., Low Power Communication Devices*, 13 R.R. 1546e, 1546g–1546h (1957). However, the FCC soon settled on the rationale in the text, and Congress subsequently clarified that *all* radio transmissions constitute interstate commerce. *See* H.R. Conf. Rep. No. 97-765 at 31-33 (1982).

^{10/} *See Certain Low Power Radio Frequency Electrical Devices*, 3 Fed. Reg. 2999 (December 14, 1938); *Ultra-Wideband Transmission Systems*, 19 F.C.C.R. 24,558, at ¶ 72 & n.188 (2004) (citing decisions that show the FCC's continued reliance on the harmful interference criterion as the basis for allowing unlicensed operations under section 301).

^{11/} 19 F.C.C.R. 24,558, at ¶ 5.

^{12/} *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

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important purposes such as public safety, the FCC has stressed that their operation cannot cause harmful interference.^{13/}

10. A corollary is that operators must promptly cease any unlicensed operations that do cause harmful interference. This requirement is enshrined in the FCC's rules:

The operator of [an unlicensed] radio frequency device shall be required to cease operating the device upon notification by a Commission representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected.^{14/}

Numerous Commission orders over the years embody this rule^{15/}. Even where public safety-related Part 15 devices (which TVBDs are not) are authorized, the Commission has consistently

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 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).

^{13/} 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 not exempt Part 15 devices from this latter requirement because of the application for which the Part 15 transmitter is employed.”).

^{14/} 47 C.F.R. § 15.5(c). “[A]ll Part 15 devices operate under the condition that transmission must cease if the Part 15 device causes harmful interference.” Report and Order, *Amendment of Part 15*, 16 FCC Rcd. 22337, ¶ 11 (2001). *The Commission assured the public in the Notice of Proposed Rule Making in this proceeding that if TV White Spaces Devices were to be authorized, the status of licensed services operating in the bands would not be affected. See the Notice at ¶ 29 (2006)* (“Because unlicensed operations are not allowed to cause harmful interference, if we proceed on an unlicensed basis, the interference protection status of existing services operating in this spectrum would not be affected.”) (citing 47 C.F.R. § 15.5). Instead of that, wireless microphones are now not protected against interference outside of an arbitrarily defined, fixed operational area.

^{15/} See, e.g., Ultra-Wideband Transmission Systems, 19 F.C.C.R. 24,558, at ¶ 99 (2004) (“If a Part 15 device causes interference it is required to remedy the interference or to cease operation.”); Spread Spectrum Transmitters, 12 F.C.C.R. 7488 (1997) (“[T]he primary operating conditions under Part 15 are that the operator must accept whatever interference is received and must correct whatever interference is caused.”); Unlicensed NII/SUPERNet Operations, 11 F.C.C.R. 7205, at ¶ 54 (1996) (requiring unlicensed NII/SUPERNet devices “to cease operation or make some accommodation . . . to eliminate any harmful interference caused to a licensed operation”); Additional Frequencies for Cordless Telephones, 10 F.C.C.R. 5622, at ¶ 16 (1995) (noting that “Part 15 rules require that a cordless telephone cease operation if it is found to cause harmful interference”); Operation of Wide-band Swept RF Equipment Used as Anti-Pilferage Devices, 65 F.C.C.2d 802 (1977) (requiring operators of security devices “to stop operating the device until such time as the harmful interference is eliminated”); Operation of Radio Door Controls, 1 F.C.C.2d 518, at ¶ 4 (1965) (categorically banning devices shown to interfere with licensed radionavigation services).

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acknowledged that “operation of a [control or security alarm device] *must cease* if harmful interference occurs to a licensed radio service until the interference problem has been resolved.”^{16/} Congress has long been aware of, and has acquiesced to this decades-old interpretation of section 301.^{17/} Now, however, with respect to wireless microphones, the Commission has tossed aside this 70-year-old interpretation without explanation of its factual conclusions. The failure of the Commission to protect Part 74 licensed facilities against Part 15 device interference is arbitrary and capricious and is an action well outside its authority under Section 301 of the Communications Act.

11. The Public Interest Spectrum Coalition (PISC) seeks on reconsideration more power for fixed TVBDs than 4 watts EIRP if there are no full-service DTV stations within both ± 1 and ± 2 channels (in addition, of course, to the co-channel preclusion). SBE suggests that such a proposal ignores the myriad of other licensed stations also entitled to protection: Class A TV stations; LPTV stations; TV Translator stations; UHF TV Translator Relay stations; LPA stations; cable TV headends; DBS headends and TV Translator input channels are all entitled to protection from interference, and PISC has utterly failed to justify the interference potential to these licensed service stations. Similarly, Motorola, Inc. (Motorola) seeks greater antenna height than 30 meters for fixed TVBDs. Motorola also asks that the wireless microphone sensing requirement should be eliminated, and urges less-stringent adjacent-channel protection requirements. Finally, Motorola wants the TVBD identification (ID) requirement eliminated.

^{16/} 88 F.C.C.2d 147, at ¶ 37 (emphasis added).

^{17/} See, e.g., S. Rep. No. 90-1276, 1968 USCCAN 2486, 2487 (1968) (“The Federal Communications Commission presently has authority under section 301 of the Communications Act to prohibit the use of equipment or apparatus which causes interference to radio communications.”). “It is well established that when Congress revisits a statute giving rise to a longstanding administrative interpretation without pertinent change, the ‘congressional failure to revise or repeal the agency’s interpretation is persuasive evidence that the interpretation is the one intended by Congress.’” *CFTC v. Schor*, 478 U.S. 833, 846 (1986) (citation omitted).

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Again, these changes are at variance with the Commission's obligations under Section 301 of the Communications Act to authorize those devices which have, predictably, a significant interference potential to licensed services. *See*, the Notice of Proposed Rulemaking, *Restricted Radiation Devices*, 14 Fed. Reg. 2033, at ¶ 1 (1949) (FCC has a "continuing responsibility *under section 301* . . . to promulgate rules and technical standards aimed at the suppression of radio energy which, regardless of its source, is an actual or potential source of interference to authorized radio signals . . .") (emphasis added).

12. FiberTower/Sprint Nextel/COMPTEL/RTG (FT/SN/COMPTEL/RTG) seek to permit white spaces spectrum to be used for backhaul purposes, on a protected basis. This is in SBE's view, untenable. First, as explained above, there are no vacant TV channels for TVBDs except outside even medium-sized metropolitan areas. Therefore, there are no vacant TV channels for backhaul use. Second, there is no such thing as a "protected" Part 15 application. Part 15 uses are, by definition, and by statutory requirement, unprotected devices with no allocation status; they operate at sufferance to all licensed services. TVBD's cannot have it both ways: the flexibility of unlicensed operation and a status of a protected (i.e. licensed) radio service.

13. The decision to allow white spaces devices is seriously flawed and not supported by the record in this proceeding. As the Commission has failed to properly analyze the interference potential from these devices, it is unreasonable to postpone that analysis to the equipment authorization stage on a case-by-case basis. Most urgently, the Commission should not adopt the rule relaxations proposed by Adaptrum, PISC, Motorola, FT/SN/COMPTEL/RTG, Dell/Microsoft, WIPA, SCTDV, The Wi-Fi Alliance, and IEEE802. Rather, far more strict provisions to prevent interference to licensed services *ex ante*, especially for broadcast and

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broadcast auxiliary operations on television broadcast channels, are required and must be implemented.

Respectfully submitted,

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