

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 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 3 GHz Band)	ET Docket No. 02-380
)	

SUBMISSION FOR THE RECORD:

**ANY FUTURE APPROVAL/DISAPPROVAL PROCESS FOR
UNLICENSED DEVICES RELIANT ON SENSING MUST CONTAIN
RIGOROUS SCIENTIFIC AND PROCEDURAL SAFEGUARDS**

The Association for Maximum Service Television, Inc. (“MSTV”) here comments on the Commission’s reported plan to move forward with “sensing” as a means of avoiding interference to television receivers, cable service, and wireless microphones. Despite the widespread failure of the prototype sensing devices evaluated by OET it appears that the Commission is on the verge of adopting rules that could allow unlicensed devices relying solely on sensing to be authorized after just “another round of testing within the FCC labs.”¹ This decision could establish a non-rigorous and procedurally defective glide path for unlicensed devices *proven* to cause interference to licensed services, including local television, and threatens the public that benefits from those licensed services. MSTV opposes this decision but, below, identifies specific steps to make that process, if it is to be adopted, fair, reliable, lawful, and adequately protective of viewers’ television service. This Submission then specifies the defects

¹ Chloe Albanesius, *FCC Gives Conditions Support to White Spaces*, PC Magazine (Oct. 15, 2008), at <http://www.pcmag.com/article2/0,2817,2332583,00.asp>.

in the Commission's evaluation of sensing technologies up to this point which the future procedures recommended here are intended to avoid.

I. IF THE COMMISSION ADOPTS A PROCESS FOR AUTHORIZING SENSING-ONLY DEVICES IN THE FUTURE, THAT PROCESS SHOULD BE SCIENTIFIC, OPEN, ACCOUNTABLE, AND COMPLIANT WITH SOUND ADMINISTRATIVE PROCEDURES.

Open. The Commission should conduct an open, fair, and legally compliant administrative process for approving or disapproving sensing-only devices in the future. Television broadcasters, wireless microphone users (including sports leagues, musicians, churches, theaters, and broadcasters), television manufacturers, portable device manufacturers, cable operators, and members of the public will surely have valuable contributions to make going forward and in any event must be given an opportunity to comment. To ensure that the Commission has the benefit of input from the public:

- The proposed test procedures and methodologies used in equipment approval of any device should be subject to public notice and comment prior to the initiation of testing;²
- The approval process should be based on a Report of the testing results;
- That Report should be subject to peer review by an expert outside agency such as the National Institute of Standards and Technology (“NIST”);³ and
- That Report, the peer review, and OET's response should then be released for public notice and comment.⁴

² See Emergency Request, ET Dkt Nos. 04-186 and 02-380, at 2-4 (Oct. 17, 2008); see also Reply to Opposition and Addition to Request for Relief, ET Dkt Nos. 04-186 and 02-380, at 3-6 (Oct. 28, 2008).

³ See Pub. L. No. 106-554, § 515, reprinted at 44 U.S.C. § 3516 (Historical and Statutory Notes) (“Data Quality Act”); Implementation of Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Pursuant to Section 515 of Public Law No. 105-554, Information Quality Guidelines, 17 FCC Rcd 19890 (2002); Final Information Quality Bulletin for Peer Review, Final Bulletin, Office of Management and Budget, 70 Fed. Reg. 2664 (Jan. 14, 2005) (“Peer Review Bulletin”). See also Peer Review Bulletin at 2675-76.

⁴ See *Am. Radio Relay League v. FCC*, 524 F.3d 227 (D.C. Cir. 2008).

Scientific. Science must form the basis for any approval of a sensing-only device.

Testing should include thorough evaluation of both the interference potential of the device and the device's spectrum-sensing capabilities — not just the latter factor, as in the tests conducted to date. Testing also should include the real-world environment under which sensing-only devices will be operated, as observed by the internal peer reviewers during Phase II testing.

Further examination also is needed as to the appropriate sensing detection threshold. Certainly, the Commission should accord no weight to its apparent plan to adopt a threshold of -114 dBm for the ancillary sensing component on a geolocation device. The inclusion of a sensing component on a geolocation-equipped device is superfluous, because it is the geolocation component that will actually prevent co-channel interference. There is simply no scientific basis for taking that irrelevant detection threshold from the geolocation/sensing context and giving it any weight in the sensing-only context. The Commission must thus begin anew to evaluate the appropriate sensing threshold for a sensing-only device. In conducting this inquiry, the Commission should bear in mind that, in 2007, OET concluded that -114 dBm is far too lax a standard for a sensing-only device. That limited testing on sensing-only prototypes suggests that a sensing-only device must be able to sense signal levels that are weaker than -122 dBm at a minimum.⁵

The controlling principle must be that a device may be approved only after it is demonstrated that it effectively protects the public's service from interference. Any rules,

⁵ The OET Report states that “comparative receive power measurements performed at each test site” indicate that the difference in signal level between TV signals received by a roof-top television antenna and those received by a WSD device's antenna can be as much as 34 dB (or 38 dB for a DTV antenna that complies with the FCC's DTV planning factors). The math and the concept are simple. If a TV set with an outside antenna is receiving the minimum DTV signal and the WSD is receiving the same signal at a reduction of 38 dB, the sensing level needed is $-84 + (-38)$ or -122 dBm, based on the OET measurements.

decisions, or approvals must maintain this link between authorization and protecting American consumer from interference.

Accountable. While the Commission should, of course, rely on experts in OET and other offices and bureaus, peer review by an independent expert entity, and public comment, the stakes are too high — in terms of irremedial harm to consumers — for the Commission to delegate the decision to approve or disapprove sensing-only devices in the future. The Commission should retain responsibility — and thus accountability — for designing the parameters and processes that will govern sensing-only devices and for making the ultimate decision to approve or disapprove these technologies in the future.

II. THE ABOVE RECOMMENDATIONS ARE INTENDED TO ADDRESS AND MITIGATE THE DEFECTS IN THE CURRENT RECORD RELATING TO SENSING-ONLY DEVICES.

The prototype sensing devices evaluated by OET in this proceeding failed test after test. Moreover, (1) the Commission has yet to determine the appropriate sensing detection threshold for such devices, (2) sensing-only device testing conducted to date failed to perform in real-world conditions, and (3) there have been shortcomings in the process used thus far to evaluate sensing-only technologies. The recommendations specified in Section I of this proceeding are designed to mitigate these problems.

Lax and Unjustified Sensing Threshold. There is no basis to approve any sensing-only devices until it can be demonstrated that such devices can, at a minimum, accurately determine whether a TV channel is occupied or vacant and there is compelling technical justification and evidence for a safe sensing level. It has been reported that the pre-qualification sensing level being considered by the Commission is -114 dBm. The record already demonstrates, however, that that level will fail to protect the digital television viewing public.

A device that senses only to that level will fail to sense a DTV signal of -115 dBm or weaker. But weak signals of this kind occur throughout a station's service area, including in dense urban areas where signals are attenuated by buildings and other obstructions. DTV receivers and digital-to-analog converter boxes, however, often are able to receive weak signals and provide viewers with good service.⁶ If an unlicensed device is allowed to transmit, for example, on a channel in an apartment where the DTV signal is at -115 dBm or lower, the device will prevent reception of that station's signal not only in that apartment, but also for a radius of at least 1.2 kilometers. Thus, to "test" a device to determine if it can sense signals that are at least as strong as -114 dBm would be akin to testing a smoke detector to see if it can detect raging flames. In both cases, the device tested needs to be far more sensitive to what it is supposed to sense if the "test" is to have any value and if the public is to be adequately protected.

OET's 2007 report on the Performance of Prototype TV-Band White Space Devices ("Phase I Report") confirmed the inadequacy of a -114 dBm threshold detection level. In that Report, OET found that devices sensing at the -114 dBm level "do not consistently sense or detect TV broadcast or wireless microphone signals" and that "the transmitter in the prototype device is capable of causing interference to TV broadcasting and wireless microphones."⁷ Because of the unacceptable results of devices set to a -114 dBm detection threshold, OET concluded: "further testing of these devices was not deemed appropriate at this time."⁸ It is thus

⁶ A television receiver can receive these weaker signals through the use of a large outdoor antenna (occasionally including a preamplifier). As noted in the DTV receiver report, this can make a difference of 30 dB or more in received signal level compared to the use of an indoor antenna. This difference would be even greater for the small antennas that are typically used for portable devices.

⁷ Initial Evaluation of the Performance of Prototype TV-Band White Space Devices, OET Report FCC/OET 07-TR-1006, at x (July 31, 2007).

⁸ *Id.* at xi.

clear that if the Commission goes forward with a sensing detection threshold of just -114 dBm, many viewers' digital television service will be destroyed. Moreover, the data in the second OET Report also support these findings.

Incomplete Testing of Sensing-Only Devices. The decision to move forward with sensing is based upon tests that not only demonstrated that sensing-only devices did not work but also failed to evaluate certain important issues. Specifically, the OET tests focused on a limited question: whether, under controlled circumstances, the device's scanner would fail to detect the presence of a given signal. The tests were undertaken at just nine locations in the Washington-Baltimore area — a limited set of locations that does not represent a diverse enough sample to model the variety of conditions and areas that exist within the United States. These limited tests were much simpler than the tests necessary to determine that a device can perform accurately in all or even most real-world situations. Clearly, the limited tests to date give the Commission no basis for crafting a universally applicable rule for sensing-only devices.

The just-released internal peer review of the OET Phase II Report pointed out a number of other ways in which the tests to date failed to cover the range of cases that occur in real-world settings. For example, the internal peer reviewers found that OET could have “tested multiple, adjacent DTV signals at the same time,” studied “more scans at the various field locations to obtain a larger set of results for determining detection reliability,” “consider[ed] the potential effects of interfering structures on the results,” and “identif[ied] areas subject to fading and shadowing and to perform tests in and around these areas” (to name just a few of the shortcomings).⁹

⁹ See Peer Review Panel Report on OET Report FCC/OET 08-TR-1005, Evaluation of the Performance of Prototype TV Band White Space Devices, Phase II (Oct. 1, 2008).

The distance over which a device can cause interference to DTV viewers and other authorized users of the broadcast spectrum is a key factor in determining the required sensing capabilities needed. Even the limited interference analysis on this subject in the Phase II Report found that a device operating on a given channel will cause interference at a range of up to 1.2 kilometers. MSTV's analysis of OET's data shows that the interference distance may be as high as 5 kilometers.¹⁰ But the harm, in any event, will be great. Because a "mis-fire" of an unlicensed device will cause interference over such a large distance, potentially to hundreds of viewers, the sensing mechanism must be *absolutely correct and reliable* in order to avoid interference to DTV viewers and other authorized users.

Inadequate Process. As documented in the Emergency Request¹¹ and related pleadings, the process used by the Commission thus far to evaluate sensing-only devices has not fully complied with the Commission's own procedures and sound principles of administrative law. First, the Commission did not give the public the opportunity to submit comments on OET's Phase II Report, and therefore does not have the benefit of public comment on its proposed decision, including the further approval process contemplated for sensing-only devices. The absence of opportunity for public comment is particularly consequential because key elements of the rules the FCC intends to adopt appear to be contradicted by the data in the 400-page report. Second, the Commission failed to submit the OET Report to outside peer review and peer reviewers inside the Commission were given the inaccurate impression that the

¹⁰ The OET's 1.2 km interference distance was extrapolated from data taken at the FCC's Laboratory from the radial path in which the Adaptrum device was directly in front of the TV receive antenna. However, measurements were taken along other radials and using the measurements at transmitter site 3 on a bearing of 72.7 degrees, the same extrapolation method would yield an interference distance of about 5 km.

¹¹ See Emergency Request, ET Dkt Nos. 04-186 and 02-380, at 2-4 (Oct. 17, 2008).

Commission would “publish the report and invite public comment in the same manner as the Phase I Report.”¹² In addition, the internal peer reviewers may not have known about the Report’s conclusion that sensing passed a “proof of concept” test and in any event did not comment on it.

¹² Memorandum from Jules Knapp, Chief, OET, to Jim Schlichting and George Dillon re: Peer Review of Sensing Devices Phase II Study (Sept. 11, 2008).

CONCLUSION

The Commission's apparent plan to move forward with future decisions to approve or disapprove sensing-only devices is a mistake of science, proper procedure, and public policy. The only way the harms that will flow from this mistake can be mitigated is if the Commission makes clear that the future approval/disapproval process is scientific, open, accountable, and adequately protective of American viewers in the particular respects specified above.

Respectfully submitted,

/s/

David L. Donovan
Victor Tawil
Bruce Franca
ASSOCIATION FOR MAXIMUM
SERVICE TELEVISION, INC.
P.O. Box 9897
4100 Wisconsin Avenue, NW
Washington, D.C. 20016
202-966-1956 (tel.)
202-966-9617 (fax)



Jonathan D. Blake
Matthew S. DeNero
Eve R. Pogoriler
COVINGTON & BURLING LLP
1201 Pennsylvania Avenue, N.W.
Washington, DC 20004-2401
(202) 662-6000 (tel.)
(202) 662-6291 (fax)

*Counsel for the Association for Maximum
Service Television, Inc.*

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