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

REPLY TO OPPOSITION AND ADDITION TO REQUEST FOR RELIEF

The Association for Maximum Service Television, Inc. ("MSTV")[1] and the National Association of Broadcasters ("NAB")[2] hereby respond to the White Spaces Coalition's Opposition to the Emergency Request.[3] The undersigned are reviewing in detail the 400-page report released by the Office of Engineering and Technology ("OET") describing test results and conclusions about the viability of spectrum-sensing technology for TV-band white space devices ("WSDs"),[4] and they take this opportunity to describe a list of preliminary questions and concerns raised by the OET Report and the simultaneous announcement of Chairman Martin that the Commission would vote on November 4, 2008 to authorize WSDs. *See* Attachment A. In addition, the parties add to their Emergency Request the suggestion that the Commission put out for public comment not only the OET Report and the proposed rules but also data gathered in the

[1] MSTV is a nonprofit trade association of local broadcast television stations committed to achieving and maintaining the highest technical quality for the local broadcast system.

[2] NAB is a nonprofit trade association that advocates on behalf of more than 8,300 free, local radio and television stations and also broadcast networks before Congress, the Federal Communications Commission, the Courts, and other federal agencies.

[3] *See* Opposition to "Emergency Request," ET Dkt Nos. 04-186 and 02-380 (Oct. 24, 2008) ("Opposition").

[4] *Evaluation of the Performance of Prototype TV-Band White Spaces Devices: Phase II*, FCC/OET 08-TR-1005 (rel. Oct. 15, 2008) ("OET Report").

OET tests that were not included in the Report.[5] Finally, the undersigned express their agreement with the concerns raised by Chairman Dingell in his recent letter to Chairman Martin regarding peer review and accountability.[6]

I. THE COMMISSION SHOULD GRANT THE EMERGENCY REQUEST.

The Emergency Request asked that the Commission issue a public notice seeking comment from members of the public on the 400-page OET Report.[7] The White Spaces Coalition opposes that request on the grounds that broadcasters have been able to observe and comment on the OET tests[8] and that broadcasters "misunderstand the purpose of OET testing."[9] The White Spaces Coalition is incorrect on both counts, and the Emergency Request should be granted.

While MSTV and others were able to observe and comment on the tests, at no time before the release of the OET Report did the evidence – or the OET – indicate that there had been a "proof of concept" for spectrum sensing devices. Indeed, the data show that spectrum sensing cannot be used to determine accurately whether a television channel is occupied or vacant. The widespread WSD sensing failures, all documented in the OET Report, rebut the Report's conclusion that there has been a "proof of concept." Thus, there is no basis for concluding that devices that rely on spectrum sensing only, without geolocation, are feasible.

[5] This addition is a convincing example of why the Report should be put out for public comment. The omission of these relevant data is a point that has surfaced only in the past several days as parties have begun to analyze the Report in greater depth – scrutiny that the Report (and the public) deserves given the stakes involved here and the irreversibility of the action the Commission seems poised to take.

[6] *See* Letter from John D. Dingell, Chairman, House Committee on Energy and Commerce, to Kevin J. Martin, Chairman, Federal Communications Commission, ET Dkt. No. 04-186 (Oct. 24, 2008).

[7] *See* Emergency Request, ET Dkt Nos. 04-186 and 02-380 (Oct. 17, 2008).

[8] *See* Opposition at 2.

[9] *See id.* at 4.

Members of the public should be able to review and comment meaningfully on this lengthy, complex, and important report.

The testing conducted by the OET and the OET Report will form the basis for the rules that the FCC will adopt with respect to white spaces. "It would appear to be a fairly obvious proposition that studies upon which an agency relies in promulgating a rule must be made available during the rulemaking in order to afford interested persons meaningful notice and an opportunity for comment."[10] In accordance with applicable law and sound public policy, broadcasters, other interested parties, and most of all the public should be allowed adequate time to review and comment on the OET Report before the Commission adopts rules based on that report.[11]

II. THE OET REPORT AND RULES THAT ARE REPORTEDLY UNDER CONSIDERATION RAISE SERIOUS QUESTIONS AND SHOULD HAVE UNDERGONE INTENSIVE PEER REVIEW.

The OET Report and the Chairman's announcement of technical parameters for authorization of WSDs raise a number of serious concerns and questions. First, it appears that the Report omitted data that could call into question the viability of spectrum sensing devices and other decisions, such as permitted power levels for such devices. For example, the undersigned understand that the Motorola geolocation device computed both the channels available, and the permitted power level for each channel, at each test location. Although this data was collected by FCC engineers, it was not reported in the OET Report. This data would have shown that the Motorola device reported permitted power levels of much less than 40 mW

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

[11] *See* Emergency Request at 2-5.

in all situations where there were adjacent channel television operations. The omitted data should be made available when the Commission asks for comment on the Report.

Second, the OET Report fails to provide adequate explanations for: (1) how the burden of "proof of concept" has been met; (2) how spectrum sensing in combination with geo-location and database access provides any benefit over a more simple and straightforward geo-location and database access approach; (3) how data collected in the field studies are being used to develop "appropriate technical standards"; and (4) how issues regarding future development and approval of additional devices, including devices relying on sensing alone, can be addressed given the data and results of the OET study. In this regard, we find no analysis, data or conclusions to support a number of issues including the proper spectrum sensing threshold, the appropriate power level for adjacent-channel operations, the notion that interference within 10 meters of a television receiver can be discounted, and how such devices would comport with the general Part 15 non-interference standards. A preliminary set of questions on these points is attached hereto as Attachment A.

Third, these concerns illustrate the importance of the peer review process required by the Data Quality Act.[12] The undersigned agree with Chairman Dingell that peer review of the OET Report was required and was important as a matter of sound public policy, and they raise the questions in Attachment A in light of the Commission's affirmation that "public comment plays an important role in ensuring data quality" as well as its statement that the FCC "is dedicated to ensuring that all data it disseminates reflect a level of quality commensurate with

[12] Pub. L. No. 106-554, § 515, reprinted at 44 U.S.C. § 3516 (Historical and Statutory Notes) ("Data Quality Act").

the nature of the information."[13] These questions, like peer review, can be used to evaluate "the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product."[14]

It is clearly in the public interest that the FCC "conduct a peer review on all influential scientific information that the agency intends to disseminate."[15] Given that peer review should elicit instances where the conclusions do not follow from the analysis, and given that the OET Report concluded that there has been a "proof of concept" for spectrum sensing WSDs even though the data show that spectrum sensing was a failure, it is not clear whether the OET Report underwent peer review. If it did, the peer review was not sufficiently rigorous. Peer review must be especially meticulous when the science is novel and complex and when the information under review is important for the agency's decision-making.[16] Further, because the OET Report is a highly influential scientific assessment, even more stringent requirements are applicable.[17] For example, the Commission should have made "the draft scientific assessment

[13] *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, at para. 5 (2002) ("*FCC Information Quality Guidelines*"). Peer review is "one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community." *See Final Information Quality Bulletin for Peer Review*, Final Bulletin, Office of Management and Budget, 70 Fed. Reg. 2664, 2665 (Jan. 14, 2005) ("*Peer Review Bulletin*").

[14] *See Peer Review Bulletin* at 2665.

[15] *See id.* at 2675 (Section II). The OET Report is "scientific information." *See id.* at 2667 (defining "scientific information" to include, *inter alia*, factual inputs, data, analyses, and technical information). There is no doubt that it is influential – its dissemination "will have or does have a clear and substantial impact on important public policies or important private sector decisions." *See id.* at 2675 (Section I); *see also FCC Information Quality Guidelines*, Appendix A, para. 6.

[16] *See id.* at 2675. Further, peer review ideally would have been performed by reviewers not employed by the Commission, as external experts typically are "more open, frank, and challenging" than internal reviewers. *See id.* at 2669 (quotation omitted).

[17] The OET Report is a scientific assessment – it synthesizes multiple factual inputs, data, and assumptions, and makes judgments to "bridge uncertainties in the available information." *See id.* at 2675 (Section I). Further, it is
(continued…)

available to the public for comment at the same time it [was] submitted for peer review."[18] In any event, in order to further important goal of transparency, the Commission should "disseminate the final peer review report on the agency's Web site along with all materials related to the peer review."[19]

Fourth, the Commission should also ask for comment on its proposed rules, which it should disclose with its request for comment, since a critical question is whether the results of the OET's tests—including both the data included in the Report and the data not included in the Report—support or rebut the proposed rules. Each of the Commissioners has at one time or another stated that the issues in this case should be based "on the science." We agree. But in that event, it must be determined whether "the science" in the form of the test results in fact justify the proposed new rules.

III. CONCLUSION

The OET Report contains hundreds of pages of highly technical data and analysis. That data was gathered over months of intensive testing. The information and conclusions in the OET Report will influence the Commission's decisions in one of the most important spectrum decisions of the day. The outcome of this proceeding has the potential to promote broadband in rural America and to encourage the spread of innovative services and devices for consumers and

---

highly influential – it is novel, controversial, and precedent-setting. *See id.* at 2675 (Section III). Also, the Commission reportedly intends to authorize WSDs to operate at 40 mW on adjacent channels, which could interfere with viewers' DTV reception in 77% of a station's service area. And white spaces proponents intend to further increase WSD power, exacerbating interference problems even further, and ultimately bring about the end of television broadcasting. *See* Supplement to the Emergency Request filed by MSTV, NAB, APTS, and the ABC, NBC, CBS, and Fox Television Networks, ET Dkt Nos. 04-186 and 02-380 (Oct. 22, 2008). These outcomes would have a "potential impact of more than $500 million in any year," and provide alternative grounds for determining that the OET Report is highly influential.

[18] *See Peer Review Bulletin* at 2676.

[19] *See id.* at 2675.

businesses. But it also has the potential to disrupt a fundamental service on which millions rely: free, over-the-air television broadcasting. It also could threaten cable and wireless microphone operations (including broadcasters' wireless microphone operations). Indeed, the National Cable and Telecommunications Association ("NCTA") yesterday filed a letter observing that "there seems to be a complete disconnect between what the Commission's technical analyses have shown and what the Commission is proposing to adopt."[20] Along with NCTA, we urge the Commission "not to rush to a decision that would ignore the unique and proven hazards" of operating unlicensed devices at the parameters reportedly planned for authorization in just six business days.[21]

The Commission is required to "treat information quality as integral to every step of [its] development of information, including creation, collection, maintenance, and dissemination."[22] The issues here are complex and novel. The importance of getting it right cannot be understated. Therefore, the Commission should grant the Emergency Request. Where possible, the Commission should identify the relationship between its proposals and the test results contained in the Report and provide engineering and scientific responses to the questions raised in Attachment A.

[20] Letter from Daniel L. Brenner, NCTA to Marlene H. Dortch, Secretary, FCC, ET Dkt. Nos. 04-186 and 02-380 (Oct. 27, 2008).

[21] *Id.*

[22] *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies*; Final Guidelines, Office of Management and Budget, 67 Fed. Reg. 8452, 8459 (Feb. 22, 2002).

Respectfully submitted,

/s/_____
Marsha J. MacBride
Jane E. Mago
THE NATIONAL ASSOCIATION OF BROADCASTERS
1771 N Street N.W.
Washington, D.C. 20036
(202) 429-5300

/s/_____
David L. Donovan
Victor Tawil
Bruce Franca
THE ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.
4100 Wisconsin Avenue, NW
Washington, D.C. 20016
(202) 966-1956

Jonathan D. Blake
Eve R. Pogoriler
COVINGTON & BURLING LLP
1201 Pennsylvania Avenue, N.W.
Washington, DC 20004-2401
(202) 662-6000
COUNSEL FOR THE ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.

October 28, 2008

Attachment A

Preliminary Questions on the OET Report

Purpose of Sensing

- The OET Report states that "spectrum sensing in combination with geo-location and database access techniques can be used to authorize equipment today under appropriate technical standards." The first question to be asked is what is the function of spectrum sensing? Is it to determine whether a TV channel is occupied or vacant? The test results show that geo-location in conjunction with a trusted database is the only consistent method to correctly identify occupied or vacant channels. As pointed out in the Report, spectrum sensing in 3 of 4 of devices incorrectly identified occupied channels as vacant even under conditions strong enough to produce a viewable TV picture and spectrum sensing in the fourth device tended to identify all channels as occupied (including channel 37, which is reserved for radio astronomy and on which all transmissions are prohibited).

- Is spectrum sensing intended to protect TV viewers beyond the TV station contour? Given the unreliability of the results inside the contour and the lack of any data or testing to determine the appropriate spectrum sensing level for this task, use of spectrum sensing would be wholly unreliable and unsupported.

- Is spectrum sensing intended to protect licensed wireless microphone operations? There is no indication in the test results that such a result is possible using existing spectrum sensing techniques. For example, according to the OET Report, the Philips device "reported all the channels on which microphones were designated to transmit as occupied whether the microphone was transmitting or not." The I2R device, according to the Majestic theater results in OET Report, *never* detected an operating wireless microphone even when the microphones were less than 50 feet away. So, clearly, microphone detection is not a purpose of spectrum sensing or at least one that is realizable. How does including spectrum sensing or suggesting spectrum sensing along with geo-location offer any advantage over a geo-location and database access approach?

Sensing Threshold

- The FCC has provided no calculations, analysis, or data to support the choice of any specific sensing threshold nor how such data supports any finding.

- It has been suggested that the -114 dBm has been chosen as a level to be met to qualify for additional testing. Is it not true that this is the same level that was met by devices in the first round of FCC testing that the FCC declared did not "work"?

- Explain how such sensing threshold is consistent with the data taken during the second round field tests. This data shows that the difference between the signal sensed by a device and a TV antenna can be more than 38 dB (a 34 dB difference was measured with

an antenna more than 4 dB less than the DTV planning factors). Doesn't this measurement suggest that a more sensitive sensing threshold (-84-38 = -122) is needed even for these limited tests? How has the FCC accounted for evidence in the record which found signal levels inside a station's contour at -126 or -128?

- Understanding that actual measurements could not be made, in the opinion of engineers conducting the tests, were TV antennas and receive facilities observed that were better than the TV receive facility used by the FCC or even than what would be called for by the DTV planning factors? For example, were TV antennas at higher elevations, facilities using pre-amps or larger or higher gain antennas observed during the testing? Were these antenna taken into account in the development of any threshold level?

- Intel earlier in this proceeding suggested a -118 dBm level; was this analyzed? MSTV and others have suggested that even lower levels are needed and provided data to support these views; were these levels analyzed? Did the FCC conduct a systematic examination of actual signal strengths inside a station's contour? If not how does it know what is the appropriate sensing threshold?

40 mW Adjacent Channel Power

- The FCC has provided no calculations, analysis, or data supporting the 40 mW adjacent channel limit nor has it shown how such devices would not cause interference to TV viewers.

- Isn't it true that the Motorola geolocation device computed both channels available and permitted power for each channel at each test location and that this data was collected by FCC engineers? Why wasn't this data reported in the test results? What power levels did Motorola calculate were needed to avoid interference on channels with adjacent TV operations within the contour? How many instances were there where the Motorola calculations suggested that a WSD device could operate at 40 mW or more on an adjacent channel and not cause interference to DTV viewers? How many instances were there where the Motorola calculations suggested that a WSD device must operate at 40 mW or less on an adjacent channel to not cause interference to DTV viewers? Please provide the same information for the 5mW adjacent channel power level proposed by broadcasters. Please explain the basis for conclusions that 40 mW is possible at all locations where such disagreement occurs.

- In the original NPRM in the White Spaces proceeding, the FCC put out a comprehensive and detailed description of how to calculate interference to meet the required D/U protections. How does the 40 mW limit take into account this analysis? How is location variability or protection of 90% of locations taken into account?

- Microsoft previously proposed a formula for adjacent channel power based on received TV power.[1] Isn't it true that this formula would not permit a 40 mW level anywhere within a broadcast station's service? How can the FCC say 40 mW is permissible if Motorola, Microsoft and Google (not to mention broadcasters) agree that power levels must be much lower within the DTV contour in many instances?

- Has the FCC conducted specific tests to examine the potential attenuation of interfering signals from unlicensed devices due to walls, antenna discrimination, or other factors? Has the FCC conducted such an analysis taking into account the decrease in broadcast signals due to walls, roofing materials etc, especially with respect to consumers using indoor antennas?

Part 15 Interference Standards

- Is it correct that Part 15 is based on non-interference to other services?

- Aren't technical standards for Part 15 devices developed so that these devices do not cause interference? However, didn't interference to cable service occur at less than 10 mW? Has the FCC ever adopted Part 15 technical limits where devices have been tested and shown to cause interference to existing services even when operating at lower power levels?

FCC Interference Model Flawed for DTV Protection

- The OET DTV receiver report states that the "signal level at the TV's RF input can easily vary over a 26-dB range simply by changing from an indoor antenna to an outdoor, mast-mounted antenna. The span can be even wider (30-dB or more) if a mast-mounted preamp is used. …" How is this real world variability taken into account in developing the WSD technical standards including the 40 mW limit?

- In the original NPRM in the White Spaces proceeding, the FCC put out a comprehensive and detailed description of how to calculate interference to meet the required D/U protections for co - channel and adjacent channel operations. This procedure included factors to take into account location variability. The DTV receiver report stated that signal variability can be affected by use of an indoor antenna. How do the technical standards for unlicensed devices take these factors into account? For example, were

[1] Both Microsoft's and Google's later proposal fail to take into account (1) propagation variability and (2) the fact that viewers may be using lower gain indoor antennas, and are therefore flawed in their proposed use of higher power.

these factors used in determining the 40 mW adjacent channel limit and the 10 meter separation distance?

- FCC has proposed that interference from an unlicensed WSD to a TV receiver at 10 meters or closer can be disregarded. This approach or model is based on the original 1979 decision establishing technical limits for Personal Computers. A number of factors, however, make such an approach inappropriate for unlicensed WSD and the FCC has provided no information or analysis to support this interference approach.

- The 10 meter distance was established for personal computers to protect nearby TV viewers. In 1979, however, the only consideration was *analog* TV. The technical limits that were established for personal computers were based on the point where interference would appear to be just noticeable on an analog TV by a technical expert. In addition, in the analog TV case, interference could increase by a factor of more than a one thousand (30 dB) before the TV picture became "unwatchable." However, for digital TV, the picture goes from perfect to "no picture and sound" immediately (less than 0.1 dB) with interference. The FCC provides no explanation or analysis to explain how the same model used for analog TV is appropriate for DTV given this fact.

- Personal computers are also unintentional radiators and the limit generally applies to narrowband emissions from such devices that can vary widely from device to device. WSD are intentional transmitters and are intended to transmit on vacant channels. Unlike two personal computers than might have a narrow emission or spur at very different frequencies, two WSD will transmit on the same vacant channel if it is available in the area. The FCC provides no explanation or analysis to explain how the same model used for analog TV is appropriate for DTV given this fact.

Interference Distance of 10 Meters Not Appropriate For Mobile TV

- The promise of DTV was not just better pictures and sound in viewers' homes but new services for the American public. Broadcasters and the consumer electronics industry have invested heavily to meet that promise and bring new mobile television and other services to the public. Unlike the unlicensed white spaces "devices" submitted to the FCC during this proceeding, the prototype mobile television devices represent real consumer devices in terms of size, packaging and features and, most importantly, unlike the unlicensed devices, the mobile TV prototypes worked!

- The promise of mobile TV means that consumers will be able to bring digital television out of the home and with them anywhere including where they work and play. The idea that adjacent channel interference at 10 meters is always in the viewer's home and therefore under his or her control is simply not true in the mobile case, as the FCC clearly recognizes in other bands. For example, in a recent report on Advanced Wireless Service

Interference Tests Results and Analysis, the FCC used a two meter separation distance in its interference analysis. This same, more limited assumption should apply with a mobile TV viewer as the victim and a white spaces user as the interferer, as shown in the appendix to this attachment.

Appendix

MSTV
MAXIMUM SERVICE TELEVISION

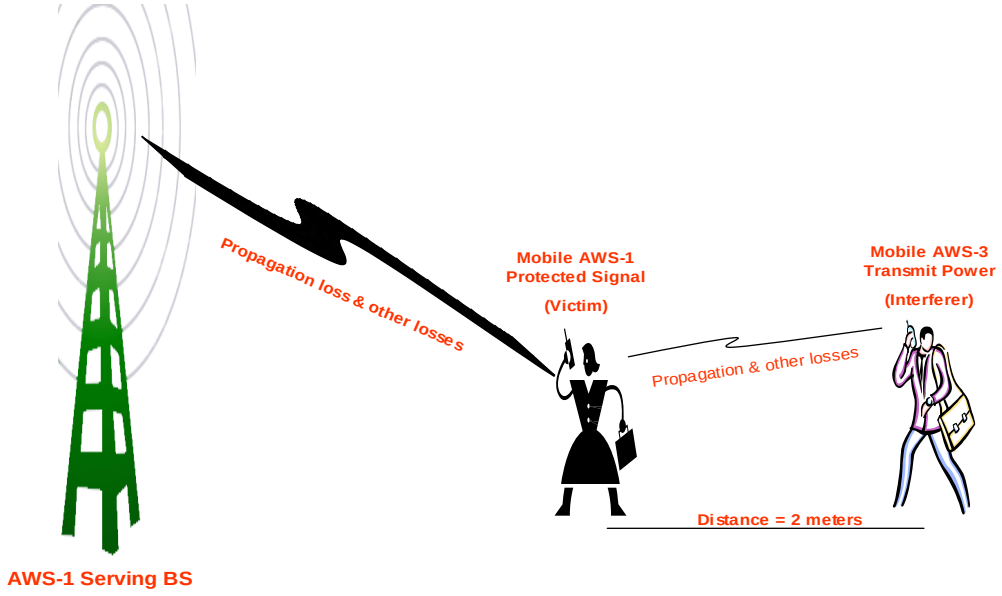
Mobile DTV Adjacent Channel Interference Analysis

The following analysis shows that an unlicensed device operating at 40 mW will cause interference to DTV mobile viewers within the protected contour of a DTV station. This analysis is based on the FCC's recent AWS interference study and only considers those factors, such as antenna mismatch, head and body loss, multipath/shadowing and even wall attenuation, which would reduce interference from the unlicensed device. Nonetheless, the analysis shows that interference is still likely to occur.

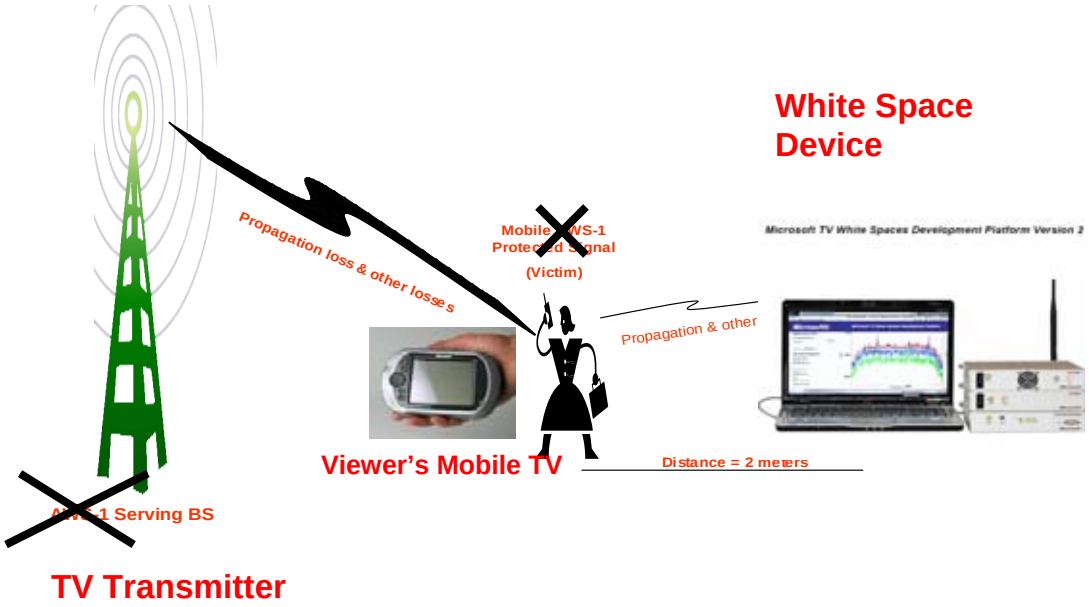
To protect DTV signals from interference, the D/U protection ratio must be met:

- DTV sets make "perfect picture" with signal levels of -84 dBm and above.
- FCC rules currently state that the D/U ratio for adjacent channel protection is -26 dB for upper adjacent and -28 dB for lower adjacent channels. These levels were also proposed by FCC for white space devices.
- To meet -26 D/U, unlicensed signal can not exceed -84 dBm/U = -26 dB or U = -58 dBm at the TV set.
- For 40 mW device (+16 dBm), signal attenuation must be 74 dB or more.

Let's use the recent AWS analysis, Figure 9 from the AWS Report, as an example:



The following picture shows the modified AWS analysis for mobile DTV.



Assumptions from AWS interference analysis:

AWS Report	Mobile DTV Factors	Possible Attenuation
Desired AWS-1 serving signal to be protected is -95 dBm	Desired DTV signal to be protected is -84 dBm	
Interference criterion is call setup failure	Interference criterion is loss of picture and sound	
Separation distance = 2 meters	Separation distance = 2 meters	
Free Space Propagation Model (-45 dB at AWS band)	Free Space Propagation Model (-34 dB at 600 MHz)	-34
Head – body loss of 6 dB	Head – body loss of 6 dB	-6
Loss due to antenna mismatch of 2 dB	Loss due to antenna mismatch of 2 dB (For home DTV case, large gain antenna could be pointed at unlicensed device increasing unlicensed signal while still receiving weak TV signal.)	-2
No loss was considered due to antenna efficiency	N/A	
AWS-1 OOBE slope of 3 dB	N/A	
Multipath/Shadowing loss of 3.5 dB	Generally not appropriate for 2 meter separation	-3.5
Call setup failure, call drop,	N/A	

bandwidth correction factor		
Attenuation with all factors considered		**28.5 dB less** than needed to protect mobile DTV viewers

Even considering all factors used in the AWS case, interference would be caused to mobile DTV viewers within a DTV station's protected contour from an unlicensed device operating at 40 mW. The AWS analysis was based on licensed-to-licensed service interference. Given the non-interference and lower status of unlicensed devices, unlicensed devices should provide more protection to licensed operations not significantly less than other licensed operations.