Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 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

NCTA OPPOSITION TO PETITIONS FOR RECONSIDERATION

William A. Check, Ph.D.
CTO & Senior Vice President
Science & Technology

Andy Scott
Vice President, Engineering
Science & Technology

Rick Chessen
Loretta Polk
National Cable & Telecommunications Association
25 Massachusetts Avenue, N.W. – Suite 100
Washington, D.C. 20001-1431
(202) 222-2445

February 24, 2011

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NCTA OPPOSITION TO PETITIONS FOR RECONSIDERATION

The National Cable & Telecommunications Association ("NCTA"),[1] pursuant to section 1.429 of the Commission's rules, hereby submits its opposition to petitions requesting the Commission to reconsider its rules on the technical parameters of unlicensed devices ("TVBDs") operating in the television broadcast bands, or so-called TV "white spaces," that were adopted in its *Second Memorandum Opinion and Order* ("Order").[2]

In the Order, the Commission largely upheld its decision in the *Second Report and Order* but made certain modifications to the rules following an exhaustive six-year proceeding.[3] While NCTA's members remain concerned about the potential for harmful interference to cable services and to wireless microphone operations,[4] we recognize that the Commission attempted to

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[1] NCTA is the principal trade association for the U.S. cable industry, representing cable operators serving more than 90 percent of the nation's cable television households and more than 200 cable program networks. The cable industry is the nation's largest provider of broadband service after investing over $170 billion since 1996 to build two-way interactive networks with fiber optic technology. Cable companies also provide state-of-the-art competitive voice service to more than 23 million customers.

[2] *Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Second Memorandum Opinion and Order, FCC 10-174 (rel. Sept. 23, 2010) .

[3] *Id.*, Second Report and Order (rel. Nov. 14, 2008).

[4] *Id., see e.g.* NCTA Reply Comments on Petitions for Reconsideration, May 18, 2009; NCTA Comments on Petitions for Reconsideration, May 8, 2009; NCTA Petition for Reconsideration and Clarification, Mar. 19, 2009; NCTA Ex Parte, Oct. 27, 2008; NCTA Comments, Aug. 15, 2007; NCTA Reply Comments, Mar. 2, 2007; NCTA Comments, Jan. 31, 2007.

balance the introduction of new wireless broadband devices with protecting existing communications services. Two petitions for reconsideration, filed by Wi-Fi Alliance and Motorola Solutions (collectively, "petitioners"), seek to undermine the measures adopted in the current regulations to minimize interference to consumers' reception of cable services in the home and to cable headends' reception of distant broadcast signals, as well as to over-air television broadcast signals.[5]

Wi-Fi Alliance wants the benefits of "fixed" TVBDs designed for operation *outside* of buildings for its proposed devices without the obligations that are designed to help ameliorate interference to very sensitive TV receivers from *portable* TVBDs. The type of "white spaces" device contemplated by Wi-Fi Alliance is completely different from the "fixed devices" that have been the subject of the "white spaces" proceeding. Wi-Fi Alliance and Motorola Solutions also propose drastic and harmful changes to the out-of-band emission provisions. As discussed below, both of these petitions should be denied by the Commission.

[5] *Id.*, Wi-Fi Alliance Petition for Reconsideration, filed Jan. 4, 2011; Motorola Solutions, Inc. Petition for Reconsideration, filed Jan.5, 2011.

I. THE COMMISSION SHOULD REJECT PETITIONER WI-FI ALLIANCE'S ATTEMPT TO CIRCUMVENT THE RULES FOR PORTABLE DEVICES AND SHOE-HORN PROPOSED TVBDS INTO THE FIXED DEVICE RULES

In a rather cryptic petition, Wi-Fi Alliance asserts that the current rules have "market limiting issues" that will allegedly stifle the growth of the unlicensed TVBD market.[6] The Petition appears to envision the development of television receivers that incorporate TVBD capabilities and believes that in order for a market for such devices to thrive they should be treated as "fixed" TVBDs rather than Mode II portable TVBDs (or "personal/portable devices").[7]

Personal/portable devices are required to have an automatic geo-location (GPS) capability and to check their location at every power-up cycle, at least daily when in continuous operation, and every time they detect movement by more than 100 meters.[8] Wi-Fi Alliance asserts that TVBDs incorporated into indoor television receivers may be unable to receive GPS signals and hence should be considered fixed devices for such applications, which would exempt them from the GPS requirement. But it proposes that such devices (and all other fixed devices) be allowed to operate (like all portable devices) on channels adjacent to over-the-air broadcast channels, subject to the requirement that their transmit power be limited to the power currently authorized for portable devices under those same conditions (*i.e*. 40 mW total conducted power and -1.8 dBm/100 kHz power density).

While Wi-Fi Alliance proposes that these devices be subject to adjacent power limitations applicable to personal/portable devices, it has not proposed that *non-adjacent* channel operation be subject to the 100 mW limit applicable to personal/portable devices. Thus, what Wi-Fi Alliance really seeks to gain is not a relaxation of the geo-location requirements of

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[6] Wi-Fi Alliance Petition at2.

[7] 47 C.F.R. § 15.703(c) ("fixed device"); 47 C.F.R. § 15.703(f) ("Mode II personal/portable device").

[8] 47 C.F.R. § 15.711(b)(3)(ii).

personal/portable devices, but rather to be allowed to operate these devices as fixed devices at a full *4 Watts of power* on all permitted non-adjacent channels. This would amount to operation at *40 times* the power level permitted for portable devices in the rules. And, as noted, such devices would not be required to include a geo-location capability since true fixed devices rely on geo-location coordinates being entered into the database by a professional installer.

Defining consumer-owned television receivers and similar devices as "fixed" TVBDs would turn the Commission's "white spaces" rule-making proceeding completely on its head.[9] Indeed, equipping television receivers with built-in fixed TVBD power, and operating under less stringent fixed device regulations, will defeat the interference protections incorporated into the rules and result in serious adverse consequences for both cable services and over-the-air television signals.

First, the entire "white spaces" proceeding assumes a model in which truly fixed TVBDs are located outside buildings and are installed by well-documented professionals. Given this assumption, it was reasonable for the Commission to trust the operators of those devices to accurately determine their exact locations (as an alternative to using auto-location capability) and to enter that data into the electronic database system. Operation at higher transmit power levels and on VHF channels was also justified for fixed devices based on their external locations -- where they would operate at a greater distance from cable subscribers' television receivers (and the transmissions of other incumbent services. As the Commission explained in the *Second*

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[9] To provide for operation of this type of fixed device on adjacent channels, the Wi-Fi Alliance suggests that the rules be changed by inserting the word "fixed" into section 15.709(a)(5)(ii) of the Commission's rules on the permissible TVBD power spectral density values, *i.e.* to read "*Fixed and* Personal/portable devices operating adjacent to occupied TV channels: -1.8 dBm (emphasis added); and section *15.712(a)(2)* of the Commission's rules on required separation distance, *i.e.* to read . . . . *Fixed and* Mode II personal/portable TVBDs may operate at closer separation distances, including inside the contour of adjacent channel stations, provided the power level is reduced to 40 mW or less as specified in §15.709(a)(2).

Report and Order, "the requirement for fixed devices to operate at outdoor locations will provide sufficient separation from consumer TV receivers to avoid direct pick-up interference from their operations to cable service."[10] The same cannot be said for television receiver-based TVBDs operating indoors, at much higher power, and exempt from the requirements that apply to other fixed TVBDs.

Second, the Commission's rules ensured that existing services would be further protected because signals from fixed devices operating outside a building would be attenuated when passing through external building walls. This would at least partially compensate for the lack of shielding in consumer electronics equipment, particularly on VHF channels. By contrast, personal/portable devices, which are not readily identified, are limited to 16 dB lower power than fixed devices and are required to have a geo-location capability that is secure from tampering, and automatically and frequently determines their location and the allowable channels and power levels for that location. Allowing television receiver-based TVBDs to be installed indoors and exempt from the limitations on personal/portable devices would undermine the rules' protections.

Third, by eliminating the requirement for built-in geo-location capability in television receiver-based TVBDs, consumers would be expected to hire a "professional installer" to determine and enter the location coordinates and to hold that entity accountable for their accuracy throughout the life of the product.[11] Another problem is what happens when the

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[10] Second Report and Order at ¶ 107.

[11] The Commission did not define the specific qualifications of a" professional installer" but it is intended "to mean an entity consisting of an individual or team of individuals with experience in installing radio communications equipment and that provides service on a fee basis – such an individual or team can generally be expected to be capable of ascertaining the geographic coordinates of a site and entering them into the device for communication to a database." Order at ¶ 150. Moreover, the professional installer is responsible for "assuring the accuracy of the entered coordinates" and in the event the stored coordinates in a fixed device become corrupted, the

consumer who owns the television receiver-TVBD moves to another location. There is no reason to believe or expect consumers to have the resources necessary to accurately determine location information, for as even Wi-Fi Alliance suggests, GPS information is not always accurate or even available indoors. Nor is it reasonable to expect that consumers will have the skills necessary to accurately update the electronic location data in their television receivers. A person moving from a rural location with few channel restrictions to an urban location with many occupied channels, for example, may still have a TVBD authorized for channels that are restricted within the contour of local stations. This will cause harmful interference to both over-the-air signals and nearby cable headends.

The operation of 4 W high-power TVBDs in consumers' households would wreak havoc on reception of cable and over-the-air signals, and would create even worse direct pickup interference if consumers mount such devices on walls inside their dwellings or use the equipment for in-home video streaming between devices. In apartment houses and condominiums, the interference radius could extend by multiple dwellings in each direction. Moreover, the problem will be further compounded because unlike personal/portable devices, fixed devices are permitted to operate on VHF and low UHF frequencies.[12]

In sum, the proposed changes to the rules are hardly "minor modifications," as Wi-Fi Alliance asserts, and should be rejected.

Commission provided that "it will be necessary . . . for a professional installer to re-enter those coordinates in the device." Second Report and Order at ¶¶ 91, 86.

[12] The rules prohibit portable devices from using certain VHF channels devices because, as has been well-documented, consumer electronic devices are significantly more vulnerable to interference at lower frequencies. *See, supra*, n. 4.

II. THE COMMISSION SHOULD REJECT PETITIONERS WI-FI ALLIANCE AND MOTOROLA SOLUTION'S PROPOSAL TO DRASTICALLY RELAX OUT-OF-BAND SPURIOUS SIGNAL REQUIREMENTS

Wi-Fi Alliance and Motorola Solutions, Inc. ask the Commission to modify the rules to eliminate the out-of-band emissions ("OOBE") mask designed to protect against interference in the VHF and UHF spectrum. The current rules, 47 C.F.R. 15.709(c)(1), require that out-of-band spurious emissions be no greater than -72.8 dB/100 kHz in adjacent channels relative to the highest average total power in the channel of operation. For a fixed TVBD operated at 4 W EIRP (+36 dBm), this corresponds to a power level not exceeding -36.8 dBm/100 kHz, while for a personal/portable TVBD operated at 100 mW EIRP, it corresponds to a power level not exceeding -52.8 dBm/100 kHz.

The Petitioners seek to relax those requirements for devices transmitting at or less than 100 mW EIRP on the operating channel, so that emissions under those conditions could be as high as -25.8 dBm/100 kHz. In other words, they request that the allowable emissions for operation at or below 100 mW be *11 dB higher* than allowed for a fixed device operating at maximum power, *27 dB higher* than allowed for a 100 mW TVBD, and *31 dB higher* than allowed for a personal/portable device operating within the protected contour on a channel adjacent to a broadcast channel.

If the out-of-channel noise and spurious emissions were uniform across the adjacent channel at the permissible 40mW transmission, the total adjacent channel emissions would be only 24 dB below those on the main operating channel. This is clearly not sufficient to protect over-air reception. And the Commission appropriately declined to reduce the required adjacent

channel attenuation requested by Wi-Fi Alliance and Motorola in the Order.[13] The Commission set the current out-of-band emissions requirements after a long and thorough rulemaking. Petitioners present absolutely no technical justification for their proposed, drastic change to permitted emissions when devices operate at 100 mW and below. Wi-Fi Alliance's entire reasoning is based on the belief that the OOBE emissions mask specified in dBr terms removes one important tool that TVBDs can use to maximize performance while limiting transmit signal power: the Transmit Power Control ("TPC"). It summarily argues that with a basic geo-location database providing a "white spaces" map for TVBD transmit power limits, TPC will enable devices to meet the required interference threshold, asserting with no evidence that this is likely to occur due to advances in database technology and historical broadcast TV signal strength data at specific GPS coordinates. Wi-Fi Alliance provides no engineering analysis or justification to support its assertions that drastically relaxing adjacent channel spurious emissions from TVBDs operating at or below 100 mW EIRP transmit power will avoid interference.

Motorola argues that OOBE limits mandated in the Commission's rules are more stringent than those for Wi-Fi devices and asserts that these requirements will significantly increase the cost of deploying networks and equipment in TV white spaces. However, the issue here is with adjacent channel emissions, rather than emissions from Wi-Fi devices which operate more than 6 MHz from the occupied channel edge and in spectrum not occupied by broadcast services.[14] From an operational standpoint, the need is to avoid interference to over-the-air

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[13] *Order* at ¶ 88 ("we find it necessary to limit adjacent channel emissions to the extent practicable to prevent interference to adjacent channel TV stations and other authorized services").

[14] OOBE requirements for TVBDs are more stringent that those for Wi-Fi devices because 1) adequate reception of television signals requires a higher carrier-to-(noise plus interference) ratio C/(N+I) than do Wi-Fi signals, 2) Wi-Fi devices are generally frequency agile and can change frequencies to avoid mutual interference, and 3) Wi-Fi devices are acknowledged to be subject to interference that the user can control by changing locations as required, whereas television receiving devices are fixed in location and stations operate on licensed, locally-

reception for both individuals and cable headends (and similar facilities) when the TVBD is transmitting on a channel that is adjacent to an over-the-air channel.

Motorola proposes, however, to allow fixed TVBD adjacent channel emissions to increase by 25 dB above the current rules, when those devices are located further outside the protected station contour boundary. Specifically, it maintains that increasing the distance outside the boundary by 0.7 to 1.76 km (depending on TVBD antenna height) will result in an additional 25 dB of signal attenuation, and that, therefore, increasing adjacent channel OOBE by that amount will result in no greater interference to receivers than under the current regulations. The suggested changes will significantly affect the viability of signal reception outside protected contour boundaries. Motorola's proposal is aimed at protection of over-the-air reception for receivers located within a station's protected contour boundary. Thus, it calculates the additional distance required to attenuate OOBE, as measured at that boundary. But for any receiver that is located outside the boundary, including cable headends, the reception will be *worse* – as the desired signal strength will be lower as a result of their greater distance from the station, while the co-channel noise from fixed TVBDs will be 25 dB worse.[15]

With regard to cable headends located outside protected contour boundaries, Motorola argues "that it is not necessary to provide increased adjacent channel protection to other services or devices that use the TV band spectrum such as TV receive sites (*e.g.*, cable head-ends) . . ."[16]

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exclusive channels. The current OOBE rules are intended to avoid materially reducing the reliability of that reception and, thus, the more stringent OOBE limits are appropriate for that situation.

[15] Furthermore, to maintain equivalent rural cable headend over-the-air reception protection from fixed TVBDs, it will be necessary to increase the adjacent channel protection radius sufficiently to provide 25 dB of additional signal loss between the TVBDs and the receiving antenna. Given that the receiving antennae are often located high above the ground or on mountain tops (in order to obtain sufficient, stable TV station signal strength), the path loss calculations should assume, as a default, line-of-sight transmission conditions between the TVBD and headend.

[16] Motorola Petition at 9.

It provides no data to justify this conclusion. In fact, it clearly anticipates that this is an unsupportable position, as it goes on to state: "[h]owever, if data is presented that demonstrates an increased potential for interference, these services and devices could be similarly protected by slightly increasing the separation or keep-out zones around those services for adjacent channel TVBD usage in the geo-location database."[17]

Finally, Motorola suggests that the Commission could simplify the required regulation change by allowing 25 dB higher OOBE for all fixed devices and by forbidding adjacent channel operation for those devices anywhere inside the increased protection distance. Alternately, it suggests creating two classes of fixed devices, with only those meeting the more stringent OOBE standards being allowed to operate on adjacent channels between the old and new prohibited distances outside protected contour boundaries. Either way, Motorola falsely maintains that properly assigning allowed channels as a function of location will not be a problem for either two classes of fixed devices or to maintain larger protection zones outside headend facilities. The proposed rule change will result in significant interference and degrade channel quality for the viewer.[18]

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[17] *Id.*

[18] While the proposed new adjacent-channel limit is a few dB tighter at the occupied channel band edge than the requirements for 802.16 devices, it is 20 dB more relaxed at the outer edge of the adjacent channel. The result is that total radiation in the adjacent channel could be as high as 6 dBm. This represents a significant amount of noise that will degrade channels that may be eligible for use by other WSDs, and thus limit their usable transmission range.

CONCLUSION

By seeking to drastically subvert or relax the Commission's technical parameters for "white spaces" devices, the petitioners completely disregard the rules designed to protect existing services from harmful interference. The Commission should deny the petitions for reconsideration.

Respectfully submitted,

/s/ Rick Chessen

Rick Chessen
Loretta P. Polk
National Cable & Telecommunications Association
25 Massachusetts Avenue, N.W. – Suite 100
Washington, D.C. 20001-1431
(202) 222-2445

William A. Check, Ph.D.
Senior Vice President, Science & Technology
Chief Technology Officer

Andy Scott
Vice President, Engineering
Science & Technology

February 24, 2011