

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

In the Matters 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 COMMENTS OF DELL INC., GOOGLE, INC.,  
THE HEWLETT-PACKARD CO., INTEL CORP., MICROSOFT  
CORP., AND PHILIPS ELECTRONICS NORTH AMERICA CORP.**

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## SUMMARY

As Dell, Google, Hewlett-Packard, Intel, Microsoft, and Philips (collectively the “Coalition”) said in their opening comments, the Commission can permit innovative uses of unoccupied television spectrum (the TV “white spaces”) while ensuring that incumbent licensees in these bands are protected from harmful interference. Indeed, the Coalition explained in great detail the technical rules the Commission could adopt that would permit robust unlicensed use of the white spaces while protecting incumbent licensees. The Coalition is now prepared physically to demonstrate that it is possible to permit such use of the white spaces while protecting incumbents. It has designed, built, and made arrangements to submit to the Commission a prototype device for testing. By contrast, opponents of white space use have submitted only conjecture and comments that make assumptions which do not reflect how real-world devices will operate.

The one subject on which the record reflects near universal agreement is the need for the Commission to conduct objective testing to evaluate how devices will operate in the white spaces. The Coalition enthusiastically supports rigorous testing by the Commission, and believes that this testing should be the touchstone of this proceeding. Indeed, the Coalition urges the Commission to give preference to those technical and operational proposals that are supported by devices that have been made available for the Commission to test.

In its opening comments, the Coalition urged the Commission to authorize personal/portable devices concurrently with fixed devices, to allow personal/portable devices to employ spectrum sensing technology to avoid causing harmful interference to incumbent licensees, and to ensure that such devices are authorized on an unlicensed

basis. This approach will maximize the benefits of the white spaces by enabling a range of innovative devices and services while protecting incumbents. Accordingly, the Coalition urges the Commission to take the following actions as it formulates the final rules governing operation in the white spaces:

First, the Commission's rules should accommodate the Coalition's proposed technical and operational parameters for a personal/portable spectrum sensing device. The Coalition encourages the Commission to test its prototype rigorously so that it can see for itself that these parameters will provide incumbents with the protection from harmful interference to which they are entitled.

Second, the Commission should authorize personal/portable devices at the same time it authorizes fixed devices, if not before. Those seeking to delay the introduction of personal/portable devices have claimed a need to learn more about how such devices will operate, but fixed device prototypes are not even available for the Commission to test.

Finally, the Commission should reaffirm its initial decision to allocate the TV white spaces on an unlicensed basis. The "Swiss cheese" nature of the white spaces makes them ill-suited to licensed allocation, and licensing them will increase substantially the risk that much of this spectrum will continue to lie fallow, to the detriment of the public. While licensed use of TV spectrum will be realized in the upcoming DTV auction, this proceeding represents the only opportunity to access this unique spectrum—with its excellent propagation characteristics—on an unlicensed basis.

In short, the Coalition urges the Commission to adopt rules that will allow flexible, widespread use of the white spaces, and to confirm through independent testing that the parameters proposed by the Coalition will provide incumbent licensees with the

protection to which they are entitled. By adopting the proposals set forth by the Coalition in this proceeding, the Commission can ensure that the public receives the maximum benefit from the TV white spaces.

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The core objective of this proceeding is to tap the nation’s unused television spectrum (the TV “white spaces”) to “benefit the public by allowing the development of new and innovative types of devices and services for businesses and consumers, without disrupting television and other authorized services.”<sup>1</sup> Dell, Google, Hewlett-Packard, Intel, Microsoft, and Philips (collectively the “Coalition”) are committed to realizing this vision, and to ensuring that this spectrum is available to provide a variety of affordable broadband services to millions of underserved Americans.

In its opening comments, the Coalition provided the Commission with a technical roadmap to reach these goals.<sup>2</sup> It has now backed up its words by building a prototype which and making arrangements to submit it to the Commission for testing. This device

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<sup>1</sup> *Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, First Report and Order and Further Notice of Proposed Rule Making, 21 FCC Rcd. 12266 (¶1) (2006) (“Further Notice” or “FNPRM”).

<sup>2</sup> *See generally* Comments of Dell, Inc., Google, Inc., the Hewlett-Packard Company, Intel Corp., Microsoft Corp., and Philips Electronics North America Corp. (“Coalition Comments”).

will confirm that incumbent licensees can be protected by unlicensed devices from harmful interference.

In contrast, some parties opposing flexible, widespread use of the white spaces have provided the Commission with nothing but misleading theoretical analysis and empirical studies. These comments share one salient feature: while paying lip service to the Commission's objective of ensuring access to new innovative devices and services, they have focused instead on creating new unnecessary benefits for incumbent licensees, needlessly inhibiting use of the white spaces. A balance between the wishes of incumbents and encouraging innovation is required if the public is to realize the substantial value of this spectrum.

Significantly, the one subject on which the record reflects near universal agreement is the need for the Commission to conduct objective testing to determine how much protection TV band devices must provide.<sup>3</sup> The Coalition enthusiastically supports these calls for rigorous, independent testing, which should be the touchstone of this proceeding. In particular, the Coalition urges the Commission to give preference to those technical and operational proposals supported by devices that have been made available for testing. In this regard, the Coalition notes that its personal/portable prototype device incorporating spectrum sensing technology is, quite literally, the only option on the table for the Commission to test.

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<sup>3</sup> See, e.g., Coalition Comments at 18; Comments of Qualcomm, Inc. at 3-4 ("Qualcomm Comments"); Comments of Shure, Inc. at 22-25 ("Shure Comments"); MSTV Comments at 24-26; Comments of the New America Foundation, et al. at 71-79 ("NAF Comments"); Comments of IEEE 802.18 (IEEE 802.18 Comments") at 20-21; Comments of the Consumer Electronics Association ("CEA Comments") at 5-6.

Finally, consistent with its original determination that the white space spectrum should be allocated on an unlicensed basis, the Commission should reject calls to license any portion of the white spaces. Unlicensed use of the white spaces will provide substantial benefits for businesses, public safety, and consumers, furthering innovation and enabling widespread affordable broadband access. While licensed use of TV spectrum will be realized in the upcoming DTV auction, this proceeding represents the only opportunity to access this unique spectrum—with its excellent propagation characteristics—on an unlicensed basis.

In short, by adopting the technical and operational parameters proposed by the Coalition, concurrently authorizing the use of personal/portable and fixed/access devices, and allocating white space spectrum on an unlicensed basis, the Commission can:

- Ensure technically and economically efficient utilization of unused beach front spectrum below 1 GHz.
- Encourage innovation.
- Provide economical broadband access and other services to public safety and first responders.
- Enable a number of alternatives for economical broadband access in rural and other underserved areas via organic, low power mesh networks not dependent on significant infrastructure investment.
- Make certain that TV spectrum can be accessed on an unlicensed basis (through the white spaces) as well as on licensed basis (through DTV auctions), allowing the public to realize the advantages of both regulatory models.

**I. THE COALITION’S PROPOSAL WILL ENABLE THE USE OF UNLICENSED LOW POWER DEVICES IN THE TV WHITE SPACES.**

In its opening comments, the Coalition urged the Commission not to mandate specific technologies that must be deployed in the white spaces, but rather to set protection criteria and then confirm that devices submitted for certification can meet this

level of protection.<sup>4</sup> Specifically, the Coalition recommended that the Commission permit the use of personal/portable devices, and allow these devices to use spectrum sensing rather than requiring less efficient or more cumbersome interference avoidance mechanisms.<sup>5</sup> By giving industry the flexibility to address interference in a number of ways rather than selecting a specific interference avoidance technology, the Commission can best achieve its goals of encouraging innovation and protecting incumbents.

Many of the objections raised by those opposing flexible use of the white spaces are based on unrealistic assumptions about how real-world devices, such as those proposed by the Coalition, will operate. For example, the results presented by MSTV assume that the white space device will always transmit at maximum power through a 6 dBi antenna (in other words, 400 mW Equivalent Isotropically Radiated Power (“EIRP”) for a personal/portable device).<sup>6</sup> However, the proposal presented by the Coalition employs transmission power control (“TPC”), which will introduce up to 25 dB of attenuation depending on the received DTV signal strength in the adjacent and near channels.<sup>7</sup> In addition, the device will use a 0 dBi antenna. Finally, the device will transmit at the lowest power necessary to achieve reliable communication. Therefore, to eliminate any possibility of interference, the output power of a Coalition device is capped at 100 mW EIRP, and can be as low as 1/3 of a milliwatt as appropriate—*approximately 1200 times less power than assumed by MSTV*. As this analysis demonstrates, the

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<sup>4</sup> Coalition Comments at 19.

<sup>5</sup> *Id.* at 3-9.

<sup>6</sup> *See, e.g.*, MSTV Comments Ex. B at 34, 39.

<sup>7</sup> *See* Section I.A., *infra*.

Commission should base its decision on an objective assessment of actual operating parameters rather than theoretical speculation designed specifically to suggest that white space use is infeasible.

The Coalition's proposal, in a reasoned and practical manner, addresses all the concerns and questions voiced by the Commission as well as all legitimate issues raised by commenters. In addition, it guarantees that affordable devices can be built and the spectrum can be efficiently shared. This proposal is the result of thousands of hours of theoretical and empirical analysis carried out by Coalition staff. The Coalition has invested the time and resources to build prototype devices. It has extensively tested and refined its designs. This intensive scientific approach led to the proposal the Coalition made in its comments and the further elaboration discussed below. It guarantees that incumbent licensees will be protected from harmful interference. Indeed, the Coalition is so certain of its analysis that it is the only participant in the docket who responded to the Commission's request for a prototype device to test. The Coalition is confident that the Commission's independent and expert testing of its prototype will confirm the wisdom of the Coalition's choice of operating parameters.

**A. Technical and Operational Parameters.**

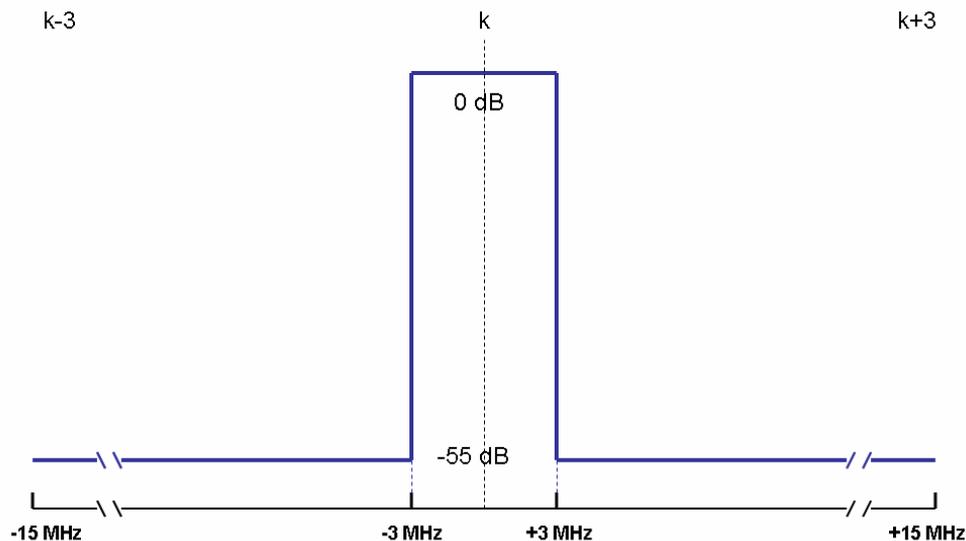
To eliminate any confusion and to facilitate the Coalition's rebuttal to comments filed in the docket objecting to portable unlicensed use of the TV white spaces, the method of operation of the proposed device is summarized below:

1. Maximum transmit power will be 100 milliwatts EIRP (or 20 dBm EIRP) reduced by Transmission Power Control ("TPC") as outlined below.
2. First, in all situations the device will transmit at the lowest power required for reliable communication.

3. Second, TPC will dynamically reduce the transmitter EIRP between 0 dB and 25 dB according to the example algorithm described below.
4. The transmit/receive antenna will be an omni-antenna with a maximum of 0 dBi gain.
5. The device will not operate in channels 2 through 20 and channel 37.
6. The device will employ a listen before talk algorithm.
7. Before operation, the device will scan all permitted channels (2 through 20 and 37 omitted) and will identify those channels with a received power below -114 dBm as vacant.
8. The device will transmit in an identified vacant channel for no more than 400 milliseconds, and will cease transmission on that channel for at least 100 microseconds so as not to monopolize the channel.
9. The device will re-scan every 60 seconds to re-determine channel vacancy.
10. To make certain that out-of-band interference limits are maintained, the device will transmit within the bounds of the transmission mask shown in Figure 1. This spectral mask (based on average power measurements in 500 kHz), combined with the rules described below, is designed to eliminate harmful interference and meet or exceed the ATSC standards.

**Figure 1**

### Spectral Mask



11. Before transmitting, the device will sense the power in the three channels above the one it wishes to transmit in and the three channels below it. It will then reduce its transmit power by employing a TPC factor as indicated by the algorithm below:
12. Assume that the unlicensed device has concluded that channel “k” is vacant and it wishes to transmit in that channel. Let  $X_{k+i}$  be the received average power at the unlicensed device in an occupied channel “i” channels away from the channel the device wishes to transmit in (*i.e.* channel k). As stated above, the device will measure the power in 3 channels above and below channel “k”. Therefore “i” will be +3, +2, +1, -1, -2, -3.
13. As long as the received DTV signal power at the unlicensed device is between -65 dBm and -90 dBm, the transmit power of the device is governed by Table 1. In the case where the received DTV power exceeds -65 dBm, the unlicensed device power is limited to a maximum of 20 dBm EIRP. When the received power is below -90 dBm for  $k= \pm 1, \pm 2$  and  $\pm 3$ , the unlicensed transmit power is fixed at -5 dBm.
14. In the case where more than one TV channel is occupied within  $\pm 3$  channels of the channel the unlicensed device wishes to utilize, it will transmit at the lowest EIRP derived from the rules above and Table 1 below.

**Table 1:** Allowable unlicensed device transmit power

Channel off-set “i”	Transmit Power Control (TPC) Factor $0\text{dB} \leq \text{TPC} \leq 25\text{dB}$	Allowed EIRP $20\text{dBm} \geq \text{EIRP} \geq -5\text{dBm}$
$\pm 1$	$20 - (X_{k\pm 1} + 85)$ dB	$X_{k\pm 1} + 85$ dBm
$\pm 2$	$20 - (X_{k\pm 2} + 85)$ dB	$X_{k\pm 2} + 85$ dBm
$\pm 3$	$20 - (X_{k\pm 3} + 85)$ dB	$X_{k\pm 3} + 85$ dBm

The Coalition notes that the approach taken above is more conservative—and thus provides more protection—than the requirements set forth in OET Bulletin 69.<sup>8</sup>

If in the future systems can be designed so that their spectral mask attenuates leakage into channels  $k= \pm 2$  and  $k= \pm 3$  in excess of the 55 dB shown in Figure 1 then the allowed power in Table 1 for  $k= \pm 2$  and  $k= \pm 3$  governing those systems should be

<sup>8</sup> See generally Longley-Rice Methodology for Evaluating TV Coverage and Interference, OET Bulletin No. 69 (Feb. 6, 2004), available at [http://www.fcc.gov/Bureaus/Engineering\\_Technology/Documents/bulletins/oet69/oet69.pdf](http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet69/oet69.pdf) (last visited Feb. 27, 2007).

allowed to increase dB for dB. For example, if a system can conform to a mask with an attenuation floor of 60 dB then the allowable power for that system for  $k = \pm 2$  and  $k = \pm 3$  should be  $X_{k \pm 2} + 90$  dBm,  $X_{k \pm 3} + 90$  dBm.

Illustrative examples in the use of the table and the rules above are instructive. Consider the case where only the adjacent channel is occupied and the received average power at the unlicensed device in that channel is -105 dBm. Since the received power is below -90 dBm, the unlicensed device will transmit at an average power of -5 dBm. On the other hand, if the received signal at the unlicensed device was -70 dBm, the table row for  $i$  equal to  $\pm 1$  yields an EIRP of 15 dBm. The device will transmit at an average power of 15 dBm or the minimum power required for reliable communication, whichever is less.

Now consider the case where the adjacent channel ( $i=1$ ) is occupied with a detected signal of -60 dBm and the next channel ( $i=2$ ) is occupied with a detected signal of -85 dBm. The detected power in the adjacent channel would permit an EIRP of 20 dBm, however, the transmitted power is limited by the lower power in channel  $i = 2$  (0 dBm EIRP) or the minimum power required for reliable communication, whichever is less.

**B. The Proposed Spectrum Sensing Approach Will Provide Broadcasters with the Protection to which they are Entitled.**

A number of comments in this proceeding have raised objections, both general and specific, to the widespread use of the white spaces. Many of these concerns assume higher power fixed operations, and simply do not apply to the low power operations the Coalition has proposed. While the Coalition will not address each of these objections individually, it would take this opportunity to address some of the larger concerns raised

by incumbent licensees. Moreover, the Coalition encourages the Commission to address any legitimate concerns raised in this proceeding by testing the prototype device.

1. *The proposed detection threshold is more than sufficient to guard against harmful co-channel interference.*

In its opening comments, the Coalition proposed that the Commission use the Threshold of Visibility (“TOV”) as a proxy for TV channel vacancy at the Grade B Contour.<sup>9</sup> Specifically, because DTV receivers require a signal level above TOV to reproduce a transmitted picture, it is reasonable to conclude that a channel is available for use at a particular time and geographic location by a personal/portable device if the signal level falls below TOV (approximately -84 dBm for DTV signals). As noted above, to ensure that incumbent licensees are protected, the Coalition proposed a detection threshold of -114 dBm, a full 30 dB below TOV for DTV signals.<sup>10</sup>

The broadcasters’ primary objection to the exclusive use of a signal detection threshold is that a TV signal could be weak, but nevertheless within the protected contour of a television station.<sup>11</sup> To be clear, however, location alone does not determine the scope of a licensee’s protection from harmful interference.<sup>12</sup> Rather, the touchstone of a claim of interference protection is whether that interference negatively impacts a signal that would otherwise produce a viewable picture.<sup>13</sup> On occasion in this proceeding,

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<sup>9</sup> Coalition Comments at 6.

<sup>10</sup> *Id.*

<sup>11</sup> MSTV Comments at 11.

<sup>12</sup> Harmful interference is defined as interference that “seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service.” 47 C.F.R. § 2.1.

<sup>13</sup> *See, e.g.*, Interference: Defining the Source, FCC Consumer Facts, available at <http://www.fcc.gov/cgb/consumerfacts/interference.html> (last visited Feb. 27, 2007) (noting that

broadcasters have attempted to assert interference “protection” where there is no television picture or consumer impact to protect.<sup>14</sup> This makes no sense.

MSTV also contends that harmful co-channel interference from unlicensed devices presents a potential interference problem for miles.<sup>15</sup> For example, in an exhibit, MSTV maintains that an unlicensed device must be kept sufficiently out of range so that its co-channel emissions will not increase the apparent receiver noise floor, and initially speculates that “to keep the free space interference field 20 dB below the desired DTV signal *would require a separation of 600 miles*” for a 4 watt device.<sup>16</sup> MSTV later concludes that a range of 15 miles is appropriate to protect against co-channel interference after accounting for obstacles on the horizon, but fails to take into account TPC.<sup>17</sup> As the Commission surely knows, the 600 mile figure is nonsensical even as a starting point. Megawatt full power TV stations operate on the same channel at much closer distances than six hundred miles, usually about 150 miles. To suggest that six hundred mile separation from a 4 watt device should be considered in any way only demonstrates the embarrassing lengths some will go to in an attempt to “protect” spectrum for which they do not have a license (*i.e.* the white spaces). Nothing could

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interference is, among other things, “any unwanted radio frequency signal that prevents you from watching television ...”).

<sup>14</sup> See, *e.g.*, MSTV Comments at 12 n.29. The signal levels within Grade B Contour cited by MSTV are at best -99 dBm at the receiver, and could not reproduce a picture even with the aid of an outdoor antenna.

<sup>15</sup> MSTV Comments at 12 n.29.

<sup>16</sup> *Id.* at Ex. A, page 8 (emphasis added).

<sup>17</sup> *Id.* at 9.

better demonstrate the need for an objective, independent Commission assessment of harmful interference risks.

MSTV also makes much of a prior Intel calculation suggesting that the interference range of personal/portable devices could be up to five miles.<sup>18</sup> As discussed previously, the Coalition has invested thousands of hours in research since the Intel filing, and learned much. That notwithstanding, the intent of Intel's submission was to adopt a series of conservative parameters. For example, Intel assumed a free space propagation model for its hypothetical personal/portable device, and also did not apply TPC in its calculations—which would reduce the transmitted power well below 100 mW in almost every case.<sup>19</sup> In any event, the Coalition has proposed 30 dB of protection beyond TOV, and also has proposed a dynamic range of 25 dB for TPC to be absolutely certain no harmful interference is caused. As with the other issues in this proceeding, the Commission's independent testing should be the final word on the subject.

2. *Personal/portable devices can successfully operate in adjacent channels.*

Comments opposing widespread use of the white spaces also have objected to the use of adjacent channels by unlicensed devices.<sup>20</sup> As a threshold matter, the Coalition notes that the IEEE 802.22 working group, which has been cited by those opposing adjacent channel uses, has confined itself to examining fixed devices and does not address the ability of personal/portable devices to access adjacent channels. Indeed, *the 4 watt EIRP devices discussed by IEEE 802.22 radiate at up to 40 times more power than*

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<sup>18</sup> See Comments of Intel Corp. (filed. Nov. 30, 2004) at App. A.

<sup>19</sup> See *id.* at 5-6.

<sup>20</sup> See, e.g. MSTV Comments at 16-21; IEEE 802.18 Comments at 8-9.

*the maximum output of personal/portable devices proposed by the Coalition*, which is reduced by TPC as discussed above. In addition, the IEEE submission contains no data or technical analysis whatsoever to support its claims, a somewhat unusual practice for this engineering body.

Though MSTV does submit data in an attempt to bolster its contention that *any* operation of a TV band device on a station's first adjacent channel will cause harmful interference,<sup>21</sup> this claim is equally unpersuasive. Most significantly, MSTV completely fails to take into account the use of TPC, which would dramatically reduce the device's radiated power and, consequently, the risk of interference. This omission is especially telling given that the *Further Notice* specifically inquired as to the use of TPC to enable adjacent channel operations.<sup>22</sup> If the substantially reduced power levels mandated by TPC posed a significant risk of adjacent channel interference, doubtless MSTV would have let the Commission know. MSTV's silence speaks volumes.

The Coalition also notes that MSTV has employed a free space propagation model in support of its arguments regarding adjacent channel interference.<sup>23</sup> To be sure, the initial *NPRM* did indicate that a free space model could be used for distances up to 1.5 kilometers, but this model is simply inappropriate for personal/portable devices. While a free space model is a very conservative worst case assumption for the ten-meter

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<sup>21</sup> MSTV Comments at 16.

<sup>22</sup> FNPRM ¶ 42.

<sup>23</sup> MSTV Comments at 16.

user terminal masts proposed by the IEEE,<sup>24</sup> it manifestly is not representative of the homes, offices, and campuses where personal/portable devices would be deployed.

Finally, MSTV has contended that its DTV receiver tests demonstrate the risk of interference on a number of adjacent and taboo channels.<sup>25</sup> MSTV notes that its tested receivers responded differently to various interference tests, and argues that, in evaluating different types of interference, the Commission should establish one set of criteria that will protect each of MSTV's tested receivers.<sup>26</sup> The unstated premise of this argument is that the Commission must protect the lowest common denominator for each type of interference tested, making white space use captive to the aggregated flaws of each receiver.

The Coalition strongly urges the Commission to reject this proposal. Varying interference rejection in a number of receivers should not impose a burden on unlicensed device operation—particularly if the receivers cannot even meet the ATSC receiver specifications. Nor should the Commission accept at face value MSTV's claims about interference from multiple devices, which the Coalition has accounted for in its mask and TPC rules. If the Commission sets unnecessary and overly restrictive standards, it will remove all incentive for manufacturers to design receivers enabling efficient spectrum use.

Any evaluation done by the Commission should ensure that TV receivers, at minimum, observe the ATSC receiver specifications. Failing that, the Coalition urges the

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<sup>24</sup> IEEE 802.18 Comments at 11.

<sup>25</sup> MSTV Comments at 17-21.

<sup>26</sup> *Id.* at 18.

Commission to establish its own reasonable standards of protection. An unduly restrictive standard will simply make it uneconomic for manufacturers to build and market devices. As a result, the American public will lose, and the only winners will be those who wish to make poor quality receivers—which face a substantially greater risk of interference from adjacent DTV transmissions than from the personal/portable devices proposed by the Coalition. In short, protecting consumers and promoting spectral efficiency are not only a matter of regulating unlicensed devices, but also of ensuring that receivers have decent affordable performance, at least to the ATSC receiver specifications.

3. *Low power television stations.*

Finally, a number of Class A, TV translator, and other low power stations have filed comments in this proceeding expressing concerns about interference protection and proposing various restrictions.<sup>27</sup> As with full-power DTV signals, the algorithm proposed by the Coalition will provide these stations (both analog and digital) with the interference protection to which they are entitled. In this regard, the Coalition notes that some comments would have the Commission use this proceeding to extend the scope of their licenses, as they have assumed (if not specifically requested) protection at their Grade B Contour or beyond notwithstanding that low power licensees are protected only at their Grade A contours.<sup>28</sup> None of the proposals that low power TV licensees have set

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<sup>27</sup> See, e.g. Comments of Community Broadcasters' Association ("CBA Comments"); Comments of Entravision Holdings, LLC ("Entravision Comments"); Comments of Sevier Valley Communications ("SVC Comments"); Comments of the National Translator Association; Comments of the Region 1 Translator Association.

<sup>28</sup> See 47 C.F.R. 74.707(a); see also CBA Comments at 2-3; Entravision Comments at 5; SVC Comments at 1.

forth in this proceeding need to be adopted as long as they receive the protection to which they are entitled, and the Coalition is confident that the Commission will confirm that Coalition's prototype is more than equal to this task.

**C. Testing.**

Throughout this proceeding, the Coalition has supported the Commission's commitment to perform objective testing to determine the appropriate parameters under which devices could operate in the TV white spaces. Indeed, given the amount of less than realistic information placed in the record to date, objective verification of many of the parties' competing claims will be essential. The Coalition urges the Commission to give preference to those technical and operational proposals supported by devices that have been made available for testing.

The Coalition has every confidence that the Commission will design and implement a series of objective tests that will confirm that incumbent licensees are protected and will reject attempts by parties to tip the scales under the guise of recommended test suites. However, the Coalition is compelled to comment on the request by MSTV to make prototypes available for inspection "by the public" – in other words by MSTV.<sup>29</sup> This request should be rejected out of hand. The Coalition already has invested a substantial amount of time and money on its TV band device program, and its prototype contains confidential information that could place the Coalition's members at a competitive disadvantage if released prematurely. MSTV does not offer a rationale for inspection of the device. The Coalition trusts the Commission to conduct fair and

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<sup>29</sup> MSTV Comments at 7-8.

impartial testing of submitted devices. Indeed, the primary advantage to Commission testing is to confirm how the device performs under *objective* testing.

**II. PERSONAL/PORTABLE DEVICES SHOULD BE AUTHORIZED AT THE SAME TIME AS FIXED DEVICES, IF NOT BEFORE.**

In its opening comments, the Coalition urged the Commission not to delay the introduction of personal/portable devices, but instead to authorize such devices at the same time that it authorizes fixed devices.<sup>30</sup> Those opposing the use of personal/portable devices maintain that insufficient information is available for personal/portable devices as compared with fixed devices.<sup>31</sup> In fact, the very opposite is true. While the Coalition has submitted a personal/portable device prototype for the Commission to test, no group has submitted a prototype of a fixed device. Thus, the only information available on fixed devices consists of theoretical analyses based on hypothetical models. This information pales beside the concrete data the Commission can obtain by testing an actual device.

IEEE 802.18 and MSTV suggest that because IEEE 802 has not developed standards for personal/portable devices, the FCC should not yet authorize such devices, but rather should initiate another proceeding to examine personal/portable devices.<sup>32</sup> IEEE 802's failure to promulgate standards in a timely manner cannot be allowed to dictate spectrum policy—the Commission's role is to establish protection standards, not to mandate particular implementation approaches. The Commission sought information about personal/portable devices in the initial NPRM at the same time that it proposed the

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<sup>30</sup> Coalition Comments at 20.

<sup>31</sup> *See, e.g.*, MSTV Comments at 6.

<sup>32</sup> *See* IEEE 802.18 Comments at 3-4; MSTV Comments at 34.

use of fixed devices.<sup>33</sup> Because the IEEE made the deliberate choice to address only the latter, it should not be heard on the former. More fundamentally, established standards are not and should not be a prerequisite for Commission authorization. In fact, spectrum allocation often precedes standardization, as in the cases of Wi-Fi, Bluetooth, Ultra-wideband and myriad other innovative services. Spectrum allocation is a task for government, not for private parties working to develop technology standards which may—or may not—advance the *public* interest.

Equally unavailing is MSTV’s suggestion that the Commission and industry must “gain experience” with fixed devices before personal/portable devices are authorized.<sup>34</sup> Such an argument is a non-sequitur: fixed devices do not operate under the same parameters, nor function in the same way, as personal/portable devices. Experience with fixed devices will add only to the knowledge of fixed devices. In fact, with the operating parameters chosen by the Coalition, personal/portable devices pose less risk than fixed devices. The Commission will be able to obtain sufficient information to authorize personal/portable devices, and should do so at the same time as fixed devices, if not before.

Finally, in light of MSTV’s insistence that TV band devices not be authorized for sale “*at least* until February 2009,”<sup>35</sup> the Coalition again urges the Commission to

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<sup>33</sup> See *Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Notice of Proposed Rule Making, 19 FCC Rcd. 10018, 10026-29 (¶¶ 18-19, 21-24) (2004) (“NPRM”).

<sup>34</sup> MSTV Comments at 6.

<sup>35</sup> *Id.* at 5-6.

maintain its commitment to allow the sale of such devices as of February 17, 2009.<sup>36</sup> As the Coalition previously has explained, it has solid roadmaps for delivery of unlicensed devices in the TV band in the near term.<sup>37</sup> Delaying this deadline will drive resources away from this development, vastly decreasing the chances that innovative TV band services and devices will be developed.

In short, opponents of personal/portable devices have not demonstrated any reason why the Commission should decline to authorize personal/portable devices or undertake yet another rulemaking to consider whether to authorize personal/portable devices. Nor have they demonstrated why personal/portable devices should be authorized later than fixed devices. The Commission should act as soon as possible this year to authorize the sale of unlicensed TV band devices—including personal/portable devices—by no later than February 17, 2009.

### **III. UNLICENSED USE OF THE WHITE SPACES WILL PROVIDE THE GREATEST BENEFIT TO THE PUBLIC.**

As several parties have observed, this proceeding began with the recognition that the “significant growth of and consumer demand for unlicensed wireless broadband applications” supported opening up the white spaces for unlicensed use.<sup>38</sup> While a handful of commenters continue to push for licensed allocation, most of these arguments already have been effectively refuted.<sup>39</sup> Members of the Coalition and others have explained that, while unlicensed use will yield substantial benefits, licensed services are

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<sup>36</sup> FNPRM ¶ 16.

<sup>37</sup> Coalition Comments at 20.

<sup>38</sup> NPRM ¶ 7.

<sup>39</sup> *See, e.g.*, Coalition Comments at 21-28; NAF Comments at 9-62.

not likely to be deployed extensively, and will not provide greater protection to incumbents.<sup>40</sup> Accordingly, the Coalition will focus in its reply on a subset of arguments offered in response to the *Further Notice*.

At the outset, the Coalition notes that a certain inconsistency characterizes the advocacy of those favoring licensed use. On the one hand, these comments suggest that extensive use of the white spaces is unworkable.<sup>41</sup> Yet these same advocates nevertheless insist that the white spaces will create so much value their auction will be extremely lucrative, perhaps to the tune of *billions* of dollars.<sup>42</sup>

One party has attempted to resolve this inconsistency (at least in part) by proposing that white space licensees be allowed to pay incumbents to accept interference.<sup>43</sup> This proposal may disenfranchise some TV viewers who would otherwise receive acceptable TV pictures today. It may also cause the broadcasters to violate the public trust the Commission has bestowed on them, and to reap inappropriate profit from the free spectrum they have been given. This proposal is even at odds with the broadcasters' insistence throughout this proceeding that the "public's free over-the-air television service" is sacrosanct even at the outer limits of the contour where a television signal cannot be decoded.<sup>44</sup> Putting aside these inconsistencies and inappropriate

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<sup>40</sup> *Id.*

<sup>41</sup> *See, e.g.*, MSTV Comments at 5-24; Qualcomm Comments at 3-4 (noting that it is "highly skeptical" that personal/portable devices will be able to employ spectrum sensing to avoid causing harmful interference).

<sup>42</sup> *See, e.g.*, Qualcomm Comments at 3-4, MSTV Comments at 38. *See also* Comments of Charles L. Jackson and Dorothy Robyn ("Jackson/Robyn Comments") at 58.

<sup>43</sup> *See generally* Jackson/Robyn Comments.

<sup>44</sup> *See, e.g.*, MSTV Comments at 12 n. 29.

consequences, the arguments advanced by licensed advocates in response to the *Further Notice* fail for two even more fundamental reasons.

**A. Licensed Allocation of the White Spaces Will Not Lead to More Efficient Spectrum Use.**

Comments filed by Charles Jackson and Dorothy Robyn and funded by Qualcomm make the most extensive case in the record for licensed use of the white spaces.<sup>45</sup> Jackson and Robyn’s argument is based largely on the work of economist Ronald Coase, who has posited that, absent transaction costs, any well defined allocation of property rights will lead to an efficient outcome.<sup>46</sup> Specifically, under the Coase theorem, clear property rights will allow private parties to bargain to internalize negative externalities (in this case harmful interference).<sup>47</sup> In other words, while Jackson and Robyn concede that the “Swiss cheese” nature and other characteristics of the white spaces decrease the usefulness of this spectrum, they maintain that “the white space is ‘junky’ in good part because broadcasters have no incentive or ability to sell or lease unneeded bandwidth.”<sup>48</sup>

The majority of Jackson and Robyn’s proposal need not be addressed in detail for the fundamental reason that its underlying premise—that broadcasters should be entitled to sell portions of the TV channel spectrum the Commission has assigned them—is well

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<sup>45</sup> See generally Jackson/Robyn Comments.

<sup>46</sup> See generally Ronald H. Coase, *The Problem of Social Cost*, 3 J. LAW & ECON. 1 (1960).

<sup>47</sup> Jackson/Robyn Comments at 3-4 (citing Ronald H. Coase, *The Federal Communications Commission*, 2 J. LAW & ECON. 1 (1959)).

<sup>48</sup> Jackson/Robyn Comments at 24.

beyond the scope of this proceeding.<sup>49</sup> The *Further Notice* sought public comment only as to whether the white spaces should be allocated on an unlicensed or licensed basis; it certainly did not ask whether the longstanding licensing regime for TV broadcasters themselves should be revised. While the Commission can consider altering the scope of broadcasters' licenses, it must do so within the framework of the notice and comment requirements of the Administrative Procedure Act,<sup>50</sup> necessitating a further *NPRM* and order in addition to the final order the Commission is scheduled to issue this autumn.<sup>51</sup>

However, the Commission need not take this step, as the extremely low transaction costs required for successful Coasian bargaining are highly unlikely to occur. One alternative proposed by Jackson and Robyn is to establish one nationwide license for the white spaces,<sup>52</sup> but this proposal is flatly inconsistent with virtually every other terrestrial wireless auction to date, and would surely not happen here.<sup>53</sup> It is far more realistic to assume that the white spaces would be auctioned off in much smaller

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<sup>49</sup> It would also be an egregious abuse of the public trust and a violation of the rules under which broadcasters have been given licensed spectrum for free. In fact, the Commission specifically declined to address this issue in the Secondary Markets NPRM, noting that it was not inquiring as to whether the Commission "should revise any of its policies and rules within the mass media services to facilitate more robust secondary markets in the broadcast field. We make this decision because of the unique obligations placed on broadcasters and the public interest considerations applicable in this context." *Promoting Efficient Use of Spectrum*, Notice of Proposed Rulemaking, 15 FCC Rcd. 24203, 24227 (¶ 69) (Nov. 27, 2000).

<sup>50</sup> See 5 U.S.C. § 553.

<sup>51</sup> See *Office of Engineering and Technology Announces Projected Schedule for Proceeding on Unlicensed Operation in the TV Broadcast Bands*, Public Notice, 21 FCC Rcd. 10124 (Sept. 11, 2006).

<sup>52</sup> Jackson/Robyn Comments at 42.

<sup>53</sup> See, e.g., Pierre de Vries, *Populating the Vacant Channels: The Case for Allocating Unused Spectrum in the Digital TV Bands to Unlicensed Use for Broadband and Wireless Innovation*, New America Foundation Working Paper #14 at 15 (Aug. 2006), available at <http://www.newamerica.net/files/WorkingPaper14.DTVWhiteSpace.deVries.pdf> (last visited Feb. 28, 2007).

geographic regions, greatly increasing both the number of negotiations that must take place with each broadcaster, as well as the number of potential negotiators. Moreover, irrespective of whether one or several licenses are auctioned, the winner would have to negotiate with numerous high and low power TV station owners, wireless microphone operators, TV translator operators, and potentially Mexico and Canada. Under any scenario, transaction costs are likely to be astronomical, to say nothing of the high likelihood that hold-outs will occur.<sup>54</sup>

Perhaps recognizing the substantive and procedural defects in their Coasian bargaining argument, Jackson and Robyn also maintain that the white spaces could still be licensed absent bargaining, as licensees could operate under the default restrictions that otherwise would be imposed on unlicensed use.<sup>55</sup> This is true enough, but such a proposal would run afoul of the many concerns the Commission raised in the *Further Notice* about allocating white spaces spectrum on a licensed basis.<sup>56</sup> In fact, absent the ability to bribe incumbents to accept interference and injure their customers, the only efficiency arguments licensed advocates have mustered are that protection criteria may be less rigorous under a licensed regime and that the “certainty” of a white spaces license would compel more infrastructure investment.<sup>57</sup> Each of these arguments fails.

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<sup>54</sup> As the Commission has recognized, “[h]oldouts may be a sign of a market imperfection or failure that might impede the proper functioning of the market.” *Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules; Carriage of the Transmissions of Digital Television Broadcast Stations; Review of the Commission’s Rules and Policies Affecting the Conversion to Digital Television*, Third Report and Order, 16 FCC Rcd. 2703, 2727 (¶ 55) (2001).

<sup>55</sup> Jackson/Robyn Comments at 52.

<sup>56</sup> FNPRM ¶¶ 28-29, 31.

<sup>57</sup> Qualcomm Comments at 5, Jackson/Robyn Comments at 26.

First, licensed advocates have offered no reason to believe that “the FCC would be likely to impose ... less protective interference standards for licensed white-space operations.”<sup>58</sup> Certainly, the Commission has not proposed different operating parameters for licensed and unlicensed use. Because devices will follow the same laws of physics irrespective of whether they are licensed, a licensing regime does not decrease the risk of harmful interference.<sup>59</sup> There is no justification for watering down the harmful interference protection criteria the Commission will set, because if the Commission does so there is substantial risk that harmful interference to over the air broadcasters will occur. Indeed, if the Commission’s rules were to be relaxed for licensed use, licensees would transmit at higher power, increasing the likelihood of interference relative to unlicensed use.

With respect to infrastructure investment, many of the uses for which the TV white spaces are uniquely suited, such as neighborhood and municipal mesh networks, require little to no infrastructure investment. Moreover, the substantial number of WISPS operating in existing unlicensed spectrum demonstrates that licenses are not a prerequisite to deploying infrastructure when it is required. This history of investment in the unlicensed spectrum refutes the speculation that a licensed regime will lead to greater investment.

Most importantly, the uncertain nature of rights allocated under a white space license would negate whatever unique investment incentive a license would otherwise provide. Indeed, even advocates of licensed have conceded that “White Space licensees

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<sup>58</sup> Jackson/Robyn Comments at 47.

<sup>59</sup> See Coalition Comments at 25-28.

could lose their ability to operate on some or all of the spectrum.”<sup>60</sup> While these advocates contend that “the best way to take account of that risk is to let the market decide,”<sup>61</sup> they neglect to explain what happens when the market decides that a license is too “junky” to provide a return on investment. In these cases, the spectrum will lie fallow when it could be tapped for myriad unlicensed uses, and the public will suffer.

Because the white spaces are power-restricted, have a lower status than incumbent operations (including wireless microphones), and are subject to substantial variation based on time and geography,<sup>62</sup> the white spaces would be by far the most restricted wireless broadband spectrum ever auctioned and licensed. The Commission was correct when it suggested that unlicensed uses may be “better able to dynamically adapt to a shifting spectrum environment characterized by low power operation,”<sup>63</sup> and it should reaffirm its initial decision to allocate the white spaces on an unlicensed basis.

**B. Advocates of Licensing Dramatically Understate the Value of the White Spaces for Unlicensed Use.**

Notwithstanding the Commission’s recognition of the growing consumer demand for unlicensed wireless spectrum<sup>64</sup> and the specific proposals of a number of comments for unlicensed use,<sup>65</sup> advocates of licensed use continue to maintain that there is “no

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<sup>60</sup> Qualcomm Comments at 6.

<sup>61</sup> *Id.*

<sup>62</sup> FNPRM ¶¶ 27-29.

<sup>63</sup> *Id.* ¶ 29.

<sup>64</sup> NPRM ¶ 7.

<sup>65</sup> *See, e.g.*, Coalition Comments at 21-28; IEEE 802.18 Comments at 5; Comments of Motorola, Inc. at 7,11; CEA Comments at 2; Comments of the Computing Technology Industry Association at 3-4; *see also generally* NAF Comments.

documented need for additional unlicensed spectrum.”<sup>66</sup> This is simply not the case: of the “beachfront” spectrum below 2 GHz, only 26 MHz is available for unlicensed broadband use, as opposed to 1,974 MHz for federal or licensed use. Indeed, there is absolutely no unlicensed spectrum available for wireless broadband in the spectrum below 900 MHz—one of the core inquiries in this proceeding.

Licensed advocates by and large have acknowledged the inherent desirability of TV spectrum due to its superior propagation characteristics, but nevertheless suggest that unlicensed users may actually be better off with the spectrum allocations at 2.4 and 5 GHz<sup>67</sup> with their inferior propagation characteristics. This argument presupposes that future unlicensed use would merely mimic existing unlicensed deployments, but this will not be the case. For example, in addition to short range applications such as media distribution (which will be far more robust than they are at 2.4 or 5 GHz), the Coalition envisions a number of “medium range” applications based on neighborhood self-organizing mesh networks.<sup>68</sup> These types of applications simply are not possible at the existing higher frequencies allocated to unlicensed devices.

Significantly, the Commission has recognized that the white spaces are capable of providing not only cheaper and more widely available broadband, but also a host of “new and innovative types of devices and services for businesses and consumers.”<sup>69</sup> The response of licensed advocates is telling. For example, Jackson and Robyn concede that

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<sup>66</sup> See, e.g., Qualcomm Comments at 6.

<sup>67</sup> See, e.g., MSTV Comments at 38-39; Qualcomm Comments at 4,6; Jackson/Robyn Comments at 27.

<sup>68</sup> Coalition Comments at 24.

<sup>69</sup> FNPRM ¶ 1.

“unlicensed use of the 2.4 GHz band has spawned WiFi and other major innovations,” but at the same time reject the notion that “additional unlicensed spectrum will create significant *new* opportunities for innovation, given the large supply that already exists.”<sup>70</sup> But they have no satisfactory explanation of why unlicensed innovation is suddenly going to cease. Of course, as of today the supply of spectrum with the superior propagation characteristics of the TV band available for unlicensed broadband use is not large—it is zero. The upcoming DTV auctions guarantee that much of this desirable spectrum will be made available on a licensed basis. The Commission should reaffirm its initial decision to allocate the white spaces on an unlicensed basis, thus ensuring that the unique properties of TV band spectrum are available for both licensed and unlicensed use.

Finally, it bears repeating that only an unlicensed allocation will ensure that available white spaces spectrum can be accessed throughout the country. While licensed advocates may maintain that the market should decide whether the white spaces should be used, there are numerous instances where uncertainty, high costs, and bleak prospects for return on investment have limited the attractiveness of for-profit deployments in spectrum with similar restrictions.<sup>71</sup> In contrast, as the success of the 2.4 GHz band demonstrates, seemingly restrictive and unattractive spectrum can be used to benefit the public in a number of ways. Entities may seek to deploy broadband services as a public good using unlicensed spectrum and technologies such as self organizing mesh networks. Thus, any valuation of white spaces must take into account the numerous benefits to be derived from allowing the public direct access to this spectrum. In short, the Commission

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<sup>70</sup> Jackson/Robyn Comments at 33.

<sup>71</sup> NAF Comments at 30-35.

should continue with its initial plan to allocate the white spaces for unlicensed use. This decision, coupled with the upcoming DTV auctions, will ensure that TV band spectrum is available for both licensed and unlicensed applications.

**C. The Commission Should Not Introduce a New Enforcement Regime for Unlicensed Devices.**

Broadcasters also have called for a new enforcement regime to police unlicensed devices operating in the TV bands.<sup>72</sup> However, as the Coalition previously has discussed, their primary justification for doing so—that devices could operate in a manner inconsistent with the Commission’s rules—applies with equal force to licensed devices.<sup>73</sup> Indeed, two of the primary examples MSTV cites to demonstrate the risks of harmful interference (Nextel operations in the 800 MHz band and satellite radios) involved licensed rather than unlicensed operations.<sup>74</sup>

MSTV notes that websites sell devices that could be used to modify Wi-Fi devices to make them non-conforming,<sup>75</sup> but users also operate illegally in licensed spectrum bands. Indeed, as the Commission is aware, there are of countless abuses of licensed spectrum, including websites and vendors in large cities selling illegal cell phone jammers, individuals modifying cell phones to transmit at illegally excessive power, users illegally operating wireless microphones in the TV bands, ham radio operators transmitting on unauthorized frequencies and at illegal power levels, and marine radio licensees operating illegally.

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<sup>72</sup> MSTV Comments at 31-32.

<sup>73</sup> Coalition Comments at 25-26.

<sup>74</sup> MSTV Comments at 7, 29.

<sup>75</sup> *Id.* at 30-31.

The Commission already has substantial tools at its disposal—including equipment authorization, fines, and prohibition of imports—to deal with the unlikely scenario of widespread non-conforming use by unlicensed TV band devices.<sup>76</sup> Thus, there is certainly no reason to give serious consideration to MSTV’s two-sentence insistence that the Commission require unlicensed devices to respond to “kill signals” sent via the Internet.<sup>77</sup> Such a requirement would be an open invitation to hackers, who could use such signals to cause massive malicious denial of service attacks, and unnecessarily restrict the use of devices by requiring them to maintain a connection to an ISP to operate. Further, as MSTV concedes (and perhaps intends) evaluating this proposal also would introduce additional delay in this proceeding.<sup>78</sup> Calls for a new enforcement regime must be based on more than MSTV’s speculation that the Commission will be unwilling or unable to enforce its rules.

#### **IV. OTHER ISSUES.**

##### **A. Wireless Microphones.**

As the Coalition explained in its opening comments, it is confident that Commission testing will confirm that the Coalition’s proposed detection threshold of -114 dBm will provide wireless microphone licensees with the interference protection to which they are entitled.<sup>79</sup> However, wireless microphone advocates have now submitted a new request, asking the Commission to set aside a number of vacant TV channels for

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<sup>76</sup> Coalition Comments at 26.

<sup>77</sup> MSTV Comments at 32.

<sup>78</sup> *Id.* (“Successful development of such a technological enforcement regime ... requires further study and development.”).

<sup>79</sup> Coalition Comments at 29-30.

their exclusive use.<sup>80</sup> While the Coalition believes that such a proposal is not necessary to protect wireless microphone use, it is not opposed to reserving channels for wireless microphone use, provided that those channels are between channels 2-20.

Wireless microphone advocates have also proposed a beacon system to create a “bubble” around areas where wireless microphones are transmitting.<sup>81</sup> Such a “bubble” will not provide any additional benefits for wireless microphone users, whom the Coalition’s proposed detection threshold will protect fully (and who may also have excess protection through the reservation of channels 2-20). Instead, these beacons would prevent the public from receiving the maximum benefits from unlicensed devices by unnecessarily preempting use of the white spaces over wide geographic areas and long periods of time.

In addition, the record in this proceeding demonstrates that many—if not most—wireless microphone users in the TV band operate illegally.<sup>82</sup> Just as sales of wireless microphones have not been restricted only to licensed users, sales of beacons would surely spread to these same scofflaws, who would then create “bubbles” around their unauthorized wireless microphone transmissions. Even implicitly allowing illegal devices to use beacons to block out spectrum around their transmissions would prioritize illegal use over authorized use of the white spaces. The Commission need not—and should not—protect unlawful users, as doing so would be *de facto* ratification of the

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<sup>80</sup> See Comments of Shure, Inc., at 12-13.

<sup>81</sup> See *id.* at 16-19; IEEE 802.18 Comments at 10.

<sup>82</sup> See 47 CFR § 74.832 (limiting licenses for low power auxiliary stations to broadcasters and media producers). Other commenters have presented evidence about this issue previously. See Technical Comments of New America Foundation, at 19-20 (Jan. 31, 2007); Reply Comments of Intel, Inc. at 25, n. 95 (Jan. 31, 2005).

illegality and invite others to flout the Commission's rules. It would make more sense simply to end the licensed status of wireless microphones and make them unlicensed devices.

**B. Public Safety Operation on Channels 14-20.**

The Coalition shares the Commission's concern about protecting public safety operations on channels 14-20,<sup>83</sup> and for this reason did not advocate that personal/portable devices be allowed on these channels in its opening comments. However, the Coalition is pleased to learn that Motorola advocates the use of personal/portable devices for public safety and first responders in channels 14-20.<sup>84</sup> Allowing public safety agencies to supplement their existing operations with unlicensed personal/portable devices not only will provide back up protection for existing uses, but will allow public safety agencies to obtain the benefits the general public will receive from unlicensed devices.<sup>85</sup> The Coalition disagrees with Motorola that spectrum sensing is unproven, and (as stated previously) is confident that the Commission will so find.

The Coalition notes that consumer personal/portable devices can easily be modified by the manufacturer to accommodate public safety operations on channels 14-20. Thus, by allocating the use of channels 21-51 for unlicensed personal/portable use by the public, the Commission can ensure that prices for counterpart public safety devices will decrease dramatically, providing both the general public and public safety users with affordable access to the benefits that these devices will provide.

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<sup>83</sup> FNPRM ¶¶ 21, 56.

<sup>84</sup> See Comments of Motorola, Inc. at 9-13.

<sup>85</sup> See Coalition Comments at 23-24 (discussing the many benefits of TV band devices).

### C. Interference to Cable Systems.

Although the Coalition's analysis suggests otherwise, the cable industry continues to maintain that unlicensed TV band devices represent a significant potential source of interference to cable operations.<sup>86</sup> While the Coalition disagrees with the majority of NCTA's assertions, it does not specifically oppose NCTA's recommendation that personal/portable devices not operate on channels 2-4.<sup>87</sup> Indeed, the Coalition does not oppose restricting personal/portable devices from all VHF channels, which appears to be the source of many of NCTA's concerns regarding direct pickup interference.<sup>88</sup>

However, the Commission should reject outright the other measures proposed by the NCTA, including capping transmit power for personal/portable devices at 10-20 mW, and requiring coordination with cable headends operating outside the Grade B Contour.<sup>89</sup> As a threshold matter, cable headend antennas are usually mounted far off the ground and out of the way of populated areas, and typically are highly directional. These factors make off-axis interference generated by a low power personal/portable device highly unlikely. More fundamentally, by setting up headends beyond the Grade B Contour, cable companies have accepted the risk of relying on transmissions that are not protected from harmful interference. Arguments that the Commission should not take into account "whether the broadcast signal received is inside or outside of a defined contour"<sup>90</sup> do not

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<sup>86</sup> *See generally* Comments of the National Cable and Telecommunications Association ("NCTA Comments").

<sup>87</sup> NCTA Comments at 5.

<sup>88</sup> *Id.*

<sup>89</sup> *Id.*

<sup>90</sup> *Id.* at 17.

help determine how best to enable use of the white spaces, but merely seek to expand impermissibly the rights of broadcasters beyond the scope of their licenses.

The NCTA implies that the restrictions it has proposed are necessary to allow cable companies to meet their “must carry” obligations under Part 76 of the Commission’s rules,<sup>91</sup> but this is simply not so. If a broadcaster wishes to invoke its must carry rights, it has the obligation to provide a “good quality” signal (which the Commission has determined to be -61 dBm or better for digital signals) at the cable system’s principal headend.<sup>92</sup> Indeed, cable companies routinely refuse to carry broadcasters’ signals based on their failure to provide a good quality signal to their principal headends.<sup>93</sup> As the NCTA concedes, signals are often delivered terrestrially rather than over-the-air,<sup>94</sup> and there is no reason that broadcasters cannot do so if they cannot deliver a -61 dBm signal to areas where they are not entitled to interference protection.

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<sup>91</sup> *Id.* at 17, 19.

<sup>92</sup> *In re Carriage of Digital Television Broadcast Signals Amendments to Part 76 of Commission's Rules*, First Report and Order and Further Notice of Proposed Rule Making, 16 FCC Rcd. 2598, (¶¶ 44-46) (rel. Jan. 23, 2001). *See also* 47 U.S.C. § 535(g)(4) (station required to deliver good quality signal as defined by Commission); 47 C.F.R. § 76.55(c)(3) (cable system not required to carry UHF station unless station provides good quality over the air signal or pays costs of delivering good signal); Daniel L. Brenner et al. *Cable Television and other Nonbroadcast Video: Law and Policy* § 6:79.

<sup>93</sup> *See, e.g., LeSEA Broadcasting Corp. v. Cox Communications Kansas, LLC*, Order on Reconsideration, 19 FCC Rcd. 6218 (2004); *Paxson Salt Lake City License, Inc. v. Sonic Cable Television*, Order on Reconsideration, 15 FCC Rcd. 7361, 7365 (2000); *Washburn University Topeka v. Kansas City Cable Partners*, Memorandum Opinion and Order, 14 FCC Rcd. 9323 (1999); *Paxson Salt Lake City License, Inc. v. Sonic Cable Television*, Memorandum Opinion and Order, 13 FCC Rcd. 9434 (1998).

<sup>94</sup> NCTA Comments at 15-16.

#### **D. Wireless Medical Telemetry Services.**

Finally, two parties have expressed concern about harmful interference to devices in the Wireless Medical Telemetry Service (“WMTS”).<sup>95</sup> While 8 MHz of this spectrum is allocated at 1.4 GHz, the Commission also has allocated 6 MHz to this service at 608-614 MHz, which corresponds to TV channel 37. The Commission has proposed that TV band devices not operate on this channel, and the Coalition agrees that this is a sensible restriction. Accordingly, the Coalition is has no objection to programming devices to avoid this channel.

However, the Coalition does not believe that the myriad other restrictions proposed by GE Healthcare and the American Society for Healthcare Engineering (“ASHE”)<sup>96</sup> will be required to authorize the use of the low power devices that the Coalition has contemplated. Assuming that the Commission restricts devices from operating in channel 37, it will have completely eliminated the risk of co-channel interference. Moreover, given the extremely close proximity between the transmit and receive antennas of these devices, there is also very little chance that a 100 mW personal/portable operating in channels 36 or 38 would cause interference to the WMTS device even if the personal/portable device were being used by the patient. Finally, the device proposed by the coalition always will use TPC to transmit at the minimum

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<sup>95</sup> *See generally* Comments of GE Healthcare (“GE Healthcare Comments”); Comments of the American Society for Healthcare Engineering of the American Hospital Association (“ASHE Comments”).

<sup>96</sup> For example, these comments have proposed a requirement that personal/portable devices employ geolocation technologies, that they restrict operation on certain vacant channels, and that operators notify health care facilities prior to commencing operations. *See* GE Healthcare Comments at 3-5, 8-10; ASHE Comments at 5-6.

required power for reliable communication, reducing the likelihood of adjacent channel interference even further.

ASHE and GE Healthcare also have raised the issue of legacy Part 15 medical telemetry devices, which were authorized to operate in most of the TV spectrum without protection from harmful interference.<sup>97</sup> Of course, the vulnerable status of these older devices is the very reason why the Commission created a safe harbor for medical telemetry several years ago, allocating 14 MHz (including 8 MHz outside the TV band entirely) where operators could relocate and receive protection. Nevertheless, some health care providers have continued to deploy unprotected Part 15 devices because WMTS devices are not compatible with their old hardware.<sup>98</sup> Indeed, GE Healthcare continues to sell devices that operate in unprotected spectrum notwithstanding that the Commission first announced its intention to authorize white space devices in 2002.<sup>99</sup>

While GE Healthcare maintains that the Commission should delay the introduction of TV band devices on channels 33-36 until 2010 to allow health care providers more time to migrate,<sup>100</sup> granting this request will serve only to encourage more irresponsible behavior on the part of those still operating medical devices in unprotected bands. By the time TV band devices are authorized for operation in February 2009,

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<sup>97</sup> GE Healthcare Comments at 3; ASHE Comments at 3-4.

<sup>98</sup> GE Healthcare Comments at 4-5.

<sup>99</sup> *See, e.g.* ApexPro Telemetry System Specifications, available at [http://www.gehealthcare.com/inen/monitor/products/telemetry/apexpro\\_specs.html](http://www.gehealthcare.com/inen/monitor/products/telemetry/apexpro_specs.html) (last visited Feb. 28, 2007).

<sup>100</sup> GE Healthcare Comments at 5.

medical telemetry operators will have had notice of WMTS safe harbor for almost an entire decade.

As ASHE concedes, it is hard to determine the exact number of health care providers that may still be operating unprotected older devices outside the safe harbor.<sup>101</sup> But if interference protection for medical telemetry truly is a “matter of life and death,” the time for those stragglers who have still not relocated to the protected WMTS bands to do so is today. These providers have had notice of the safe harbor for years, and have had notice of this proceeding for almost as long. Health care providers can—and most certainly should—stop operating in unprotected spectrum within the next two years if they have not done so already. The Commission cannot allow its policy goals to be thwarted by those too cheap or irresponsible to buy appropriate equipment even with almost ten years’ advance notice.

### **CONCLUSION**

The Commission’s decision to make available the TV white spaces for use by new devices has created exciting possibilities for Americans, including affordable broadband access and a host of innovative devices and services. However, this potential will be realized only if the technical requirements for such devices do not sacrifice flexibility to accommodate overreaching interference protection proposals. The Coalition urges the Commission to adopt minimal technical and operational rules, thereby encouraging innovation to flourish. In particular, the Commission should confirm that the technical and operational parameters proposed by the Coalition will provide incumbent users with the protection to which they are entitled by testing the Coalition’s

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<sup>101</sup> ASHE Comments at 4 n.7.

prototype device. The Commission should also authorize personal/portable devices concurrently with fixed devices, and reaffirm its initial decision that an unlicensed model is most appropriate for the TV white spaces. By taking these steps, the Commission will help ensure that the American people achieve the maximum benefit from this valuable public resource.

Respectfully submitted,

*/s/ Scott Blake Harris*

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