

## Cover sheet for response to an Ofcom consultation

### BASIC DETAILS

Consultation title: **Digital Dividend Review**

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Name: Eric van Nijhuis

Signed (if hard copy)

***Question 1: This executive summary sets out Ofcom's proposals for the release of the digital dividend. Do you agree with these proposals?***

We have no comment on this question.

***Question 2: Do you have any comments on our analysis of the essential constraints that will apply to the available UHF spectrum?***

We strongly believe that interleaved UHF spectrum should be made available for unlicensed use on a non-interfering basis.

***Question 3: Do you agree with the more detailed analysis and proposals regarding these technical constraints as set out in Annex 10?***

No comment.

***Question 4: Do you have any comments on Ofcom's assessment of the potential uses of this spectrum? Are there any potential uses which should be considered that are not mentioned in this document?***

We strongly believe that there is a large potential use for the shared use of UHF band by low-power unlicensed devices and that this can be achieved without undue interference to other services.

***Question 5: Do you have any comments on our analysis of the choice between a market-led and an interventionist approach to the release of this spectrum? Do you agree with the analysis of different mechanisms for intervening to remedy potential market failures?***

No comment.

***Question 6: Do you agree with our proposals to continue making available channel 69 for use by low power PMSE devices? Do you agree with our proposal to make some or all of the spectrum available for use on a licence-exempt basis?***

We strongly feel that spectrum should be made available for use by any unlicensed device on a non-interfering basis.

***Question 7: Do you agree that there should be transitional protection for professional PMSE users to ensure that they can continue to access interleaved capacity until at least the end of 2012? Do you have any views on the mechanism for providing future access to this spectrum?***

Yes.

***Question 8: Do you consider that additional spectrum from the digital dividend should be reserved for low power applications? If so, please provide as much evidence as possible about the nature of the application and its potential value to society.***

We strongly believe that additional spectrum should be reserved for low power unlicensed applications. Considering the value created and lifestyle improvements provided by existing low power solutions operating in the unlicensed ISM bands, we can easily contend that there is a definite need for augmenting the use of crowded ISM bands with additional UHF spectrum.

The 2.4GHz band is extremely crowded and support for applications such as in-home distribution of HD content would be very difficult (due to well known interference/capacity issues). The more advanced networks would need to coexist with legacy devices that (when switched on) could severely degrade the new network's performance. Moreover, FM "Video Senders" use this band already and cause severe inference with IEEE802.11-based systems.

The 5GHz band, although less crowded at present, is likely to become more populated with the introduction of the 802.11n devices in 2007. This situation is expected to become worse as installations migrate to the "clearer" 5GHz band.

Whilst a "whole house" coverage can occasionally be implemented with 2.4GHz, at 5GHz this is significantly more difficult to realize due to poorer propagation.

Both 2.4GHz and 5GHz IEEE 802.11-based systems were never designed for streaming applications such as video and, as such, the IEEE 802.11 Medium Access Control layer cannot provide a suitable Quality of Service ("QoS") necessary for reliable delivery of high quality video content. Another technology is required to support QoS for video streaming.

Providing unlicensed devices with access to the UHF spectrum on a non-interfering basis will benefit large segment of the public by allowing the manufacture and sale of devices featuring lower power, lower cost, more reliable, and relatively longer range communication capability. These devices will take advantage of the favorable physical propagation characteristics of the UHF spectrum, for example; easily going through the walls to enable whole home networking applications.

It is well understood that the rights and privileges of the incumbent and licensed users needs to be protected. Specifically, devices using cognitive techniques are able to sense their environment and adjust their operating parameters (i.e. transmit power and frequency of operation) to communicate with other devices on a non-interfering basis.

The benefits of unlicensed use of spectrum are exemplified by the wide public adoption of WiFi and Bluetooth devices where Bluetooth alone has sold more than one billion units. The potential for a similar market exists for the unlicensed use of UHF spectrum. As an example, we have listed below a few applications that can exploit the benefits of the UHF spectrum.

1. In home MultiMedia (MM) distribution
2. WLAN networking and long range bridging
3. Self organizing, mesh connected community and campus networks
4. Remote patient monitoring and elderly care
5. Gaming

6. People, animal and asset tracking
7. Industrial automation and control
8. Home automation and control
9. Security covering whole homes, larger properties, communities and campuses
10. Public safety

Most of these applications require much less infrastructure when compared to the existing shorter range ISM band solutions, thus creating a significant benefit to the user.

A similar filing to the FCC in support of allowing the use of UHF spectrum by the unlicensed devices is shown in the Appendix. Section I of the Appendix shows the technical parameters of a suitable radio using cognitive techniques.

As a final note, we conclude that the use of the spectrum on an unlicensed basis would potentially bring the most benefits to the public economically and as lifestyle enhancements.

***Question 9: Do you consider that it would be desirable to hold back some spectrum from award with a view to its potential use for future innovation? If so, please provide comments on how much spectrum should be held back, and for how long.***

We urge Ofcom to consider making as much spectrum as practically available as soon as possible. We believe that making spectrum available on a non-interfering basis for unlicensed devices will spur innovation and provide economic growth.

***Question 10: Do you agree with our proposal that we should package the interleaved spectrum in a way that would be suitable for use by local television services, but not reserve spectrum solely for this use?***

Yes.

***Question 11: Do you agree with our proposal to package the spectrum in a way which does not preclude mobile broadband use, but to take no further action in relation to this use?***

No comment.

***Question 12: Do you agree with our proposal that we should not intervene in the award of this spectrum to reserve spectrum for DTT? Do you agree that we should package the spectrum in a way which is suitable for DTT use?***

We urge Ofcom to consider maximising the shared use of spectrum by unlicensed devices.

***Question 13: Do you consider that we have included in our analysis the most material risks in relation to market failure?***

No comment.

***Question 14: Do you agree with our proposal to auction licences for the use of the available UHF spectrum?***

It will not be possible to auction licenses in the case of unlicensed low power applications where there are many individual users.

***Question 15: Do you agree with Ofcom's proposals as to the timing of any auction? If not, what alternative proposal would you make and why, and what evidence and analysis can you provide in support of your alternative proposal?***

We agree that spectrum for unlicensed applications should be made available as soon as is practicable and that equipment using cognitive techniques should be allowed before 2012, providing that they operate on a non-interfering basis.

***Question 16: Do you have any views on which of the packaging options identified for the cleared spectrum would be most suitable?***

No comment.

***Question 17: Do you have any views on which of the packaging options identified for the interleaved spectrum would be most suitable?***

We believe that the ideal spectrum packaging should be the most flexible whilst allowing the widest possible range of uses and technologies.

***Question 18: Do you have any views on which of the auction design options would be most suitable?.***

No comment.

***Question 19: Do you agree with Ofcom's proposals for the non-technical terms of the licences to be awarded for use of the UHF spectrum?***

No comment.

***Question 20: Do you agree with the analysis of the options as set out in this Impact Assessment?***

No comment.

**Appendix**

The following pages are extracted from a submission by Dell, Google, Hewlett-Packard, Intel, Microsoft, and Philips (collectively the "Coalition") to the US Federal Communications Commission. This extract outlines the technical parameters for a radio using cognitive techniques.

The full document is publicly available at:

[http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native\\_or\\_pdf=pdf&id\\_document=6518909731](http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6518909731)

**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.**

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.**

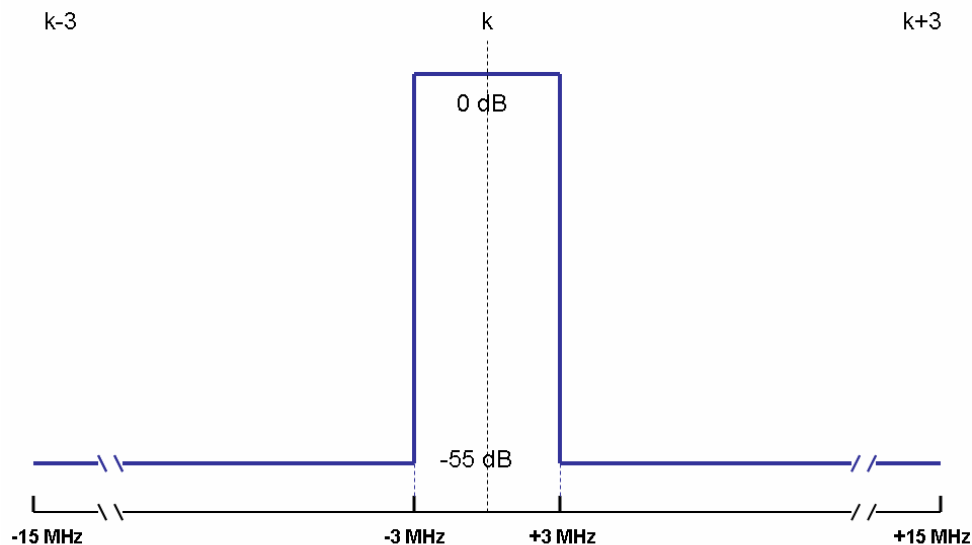
To eliminate any confusion and to facilitate the Coalition's rebuttal to comments filed in the docket objecting to portable unlicensed use of the TV white spaces, the method of operation of the proposed device is summarized below:

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.