

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

|  |   |                      |
|--|---|----------------------|
| In the Matter of                                   | ) |                      |
|  | ) |                      |
| Amendment of Part 15 of the Commission's Rules     | ) | ET Docket No. 14-165 |
| For Unlicensed Operations in the Television Bands, | ) |                      |
| Repurposed 600 MHz Band, 600 MHz Guard             | ) |                      |
| Bands and Duplex Gaps, and Channel 37, and         | ) |                      |
|  | ) |                      |
| Amendment of Part 74 of the Commission's Rules     | ) |                      |
| For Low Power Auxiliary Stations in the            | ) |                      |
| Repurposed 600 MHz Band and 600 MHz Duplex         | ) |                      |
| Gap  | ) |                      |
|  | ) |                      |
| Expanding the Economic and Innovation              | ) | GN Docket No. 12-268 |
| Opportunities of Spectrum Through Incentive        | ) |                      |
| Auctions   | ) |                      |

To: The Commission

**COMMENTS OF  
THE WIRELESS INTERNET SERVICE PROVIDERS ASSOCIATION**

**WIRELESS INTERNET SERVICE  
PROVIDERS ASSOCIATION**

February 4, 2015

Chuck Hogg, President  
Alex Phillips, FCC Committee Chair  
Jack Unger, Technical Consultant

Stephen E. Coran  
David S. Keir  
Lerman Senter PLLC  
2000 K Street, NW  
Suite 600  
Washington, DC 20006-1809  
(202) 416-6744

*Counsel to the Wireless Internet Service Providers Association*

**TABLE OF CONTENTS**

SUMMARY ..... iii

Introduction..... 2

Discussion..... 5

I. THE COMMISSION SHOULD ADOPT RULES THAT WILL INCREASE SPECTRAL EFFICIENCY, OPERATIONAL FLEXIBILITY AND VIABILITY OF TV BAND SPECTRUM FOR FIXED UNLICENSED USE. .... 5

    A. The Commission Should Make Additional TV Channels Available For Unlicensed Use. .... 5

    B. The Commission Should Reduce The Adjacent-Channel Restrictions To Enable More Spectrally Efficient Use Of Vacant TV Channels..... 7

    C. The Commission Should Enhance Operational Flexibility For White Space Devices. .... 10

    D. The Commission Should Adopt Rules That Will Promote Greater Operational Flexibility For Fixed White Space Devices In Rural Areas..... 13

II. THE COMMISSION SHOULD ESTABLISH PROCEDURES BY WHICH 600 MHz LICENSEES PROVIDE NOTICE THAT THEY HAVE COMMENCED OPERATIONS..... 16

III. THE COMMISSION SHOULD REJECT ITS PROPOSAL TO INCREASE THE FREQUENCY OF DATABASE RE-CHECKS. .... 18

Conclusion ..... 23

## SUMMARY

In these Comments, the Wireless Internet Service Providers Association (“WISPA”) responds to certain of the Commission’s proposals to enable more flexible, robust and efficient deployment of fixed broadband services on unlicensed TV band spectrum. WISPA commends the Commission for developing a large set of specific recommendations and, with a few refinements, WISPA supports the Commission’s proposals to modify technical and operating requirements in order to help accelerate broadband expansion in rural areas. WISPA opposes the Commission’s plan to increase the frequency of database re-checks.

WISPA urges the Commission to make additional TV channels available for shared use. These include Channel 37 in areas outside of exclusion zones “right-sized” to protect incumbent radioastronomy and Wireless Medical Telemetry Service facilities and channels adjacent to Channel 37 that are currently set aside for exclusive use by wireless microphones. WISPA also supports use of TV Channels 3 and 4 for shared unlicensed use.

The Commission also should reduce the six-megahertz of adjacent-channel protection that TV stations currently have on both sides of occupied TV channels to three megahertz in any location where there are two or more contiguous white space channels. In addition, as the Commission repacks and displaces TV and low power TV stations, it should do so in a manner that promotes spectral efficiency by optimizing the usability and viability of vacant spectrum. WISPA asks the Commission to create, wherever possible and consistent with statutory and technical requirements, “spectrum neighborhoods” that eliminate unusable slivers of white space spectrum in favor of larger contiguous blocks of licensed and unlicensed spectrum. Taken together, these actions will help compensate for the loss of spectrum that will inevitably result from the incentive auction.

WISPA enthusiastically supports the Commission's proposals to allow the TV bands database to recognize and accommodate white space devices operating at intermediate power levels of less than 4 Watts EIRP and using directional antennas. The proposed rules will significantly increase spectral efficiency by allowing more vacant spectrum to be used in more locations. WISPA believes that the TV bands database administrators can easily implement these additional capabilities.

In rural areas, the Commission proposes allowing operation using higher power and increased antenna heights. With appropriately increased distance separation criteria, WISPA believes there will be no harm to incumbent stations if fixed operators in rural areas could use up to 16 Watts EIRP and with increased antenna heights above ground and above average terrain.

WISPA also asks the Commission to establish procedures by which 600 MHz licensees would provide notice that they have "commenced operations." WISPA proposes that 600 MHz licensees provide notification to the Commission and a database administrator at least 60 days before they begin transmitting. White space operations would still be permissible in other areas outside of the areas where licensed 600 MHz operations have commenced.

WISPA disagrees with the Commission's proposal to increase the database re-check frequency requirement from one per day to one every twenty minutes. Instead, because bi-directional communication between fixed white space devices and the white space database already exists, it is far more efficient for databases to simply push frequency-change information out to fixed white space networks and operators only when a frequency change is actually required.

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

|  |   |                      |
|--|---|----------------------|
| In the Matter of   | ) |                      |
|  | ) |                      |
| Amendment of Part 15 of the Commission’s Rules<br>For Unlicensed Operations in the Television Bands,<br>Repurposed 600 MHz Band, 600 MHz Guard<br>Bands and Duplex Gaps, and Channel 37, and | ) | ET Docket No. 14-165 |
|  | ) |                      |
| Amendment of Part 74 of the Commission’s Rules<br>For Low Power Auxiliary Stations in the<br>Repurposed 600 MHz Band and 600 MHz Duplex<br>Gap   | ) |                      |
|  | ) |                      |
| Expanding the Economic and Innovation<br>Opportunities of Spectrum Through Incentive<br>Auctions   | ) | GN Docket No. 12-268 |
|  | ) |                      |
| To: The Commission   |   |                      |

**COMMENTS OF  
THE WIRELESS INTERNET SERVICE PROVIDERS ASSOCIATION**

The Wireless Internet Service Providers Association (“WISPA”), pursuant to Sections 1.415 and 1.419 of the Commission’s Rules, hereby comments on proposed changes to the Commission’s Part 15 rules that will promote the unlicensed use of TV band spectrum.<sup>1</sup> On the whole, WISPA endorses the Commission’s efforts in thoughtfully crafting proposals and draft rules that, if adopted, will enable more flexible, robust and efficient deployment of fixed wireless broadband services and fuel the Nation’s burgeoning unlicensed spectrum ecosystem. As discussed below, in a few instances the Commission’s proposals do not go far enough, and in a

---

<sup>1</sup> *Amendment of Part 15 of the Commission’s Rules For Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gaps, and Channel 37*, Notice of Proposed Rulemaking, 29 FCC Rcd 12248 (2014) (“*NPRM*”). The Office of Engineering and Technology extended the deadlines for filing Comments and Reply Comments to February 4, 2015 and February 26, 2015, respectively. See *Amendment of Part 15 of the Commission’s Rules For Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gaps, and Channel 37*, Order, DA 14-1801 (rel. Dec. 10, 2014).

few other cases the Commission's proposals would hinder cost-effective deployment of fixed broadband services. WISPA urges the Commission to adopt and make effective new rules expeditiously, independent of its consideration of rules in other proceedings and irrespective of any delays in the incentive auction.

### **Introduction**

WISPA is the trade association representing the interests of the fixed-wireless industry. WISPA has more than 800 members, most of which are wireless Internet service providers ("WISPs") that provide fixed wireless broadband service to millions of consumers and businesses in rural areas. WISPs rely primarily on unlicensed spectrum in the 900 MHz, 2.4 GHz, and 5 GHz bands and "lightly licensed" spectrum in the 3650-3700 MHz band to deliver last-mile service, and use a combination of unlicensed and licensed links and fiber for backhaul and point-to-point connectivity. In many rural areas of the country, WISPs provide the only terrestrial broadband service because the cost to extend cable, DSL and fiber cannot be justified by the sparse population. In urban and suburban markets, WISPs compete with wired technologies to provide service.

In addition to the unlicensed and "lightly licensed" spectrum bands mentioned above, WISPs have been first to launch private network and commercial fixed wireless broadband services in the unlicensed TV band. Here are just a few examples of successful deployments achieved using TV white spaces:

- **Declaration Networks Group** of Alexandria, Virginia is now operating the largest white space network in the country in Morgantown, West Virginia as part of its AIR.U program. The network is on the campus of West Virginia University and includes base stations that blanket the Morgantown campus, with initial applications delivering Public Wi-Fi to students and faculty at targeted "hot spot" locations that support the University's Public Rapid Transit System, which serves more than 15,000

riders daily.<sup>2</sup> The next phase of the project will be providing enhanced Internet service at WVU's off campus Extension Services facility, providing a six-fold upgrade in the connection speed to allow greater use of video conferencing and online education resources.

- **The Town of Thurman, New York** has just launched a new community-based network using white space spectrum to provide last-mile service to unserved homes in a remote area of upstate New York, which is nestled in the eastern portion of the Adirondack National Park. This new network will provide the first broadband service to 80-100 homes and businesses located in isolated areas that are inaccessible by other means.<sup>3</sup> Eighty percent of the funding is provided through a grant from the State of New York.
- **Cal.net**, a WISP in California, has been using white space spectrum for the last two years to deliver commercial fixed broadband services to El Dorado County, California, a mountainous, tree-covered area that would be difficult, if not impossible, and cost-prohibitive to serve with other wired technologies and wireless spectrum. Cal.net is working to secure state and private funding to substantially increase its footprint.

Notwithstanding these success stories, certain external factors have hindered the robust deployment that the Commission envisioned. First, the Spectrum Act<sup>4</sup> and the subsequent incentive auction proceedings have created substantial uncertainty about the continuing viability of TV white space use. It is a foregone conclusion that, as the Commission states, “[a]fter the incentive auction and TV spectrum repacking, there will be fewer vacant TV channels available for white space devices.”<sup>5</sup> But it is not clear *how much* spectrum will remain, *where* it will remain and whether there will be a *sufficient amount* of remaining spectrum in a given market to

---

<sup>2</sup> See FCC News Release, Statement of Acting Chairwoman Clyburn on AIR.U and West Virginia University Launching a Campus-Wide Wi-Fi Network Using TV White Spaces (released July 9, 2013) (“I commend AIR.U and West Virginia University on launching a unique pilot program that provides campus-wide Wi-Fi services using TV white space devices”).

<sup>3</sup> See Jamie Munks, “White Space Hookup Could Be Ready Soon in Thurman,” *The Post-Star* (Glens Falls, NY), October 9, 2013, available at [http://poststar.com/news/local/white-space-hookup-could-be-ready-soon-in-thurman/article\\_ed57c158-312b-11e3-a52a-001a4bcf887a.html](http://poststar.com/news/local/white-space-hookup-could-be-ready-soon-in-thurman/article_ed57c158-312b-11e3-a52a-001a4bcf887a.html).

<sup>4</sup> Middle Class Tax Relief and Job Creation Act of 2012, Public Law 112-96 (Feb. 12, 2012) (“Spectrum Act”).

<sup>5</sup> *NPRM* at 12259.

develop a successful business model. Although the Commission has stated that it “expect[s] a significant amount of spectrum to be available for continued TV white space use, particularly outside of the central urban areas of the largest television markets,”<sup>6</sup> this only adds to the mystery by demonstrating, more or less, that there will be little or no spectrum for unlicensed higher-power TV white space devices in urban areas, and some varying and uncertain amount of spectrum in rural areas. As a result, WISPs and other potential users of TV white space devices have been unwilling to invest heavily in the deployment of white space equipment. They also fear stranding their investment as manufacturers exit the market entirely or abandon support for previously deployed equipment.

Second, with no anticipated market for urban deployment and an uncertain market for rural deployment, many manufacturers have been unable to raise funding to enter the market, and those that are participating have been unwilling to accelerate investment in newer generations of equipment. The equipment market for TV white space devices therefore is currently limited to a handful of small, innovative companies, and robust competition has not yet developed.

Third, the conservative rules the Commission adopted in 2006<sup>7</sup> and 2008<sup>8</sup> have not enabled the white space ecosystem to realize its full potential. As two specific examples, the *NPRM* cites instances where “the FCC approach [on adjacent-channel restrictions] is very conservative and does not maximize spectrum utilization”<sup>9</sup> and “the Commission’s current table

---

<sup>6</sup> *Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions*, 29 FCC Rcd 6567, 6577 (2014) (“*Incentive Auction Order*”).

<sup>7</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 Rulemaking, 21 FCC Rcd 12266 (2006).

<sup>8</sup> *Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd 16807(2008).

<sup>9</sup> *NPRM* at 12259 n.59.

of separation distances is overly conservative in some cases, and therefore limits the amount of white space spectrum available for unlicensed devices.”<sup>10</sup> As the Commission observes in the *NPRM*, “[o]ur experience with the development and deployment of white space devices in the TV bands leads us to consider changes to our Part 15 rules that will allow for more robust service and efficient spectral use without increasing the risk of harmful interference to authorized users.”<sup>11</sup>

WISPA commends the Commission’s efforts in commencing this proceeding, and greatly appreciates the Commission’s engagement with manufacturers and users in the consideration of comprehensive rule changes.<sup>12</sup> WISPA also believes that the record will be significantly improved through the Commission’s consideration of specific refinements to the technical and operating rules. WISPA is pleased to support the great majority of the Commission’s proposals and believes that the new rules can help overcome some of the uncertainty that has slowed commercial white space deployments and trigger new interest and investment from operators and manufacturers.

## **Discussion**

### **I. THE COMMISSION SHOULD ADOPT RULES THAT WILL INCREASE SPECTRAL EFFICIENCY, OPERATIONAL FLEXIBILITY AND VIABILITY OF TV BAND SPECTRUM FOR FIXED UNLICENSED USE.**

#### **A. The Commission Should Make Additional TV Channels Available For Unlicensed Use.**

The Commission proposes to eliminate the exclusive reservation for wireless microphones on the first two vacant channels above and below Channel 37 and to allow white space devices to operate on such channels subject to availability through the TV bands

---

<sup>10</sup> *Id.* at 12270.

<sup>11</sup> *Id.* at 12250.

<sup>12</sup> *See id.* at 12253.

database.<sup>13</sup> WISPA supports these proposals, which will enable shared use of channels that are generally underutilized by wireless microphones. Together with Commission proposals to expand the eligibility for licensed wireless microphones<sup>14</sup> and to allow sharing among wireless microphones and white space devices on other TV band spectrum, the Commission should not maintain these channels for exclusive wireless microphone use. The Commission also should adopt its proposal to relax the stringent out-of-band emission limits on Channels 36-38 and instead require white space devices “to meet either the current adjacent channel or the Section 15.209 emissions limits as appropriate.”<sup>15</sup>

Further, outside of exclusion zones designed to protect radioastronomy (“RAS”) sites and Wireless Medical Telemetry Service (“WMTS”) facilities, the Commission should permit fixed white space devices to operate on Channel 37 with an EIRP of up to 4 Watts where Channels 36 and 38 are vacant.<sup>16</sup> WISPA also agrees that the Commission should permit operation with up to 4 Watts in the six megahertz band centered on the boundary of Channel 37 and one of the adjacent channels where only one of the adjacent channels (Channel 36 or Channel 38) is also vacant.<sup>17</sup> RAS and WMTS facilities can be protected through the TV bands database in the same manner as other protected facilities, with “right-sized” exclusion zones that do not over-protect RAS and WMTS.

---

<sup>13</sup> *See id.* at 12255-56.

<sup>14</sup> *See Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band; Public Interest Spectrum Coalition, Petition for Rulemaking Regarding Low Power Auxiliary Stations, Including Wireless Microphones, and the Digital Television Transition; Amendment of Parts 15, 74 and 90 of the Commission’s Rules Regarding Low Power Auxiliary Stations, Including Wireless Microphones*, Second Report and Order, 29 FCC Rcd 6103, 6107 (2014).

<sup>15</sup> *NPRM* at 12286.

<sup>16</sup> *See id.* at 12280.

<sup>17</sup> *See id.*

WISPA also endorses the Commission's proposal to allow white space device use across a broader 12 megahertz band in areas where there are guard bands adjacent to Channel 37 and the spectrum is not being used for RAS or WMTS.<sup>18</sup> The database can reasonably determine the appropriate EIRP, frequency separation and other technical parameters allowed under these circumstances. As the Commission proposes, the out-of-band emissions limits that currently apply to these channels should be removed with the database criteria enforcing appropriate channel separation distances from WMTS. Eliminating the need for white space devices to incorporate additional filtering for these bands will have a positive impact on the development of white space equipment and services.

The Commission also proposes to lift the prohibition on fixed white space use of TV Channels 3 and 4.<sup>19</sup> The Commission notes that use of these channels for television service has declined over time. WISPA believes that white space equipment manufacturers will develop equipment for Channels 3 and 4 if the Commission increases the power levels.<sup>20</sup> WISPA notes that allowing fixed TV white space devices to use Channels 3 and 4 will contribute to the overall goals of spectral efficiency and increase the viability of white space spectrum for fixed use.

**B. The Commission Should Reduce The Adjacent-Channel Restrictions To Enable More Spectrally Efficient Use Of Vacant TV Channels.**

Under existing Part 15 rules, high-power fixed TV band devices cannot operate in the six megahertz of spectrum adjacent to occupied TV channels. Because of this restriction, there must be a minimum of three contiguous unused TV channels in order to allow only one of those channels – the middle one – to be available for unlicensed use. The Commission recognizes this limitation, and further observes that, following the incentive auction and repacking, “there will

---

<sup>18</sup> *See id.*

<sup>19</sup> *See id.* at 12256-57.

<sup>20</sup> *See id.* at 12257.

be fewer locations where three contiguous vacant channels exist, particularly in urban areas, thus limiting the locations where fixed devices may be used.”<sup>21</sup>

The Commission proposes two rule changes that will enable fixed devices to use TV white space spectrum more efficiently. First, the Commission proposes to allow fixed devices to operate on channels adjacent to occupied TV channels at a maximum operating power of 40 milliwatts EIRP, the same maximum power level applicable to personal/portable devices operating on adjacent channels.<sup>22</sup> WISPA supports this proposal.

Second, and of greater importance to WISPs and the public, the Commission proposes to allow fixed devices to operate at up to 4 Watts EIRP where there are two contiguous vacant channels rather than three.<sup>23</sup> Under this proposal, unlicensed operation would be permitted on the middle six megahertz of the 12 megahertz two-channel block. The Commission states that this action would “increase spectral efficiency” and that, based on studies of actual trials, there would be no increase in potential interference to TV reception.<sup>24</sup> WISPA agrees, and wholeheartedly supports this proposal.

Of the many proposals that WISPA endorses, this change promises to be among the most beneficial to the TV white space ecosystem and to American consumers. The trial reports the Commission mentions demonstrate that affording TV stations a full six megahertz of protection on both sides of a TV channel is overly conservative. Enabling use of an additional six megahertz of valuable spectrum offers significant benefits without any increase in harmful interference.

---

<sup>21</sup> *Id.* at 12259.

<sup>22</sup> *Id.*

<sup>23</sup> *See id.* at 12259-60.

<sup>24</sup> *Id.*

The Commission should go one logical step further and apply this same principle to *all* TV channels, not just situations where only two contiguous vacant channels are present. For example, where there are four contiguous unoccupied TV channels, unlicensed use should be permitted on all but the upper and lower three megahertz of the block, enabling 18 megahertz – the middle two channels plus three megahertz from each of the outer two channels – to be available for unlicensed use. If three megahertz of adjacent-channel protection is sufficient where there are two contiguous unoccupied channels, the same principle would hold true where there are more than two contiguous unoccupied channels.

In addition to making existing TV white space spectrum more useful, extending the Commission’s proposal in this manner can facilitate more spectrally efficient post-repacking of the TV band. By making the same amount of unlicensed TV band spectrum more usable, the Commission can have more contiguous spectrum available to create “spectrum neighborhoods,” which would, where possible in a given market, attempt to cluster primary and secondary TV stations in one part of the TV band and unlicensed services in another part of the TV band.<sup>25</sup> Spectrum neighborhoods would be developed first during the required repacking of TV stations and then by ensuring that low power TV (“LPTV”) and TV translator stations are relocated to displacement channels in a spectrally efficient way, consistent with the Spectrum Act’s requirements. These steps would maximize the efficiency of the remaining white space spectrum by creating blocks of contiguous white space. In this manner, the Commission can avoid spectrum fragmentation, where white space would unnecessarily and inefficiently be stranded into unusable spectrum slivers. Under the current rules, these unusable spectrum slivers would

---

<sup>25</sup> The use of “spectrum neighborhoods” in these bands has also been strongly supported by other spectrum users. *See, e.g.*, Reply Comments of the LPTV Spectrum Rights Coalition, MB Docket No. 03-185 *et al.*, at 11-12 (filed Feb. 4, 2015).

be 12 megahertz wide (two full TV channels); under the proposed rules, the unusable portion of spectrum could be reduced to only six megahertz, provided that the Commission reduces the adjacent-channel restriction to three megahertz. In addition, as WISPA stated in its Comments in response to the *Third LPTV NPRM*,<sup>26</sup> “spectrum that would be unavailable for higher-power fixed white space use (for example, due to adjacent-channel restrictions) could be minimized by ensuring that TV stations do not occupy channels in an inefficient manner, for example by interleaving TV channels with a single six-megahertz channel in between.”<sup>27</sup>

By combining new rules that reduce the adjacent-channel protection to three megahertz and by repacking and displacing TV and secondary services into spectrum neighborhoods, the Commission can take significant and meaningful steps to increasing the amount of usable spectrum for fixed unlicensed use, a result that will support innovation and increase broadband access and adoption throughout the country.

**C. The Commission Should Enhance Operational Flexibility For White Space Devices.**

The Commission also proposes several rule changes that would promote operational flexibility, all of which WISPA enthusiastically supports. In particular, the Commission should define intermediate power levels and corresponding distance separation limits to allow white space operation at less than four Watts of power.<sup>28</sup> Existing rules treat all fixed white space devices as if they are operating at the maximum power of 4 Watts EIRP, even if they are

---

<sup>26</sup> See *Amendment of Parts 73 and 74 of the Commission’s Rules to Establish Rules for Digital Low Power Television and Television Translator Stations; Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions; Amendment of Part 15 of the Commission’s Rules to Eliminate the Analog Tuner Requirement*, MB Docket No. 03-185, GN Docket No. 12-268 and ET Docket No. 14-175, Third Notice of Proposed Rulemaking, FCC 14-151 (rel. Oct. 10, 2014) (“*Third LPTV NPRM*”).

<sup>27</sup> Comments of WISPA, MB Docket No. 03-185, *et al.* (filed Jan. 12, 2015) at 5.

<sup>28</sup> See *NPRM* at 12260.

operating at less than the maximum. Today, in cases where a 1600 milliwatt EIRP system would not cause interference, the TV bands database would still recognize the device as one operating at 4 Watts EIRP and the channel would therefore not be available for fixed unlicensed use. As the Commission observes, allowing the use of intermediate power levels with corresponding changes to the distance separation criteria will enable white space devices “to operate in more locations with limited spectrum availability than available today.”<sup>29</sup> WISPA urges the Commission to adopt this proposal and the corresponding interim co-channel and adjacent-channel distance separation tables that specify required distance separation at reduced power levels.<sup>30</sup>

The Commission offers two alternatives on how the TV bands database would manage devices operating at an intermediate power level.<sup>31</sup> WISPA believes that either approach would work well, but suggests that the Commission require the database to return a list of channels and power levels that will be available at a given location. The user would then choose the channel and the power level based on its coverage objectives and overall network design.

Another significant action the Commission can take to promote operational flexibility would be to authorize the database to take into account directional fixed white space device antenna characteristics.<sup>32</sup> Existing rules treat all antennas as if they are omnidirectional antennas. As the Commission recognizes, “[t]he directional pattern of a fixed white space device transmit antenna could affect the identification of available channels” because a directional

---

<sup>29</sup> *Id.*

<sup>30</sup> *See id.* at 12268-69.

<sup>31</sup> *See id.* at 12261.

<sup>32</sup> *See id.* at 12270-71..

antenna will emit less signal if pointed away from the affected TV station.<sup>33</sup> If the database were to recognize directional antennas, fixed devices could be deployed in a greater number of locations so long as the database had information detailing the gain and the orientation of the antenna to establish appropriate interference protection criteria. Most frequently, a WISP or other broadband network will use a sectorized, directional antenna at the base station or access point site. A base station antenna typically has a horizontal beamwidth of 60, 90 or 120 degrees. This means that often, the broadband network can operate on a white space channel without interfering with a distant TV station that is located off to the back of the broadband network sector antenna. As long as the white space database possesses information about the directional pattern and the main-beam heading (i.e., azimuth) of the broadband sector antenna, the database can determine the appropriate power level and separation distance needed to protect the TV station.

Unless the database administrators indicate that they have the ability to incorporate greater specificity, WISPA suggests that the Commission define “simpler generic patterns that approximate commonly used antennas.”<sup>34</sup> In addition to antenna pattern and heading information, the database also should contain antenna polarization and azimuth information. In some cases, by using an antenna system that is cross-polarized relative to the polarization of a television station antenna system, even greater spectral efficiency and white space use can be achieved.

Taken together, requiring the TV bands database to incorporate both intermediate power levels and directional antenna characteristics will substantially increase deployment and operational flexibility for fixed TV white space devices, consistent with the Commission’s

---

<sup>33</sup> *Id.* at 12271.

<sup>34</sup> *Id.*

spectral efficiency objectives. More locations can be served in a more cost-efficient manner on more vacant channels, results that will help drive both deployment and equipment innovation.

The Commission should adopt its proposals, with the refinements described above.

**D. The Commission Should Adopt Rules That Will Promote Greater Operational Flexibility For Fixed White Space Devices In Rural Areas.**

The Commission proposes a number of additional rules that would enable more flexible, robust and cost-effective fixed white space deployment in rural areas.<sup>35</sup> In rural areas, there are fewer TV channels that need to be protected from harmful interference, the distance between co-channel TV stations is greater and vertical infrastructure for white space deployment is less plentiful. The Commission should adopt rules permitting higher power operations and higher maximum antenna heights so that larger areas can be covered in a more cost-effective manner with fewer base station tower locations.

Adopting different rules for rural areas would be consistent with Commission policies applied in other bands. For example, in 2004, the Commission adopted rules authorizing higher maximum power for cellular, broadband PCS and Advanced Wireless Services (“AWS”) in rural areas. The Commission found that, for these services, “increasing power limits in rural areas can benefit consumers in rural areas by reducing the costs of infrastructure and otherwise making the provision of spectrum-based services to rural areas more economic.”<sup>36</sup> For example, Section 22.913(a) establishes for cellular services a maximum effective radiated power of 1000 Watts ERP in counties that have population densities of 100 persons or fewer per square mile, a 100 percent increase over the 500 Watts ERP level authorized for non-rural areas.<sup>37</sup> The

---

<sup>35</sup> *See id.* at 12261-62.

<sup>36</sup> *Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services*, 19 FCC Rcd 19078, 19126 (2004).

<sup>37</sup> *See id.* at 19127.

Commission estimated that increasing the authorized maximum power in rural areas could result in 21 percent fewer cell sites.<sup>38</sup> Likewise, for broadband PCS and AWS, the Commission raised the maximum power level for rural areas from 500 Watts ERP to 1000 Watts ERP with similar expected decreases in the number of cell sites that would be required to produce similar coverage. The reasons to adopt a similar approach for the TV white spaces are the same – to increase coverage, lower infrastructure costs and enable more affordable service to rural areas.

The Commission seeks comment on its proposal to define a rural area as one where at least half of the TV channels are unoccupied by TV stations and thus available for white space use.<sup>39</sup> Although different from other definitions of “rural area” that are geographic-based, WISPA agrees that this definition is appropriate for TV white spaces where unlicensed spectrum availability will vary on a market-by-market basis.

For these areas, WISPA strongly supports rules that would allow operations at higher elevations above ground and higher-power operations. As the Commission states, “[a] higher antenna height above ground could be beneficial in rural areas since an antenna could be mounted on a tower or other structure at a sufficient height to clear intervening obstacles such as trees and hills that would attenuate the transmitted signal.”<sup>40</sup> The Commission also recognizes that “[s]ince there are fewer authorized users of the spectrum in rural areas, there is a lower likelihood that an increased antenna height above ground will cause harmful interference.”<sup>41</sup> WISPA recommends that the maximum antenna height above ground be increased to 100 meters, with corresponding changes to the distance separation criteria to maintain interference protection

---

<sup>38</sup> *See id.* at 19128.

<sup>39</sup> *See NPRM.* at 12262.

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

<sup>41</sup> *Id.* at 12263.

to TV stations. At 100 meters, the antenna height would be above the tree line in all locations and also above many terrain obstructions.

The Commission also should increase the number of potential tower locations by increasing the height above average terrain (“HAAT”) from 250 meters to 500 meters. As the map attached as Exhibit 1 depicts, the areas that exceed the current 250-meter HAAT limit are mostly rural areas located in mountainous regions where population density is low and broadband availability is lacking. These are precisely the areas of the country where TV white space spectrum can deliver the greatest benefit because of the propagation characteristics of TV band spectrum. WISPA acknowledges that, in response to a petition for reconsideration filed jointly by WISPA and other industry stakeholders, the Commission previously increased the maximum HAAT from 76 meters to 250 meters and amended the distance separation criteria accordingly.<sup>42</sup> The Commission can provide further operational flexibility, especially in the hardest-to-serve areas where broadband service is most lacking, by further increasing HAAT and making corresponding changes to the distance separation criteria.

The Commission should routinely approve requests for waiver of the height limits in areas where an operator can demonstrate good cause. Examples would include the unavailability of tower locations at compliant heights and the lack of interference to any TV station entitled to interference protection.

The Commission seeks comment on whether it should allow fixed operations at up to 10 Watts EIRP in rural areas with no increase in the one Watt conducted power permitted under

---

<sup>42</sup> See *Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Third Memorandum Opinion and Order, 27 FCC Rcd 3692, 3698 (2012). See also 47 C.F.R. § 15.712(a)(2).

existing rules.<sup>43</sup> The Commission indicates that the higher EIRP level would utilize higher gain antennas that concentrate their radiated power into a narrower beamwidth, thus reducing the likelihood of interference.<sup>44</sup> WISPA strongly supports the proposal for an increase in EIRP in rural areas, but believes that the Commission should seriously consider setting the increased level at 16 Watts. An increase from 4 Watts to 10 Watts is not substantial enough to provide a significant improvement in coverage in a rural, underserved area. To double the coverage distance requires a four-fold increase in power. Accordingly, allowing a maximum 16 Watts EIRP would result in meaningful improvement in broadband coverage. Increasing the coverage areas will not result in increased interference to licensed operators because the database will continue to protect licensed users.

**II. THE COMMISSION SHOULD ESTABLISH PROCEDURES BY WHICH 600 MHz LICENSEES PROVIDE NOTICE THAT THEY HAVE COMMENCED OPERATIONS.**

The Commission wisely has decided to permit the continued operation of white space devices in repurposed spectrum “except in those areas in which a 600 MHz licensee commences operations.”<sup>45</sup> However, as noted in the *NPRM*, the term “commence operations” has not yet been defined for the purpose of determining when and under what circumstances unlicensed spectrum users will be required to cease operations.<sup>46</sup> The Commission therefore should take this opportunity to provide needed guidance on the procedures and timing that will govern the modification, reduction or cessation of operations using white space devices on a given channel.

---

<sup>43</sup> See *NPRM* at 12263.

<sup>44</sup> See *id.*

<sup>45</sup> *Id.* at 12287.

<sup>46</sup> *Id.* ( n.175).

A clearer understanding of the term “commence operations” is required because that step will decrease the availability of spectrum for unlicensed use within the larger market of the licensed wireless service provider. In order to ensure that existing unlicensed users have ample time to redesign their network to use available alternative frequencies and to determine the effects on service to customers, they must have sufficient advance notice of the coming need to make such modifications. At the same time, 600 MHz licensees need clear guidance concerning the specific operational stage that is the trigger for providing advance notice to existing white space users that they are beginning to provide service. WISPA suggests that the term “commence operations” should be deemed to be the point at which the 600 MHz licensee begins to transmit using its licensed spectrum during the process of launching customer service within the ensuing 60-day period.

Users of white space devices should be notified as soon as possible once the expected date for commencement of formal pre-launch testing has been set, but in no case later than 60 days in advance of the commencement of system testing. The licensee would be responsible for submitting an initial notification of planned commencement of operations to the Commission. The notification would be placed on Public Notice by the Commission so that unlicensed users in the market would be informed that the 600 MHz licensee will be commencing operations on a date certain and could begin to take any necessary steps to modify its operations and accommodate the licensee’s upcoming launch.

Simultaneously with the submission of the notice to the Commission, the 600 MHz licensee also would provide more detailed information to the TV bands database administrator. This information would consist principally of the polygonal depiction of the scope of their base station deployment, representing the actual planned area of operation. Within the 60-day pre-

launch period, the database administrator would then work with the licensee to ensure that the precise area of operation was incorporated into the database. Once verified, unlicensed operators would be notified that the area of operation would become unavailable for co-channel unlicensed operation on the date specified by the licensee for commencement of operations. After commencement of licensed operations, use of unlicensed white space devices would be automatically precluded on that channel in the area of actual operation. Unlicensed operations could continue elsewhere in the licensed area until such time as the licensee provided additional notice of commencement of operations covering additional portions of its licensed market.

Following the filing of the initial service commencement notice and the submission of information to the database administrators, the wireless licensee would have a continuing obligation to provide information to the database administrators (but not to the Commission). For each subsequent submission to the administrators, the licensee and the database administrators would have 60 days to ensure that the data incorporated into the database was accurate, after which time protection would attach in the new areas of operation and unlicensed use would be precluded in such areas.

### **III. THE COMMISSION SHOULD REJECT ITS PROPOSAL TO INCREASE THE FREQUENCY OF DATABASE RE-CHECKS.**

The Commission proposes in the *NPRM* to modify significantly the white space device re-check interval – *i.e.*, the timeframe within which white space devices must repeat a query to the database to confirm the continuing availability of a transmit frequency – from the current once per day to once every twenty minutes.<sup>47</sup> Thus, the requirement would be changed from one database query per day to 72 queries per day. This places an undue burden on white space databases, network operators and end users. The principal justification for this dramatic increase

---

<sup>47</sup> *Id.* at 12306-08..

in database re-checks is the need to “address the concerns of [itinerant] wireless microphone users and accommodate their needs for access to available unused television channels, free from interference from unlicensed devices.”<sup>48</sup> The *NPRM*, however, does not include any specific finding that such a marked change in the frequency of queries to the TV bands database is actually necessary to ensure that adequate spectrum will be available for the successful use of wireless microphones.<sup>49</sup> Nor does the *NPRM* evidence consideration of countervailing reasons to avoid forcing WISPs and other unlicensed spectrum users from frequencies in use on as little as twenty minutes’ notice. While WISPA understands the value that ENG activity contributes to broadcast and cable news operations, it is not necessary to mandate broad disruption of the fixed wireless white space broadband ecosystem by forcing an entire wide-area network to change operating frequency, or even cease operation entirely, for the beneficial but limited purpose of allowing a reporter to use a wireless microphone to communicate 50 feet to an ENG vehicle for what is likely to be only a few minutes of on-air time.

One important consideration in this regard is the use of white space spectrum in a number of areas for public safety purposes. For example, a white space network provides important first responder and other public safety communications services in rural, rough-terrain areas of the Yurok Tribal Land in Northern California that were not previously available using other spectrum.<sup>50</sup> Selecting frequencies for such use on a daily basis is a viable approach for this

---

<sup>48</sup> *Id.* at 12307.

<sup>49</sup> WISPA has no problem with the proposal to protect registered operating locations of LPAS equipment or with the protection of locations where large numbers of unlicensed wireless microphones are used. *See NPRM* at 12305.

<sup>50</sup> *See* Press Release, *California's Largest Tribe Deploys First White Space Broadband for Remote Public Safety Environment* (June 10, 2011), (available at: <http://www.carlsonwireless.com/press-releases/californias-largest-tribe-deploys-first-white-space-broadband-remote-public-safety-environment/> (last visited, Feb 4, 2015)).

purpose, but the risk at twenty-minute intervals of losing an active channel would disrupt such critical operations. This risk is particularly acute in the case of a manhunt or search and rescue operation, where law enforcement will use white space communications to provide important information to the community. In such circumstances, the use of communications links to ensure the safety of lives must take precedence over other uses.

It is unduly restrictive to require a wideband, wide-area network serving potentially hundreds of end user locations to interrupt service because one ENG microphone is activated somewhere within its operational footprint. This would place extremely burdensome and completely unnecessary demands on database operators, network operators, network resources, network reliability and network end users. Because wireless microphones are narrowband spectrum users and operate over very short distances, they are very unlikely to suffer harmful interference from distant wideband transmissions. To force a wireless network to suspend operations under such circumstances is akin to shutting down twenty miles of interstate highway in order to allow a moose to cross at a single, isolated location. Protection to a wireless microphone should only be provided within the discrete geographic area where it is used.

As a practical matter, a WISP wide-area white space network is not unlike an LPTV station in its RF design, which results in a host of substantial challenges in the event that a frequency change must be effected in real time. These challenges include the following:

- (1) **Antenna Bandwidth**. Lower-frequency antennas are more narrow-banded than higher-frequency antennas. Because they are more narrow-banded by nature, white space antennas may not provide optimum performance or exhibit the same gain and directivity when used over a wide frequency range. Further, a frequency change from a UHF channel to a VHF channel would almost certainly require switching to an entirely different and much larger antenna system.

- (2) **Signal Propagation.** A network operator that changes to a different white space channel will, because of the change in signal propagation at the new frequency, find that the subset of specific customers that can be served may change. While the geographic coverage on a new channel may in some cases be greater, in other cases the coverage will be reduced, with the result that some existing broadband customers may lose service completely or find that their formerly reliable service has become slower and/or unreliable.
- (3) **Channel Availability.** After repacking, fewer white space channels will be available. In some areas, there may not be another available TV white space channel to which the network can change. Even where another white space channel is available for unlicensed use, there is no guarantee that one or more other unlicensed wireless network operators are not already using the other channel or channels.

Balanced against these challenges associated with frequency changes, there may actually be minimal or no interference between broadband and narrowband users even when using the same television channel. Except in the extremely unlikely event that an ENG system is in use at the physical base of a broadband network tower, the broadband network and the relatively narrow-banded ENG wireless microphone system can successfully share the use of the same six megahertz white space channel. It is unlikely that the broadband signal would interfere with the wireless microphone because the broadband signal occupies almost the entire six megahertz channel while the wireless microphone likely only occupies 200 kHz or even less of the channel. In this example, only 1/30th (3.3 percent) of the broadband signal energy would ever be detectable by the 200 kHz wireless microphone receiver. In assessing the possibility of interference between a wide-area broadband network and a wireless microphone, white space databases should possess the capability to take the directional antenna characteristics of the broadband network into account, as outlined in Section I.C., above.

It is also wholly unnecessary to require all white space devices to pull a new authorized frequency list from a white space database every twenty minutes because there is a bidirectional communication capability between white space devices and white space databases. Rather than

requiring all white space devices to be constantly querying a database, it is much more spectrally efficient and network-resource efficient for a white space database simply to push a notification of the need for a frequency change to a specific white space base station or node if and only if a frequency change is actually necessary. The database should be configured to incorporate this feature.

Moreover, the twenty-minute re-check requirement, if retained by the Commission, is inappropriate for spectrum that is unavailable for wireless microphone use in rural areas, where WISP use is most prevalent, as the more frequent database queries would serve absolutely no purpose, and would only reduce the network efficiency of WISPs and other users of unlicensed white space devices. Accordingly, even to the extent that the Commission modifies the current re-check requirement contained in Section 15.711(b)(3)(i), such a change should be limited to areas with the greatest spectrum congestion.

Similarly, it would be unreasonable to require an entire network of white space devices to vacate an operating channel solely because of a potentially transient loss of internet connectivity. Occasional temporary network outages are still a fact of life on the Internet. Losing backbone network connectivity can occur because of fiber cuts, accidental core network misconfiguration, extreme weather events or simply because of occasional equipment failure. Currently, an access point, network hub or other white space device that is unable to query the database for any of these reasons may nonetheless continue to use an active frequency until 11:59 pm on the following day in the event that it is unable to contact the TV bands database to update current usage.<sup>51</sup> Forcing cessation of transmissions and cessation of an entire network's operation in

---

<sup>51</sup> See 47 C.F.R. § 15.711(b)(3)(iii) and *NPRM* at 12306.

such a circumstance, as contemplated in the *NPRM*,<sup>52</sup> is an unnecessary burden on unlicensed spectrum users, not only in the public safety usage scenario outlined above, but also for less critical, everyday uses. Requiring a wide-area white space network to completely cease operation simply to provide protection in the extremely unlikely event that a transient wireless microphone-equipped ENG crew will enter the network coverage area during the network outage and need to use the same white space channel is not reasonable, and would be harmful to WISPs and their customers because it could turn a transient loss of connectivity to the database into a much more prolonged service disruption. Further, the temporary loss of database connectivity is not sufficient reason to deny network end-users the ability to continue to communicate locally via email, instant messaging and other locally-hosted network-centric applications. Accordingly, adoption of this proposed rule change would unnecessarily handicap the utility of TV white space for spectrum-efficient, unlicensed use.

Finally, WISPA agrees with the Commission that a ten-minute time limit for sharing information between databases<sup>53</sup> is, absent any issues that database providers themselves may yet raise, likely to be both appropriate and beneficial.

### **Conclusion**

WISPA supports the Commission's significant and specific recommendations to bolster the fixed white space ecosystem by increasing operational flexibility through technical rules that will reduce deployment costs and improve spectral efficiency. The Commission should

---

<sup>52</sup> See *NPRM* at 12306-07.

<sup>53</sup> *Id.* at 12306.

expeditiously adopt its proposals to the extent described above, and refine certain of its proposals to further enhance the viability of fixed white space deployment.

Respectfully submitted,

**WIRELESS INTERNET SERVICE  
PROVIDERS ASSOCIATION**

February 4, 2015

By: */s/ Chuck Hogg, President*  
*/s/ Alex Phillips, FCC Committee Chair*  
*/s/ Jack Unger, Technical Consultant*

Stephen E. Coran  
David S. Keir  
Lerman Senter PLLC  
2000 K Street, NW  
Suite 600  
Washington, DC 20006-1809  
(202) 416-6744

*Counsel to the Wireless Internet Service Providers Association*

# Exhibit 1

## Map of Locations Where HAAT Exceeds 250 Meters

