

**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)	
)	
Promoting Spectrum Access for Wireless)	GN Docket No. 14-166
Microphone Operations)	
)	
Expanding the Economic and Innovation)	GN Docket No. 12-268
Opportunities of Spectrum Through Incentive)	
Auctions)	
To: The Commission		

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

February 25, 2015

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SUMMARY

The Wireless Internet Service Providers Association (“WISPA”) submits the accompanying Reply Comments to address certain of the initial Comments filed in this proceeding. Given the broad consensus on a wide range of issues, the Commission should act expeditiously to adopt many of the rule changes it proposes, with the refinements and modifications described herein and in WISPA’s initial Comments.

The record reflects strong support for rules that would increase the amount and utility of unlicensed white space spectrum available for fixed broadband use. In light of its decision to eliminate wireless microphone exclusivity on channels adjacent to Channel 37, the Commission should free up these channels. Together with use of Channel 37 in areas outside of right-sized exclusion zones to protect Radio Astronomy and WMTS, these channels will create additional contiguous spectrum for white space devices. The record also shows that Channels 3 and 4 can be made available without increasing interference to television stations.

Moreover, the Comments demonstrate strong support for relaxing adjacent-channel restrictions to allow higher-power fixed use three megahertz from the TV channel band edge and low-power use immediately adjacent to the band edge. The Commission also should adopt its proposals to permit channel bonding and channel aggregation.

There is no opposition to the Commission’s proposals to allow the TV bands database to recognize fixed devices operating at intermediate power below 4 Watts EIRP. As the Commission and the record confirm, adopting these proposals will enable more frequent and efficient use of unlicensed spectrum in more areas of the country.

Likewise, the record shows widespread support for adoption of rules enabling more cost-effective use of white space devices in rural areas. These initiatives include operations at higher

power and at higher elevations above ground and above average terrain. Limiting operations at higher power or higher elevations to applicants that successfully obtain a waiver, as some wireless microphone interests suggest, would significantly deter manufacturers from making higher power devices and tie up the Commission's scarce administrative processes with unnecessary waiver review.

A few commenters seek to undermine white space use on 600 MHz spectrum when and where the licensee has not yet deployed. The Commission should reject this proposal. There is no statutory restriction on such use, and the Commission can adopt a process – such as the one recommended by WISPA – to ensure that licensees are protected from harmful interference and unlicensed operations can be transitioned to other spectrum. Demand for fixed broadband services, especially in rural areas that 600 MHz licensees may ignore for years, can be met by unlicensed providers using this spectrum until the licensed user deploys. Letting the spectrum lie fallow until licensees deploy in a particular area is spectrally inefficient, and would arbitrarily exclude from use significant amounts of white space spectrum that could otherwise be employed to provide service to underserved areas.

The Commission should reject its proposal to increase the interval of database re-checks from one every 24 hours to one every twenty minutes. Instead, the Commission should require the database to “push” information about required frequency changes to the white space device.

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Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions)	GN Docket No. 12-268
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To: The Commission

**REPLY 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 replies to certain of the Comments regarding proposed changes to certain of the Commission’s Part 15 rules.¹ The record demonstrates strong support for a number of the Commission’s technical and operating proposals that will enable more rapid, flexible, robust and efficient deployment of fixed wireless broadband services,

¹ *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 25, 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).

especially in rural areas. The Commission should reject, however, arguments advanced by a few commenters that would not permit unlicensed operations on licensed 600 MHz spectrum where and when that spectrum is not being used for licensed purposes. The Commission also should reject its proposal to increase the frequency of database rechecks. The Commission should act expeditiously to adopt and implement new rules so that wireless Internet service providers (“WISPs”) can begin to deploy broadband service using TV white space spectrum to millions of Americans that lack access to cable, fiber or copper-based broadband infrastructure.

Discussion

I. THE RECORD DEMONSTRATES STRONG SUPPORT FOR NEW RULES THAT WILL PROMOTE WIDESPREAD AND VIABLE DEPLOYMENT OF TV BAND SPECTRUM FOR FIXED UNLICENSED USE.

The Commission proposes a number of changes to its Part 15 rules that, individually and collectively, would promote the flexible and robust use of unlicensed TV band spectrum for fixed broadband deployment. The record, including WISPA’s Comments,² reflects overwhelming support for these proposals and they should be implemented once TV band databases are upgraded to accommodate the new power levels, antenna characteristics and adjacent-channel uses the Commission adopts.³ In a few cases, as discussed below, the Commission should modify its proposals to create greater flexibility without increasing the potential for harmful interference. Those few commenters opposing the Commission’s proposals

² See Comments of WISPA, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“WISPA Comments”).

³ WISPA does not object to NAB’s suggestion that the database confirm its ability to perform the additional tasks envisioned by the new rules. See Comments of the National Association of Broadcasters, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015 (“NAB Comments”) at 13. WISPA is unaware of any instances where the professional installation requirement has been insufficient to protect broadcasters.

fail to make a compelling case that operations under new rules would cause harmful interference to licensees entitled to interference protection, and their arguments thus should be rejected.

A. The Record Shows That Additional TV Channels Should Be Made Available For Unlicensed Use.

Channels Adjacent to Channel 37. The WISPA Comments supported the Commission’s proposal to allow white space devices to share use of the first two vacant channels above and below Channel 37 where those channels are made available through the TV bands database.⁴ A number of other commenters agreed that the Commission should adopt this proposal in light of the Commission’s decision to eliminate exclusivity for wireless microphone channels on these channels.⁵ As Google observes, “[b]ecause wireless microphone use is periodic and highly localized, this [existing] restriction results in two 6 MHz television channels – a full 12 MHz of spectrum – being completely unused in the vast majority of the country the vast majority of the time.”⁶ Microsoft refers to the proposed changes as “low-hanging fruit that have the potential to make an immediate impact on the development of 600 MHz unlicensed operations.”⁷ Microsoft also echoes WISPA’s support for the Commission’s proposal⁸ to relax the out-of-band emission

⁴ See WISPA Comments at 5-7.

⁵ See, e.g., Comments of Wi-Fi Alliance, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“Wi-Fi Alliance Comments”) at 7-8; Comments of WhiteSpace Alliance, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“WSA Comments”) at 7; Comments of Broadcom Corporation, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“Broadcom Comments”) at 21.

⁶ Comments of Google Inc., ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“Google Comments”) at 36.

⁷ Comments of Microsoft Corporation, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“Microsoft Comments”) at 29.

⁸ See *NPRM* at 12286.

limits on Channels 36-38 and to allow white space devices to meet either the existing adjacent-channel limits or those specified in Section 15.209.⁹

A few participants in the wireless microphone marketplace express varying degrees of concern regarding the Commission's proposal. These commenters appeal for the Commission simply to maintain the *status quo*, at least in some respects or for some duration, but without providing substantive arguments to support this wished-for outcome. Instead, they voice general complaints that the *NPRM* proposal is insufficient,¹⁰ inequitable¹¹ or premature.¹² None of these generalized concerns, however, provides sufficient justification for the Commission to change course.

Channel 37. The record also supports adoption of the Commission's proposal¹³ to allow fixed use of Channel 37 outside of exclusion zones that will protect radioastronomy ("RAS") and Wireless Medical Telemetry Service ("WMTS") facilities. For example, the Wi-Fi Alliance agrees with WISPA that fixed operations on Channel 37 should be permitted with a maximum EIRP of 4 Watts.¹⁴ Google and others agree, noting that fixed devices can be used "for

⁹ *See id.*

¹⁰ Comments of Sennheiser Electronic Corp., ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) ("Sennheiser Comments") at 6-8.

¹¹ Comments of Shure, Inc., ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) ("Shure Comments") at 11-12.

¹² Comments of Audio-Technica U.S., Inc., ET Docket No. 14-165, GN Docket No. 12-268 and GN Docket No. 14-166 (filed Feb. 4, 2015) ("Audio-Technica Comments") at 16-18.

¹³ *See NPRM* at 12280-12283.

¹⁴ *See* Wi-Fi Alliance Comments at 29. *See also* Microsoft Comments at 27; Broadcom Comments at 21.

backhauling wireless broadband services between set locations.”¹⁵ Adaptrum, Inc. notes that the existing prohibition against sharing Channel 37 with RAS and WMTS were predicated on “listen-before-talk” technology and not a database-controlled approach, and that the rationale for excluding shared use of Channel 37 no longer exists.¹⁶ No party endorsing the Commission’s proposal opposed the use of exclusion zones to protect RAS and WMTS facilities.

While some wireless microphone manufacturers contest the opening of Channel 37 for white space device use instead of allowing “licensed Class A” wireless microphones in this band,¹⁷ there is significant disagreement even within this subset of commenters on this point. Shure, for example, acknowledges that the band would *not* be suitable for current wireless microphone technology because this equipment “would not be able to fulfill the proposed requirement for database control that devices operating in this channel will require in order to protect WMTS and Radio Astronomy.”¹⁸

Finally, the Commission should reject the proposal by the National Academy of Sciences that TV white space devices should be prohibited from using Channel 37 in rural areas.¹⁹ Such a

¹⁵ Google Comments at 31. *See also* Comments of Motorola Solutions, Inc., ET Docket No. 14-165, GN Docket 14-166 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“Motorola Comments”) at 10; Comments of Dynamic Spectrum Alliance, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“DSA Comments”) at 10.

¹⁶ *See* Comments of Adaptrum, Inc., ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“Adaptrum Comments”) at 5-6.

¹⁷ *See* Sennheiser Comments at 9-10 (“the public interest would be better served by allowing licensed Class A users to share Channel 37 with RAS and WMTS”). Only one other commenter voices support for this proposal. *See* Comments of CP Communications, LLC, ET Docket No. 14-165, GN Docket 14-166 and GN Docket No. 12-268 (filed Feb. 4, 2015) at 2-3.

¹⁸ *See* Shure Comments at 21.

¹⁹ *See* Comments of the National Academy of Sciences' Committee on Radio Frequencies, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) at 6-7.

blanket prohibition on use would contravene the Commission's goals in this proceeding of enhancing spectrum efficiency and promoting wider use of the TV bands for broadband and other applications employing underutilized frequencies. NAS offers no reason that ample protection of RAS sites cannot be achieved using appropriate separation criteria.

Channels 3 and 4. Commenters further agree that the Commission should allow fixed white space devices to use TV Channels 3 and 4, as the Commission proposed in the *NPRM*.²⁰ Microsoft observes that prohibitions on use of Channels 3 and 4 were designed “to protect analog television devices and will no longer be necessary once the transition is completed for all classes of television service.”²¹ WSA correctly observes that the availability of Channels 3 and 4 could “revive interest for white space products in channels 2 to 6” because “white space device manufacturers would find product development in this band far more appealing” with five contiguous channels.²² WSA adds that the propagation characteristics of these channels would benefit rural deployment and public safety communications.²³ Likewise, Spectrum Bridge notes that Channels 3 and 4, “in conjunction with existing and available channel 2, are capable of supporting innovative fixed VHF applications, such as long range telemetry.”²⁴ Spectrum Bridge

²⁰ See *NPRM* at 12256-57.

²¹ Microsoft Comments at 46.

²² WSA Comments at 8.

²³ See *id.* at 9. See also Wi-Fi Alliance Comments at 9.

²⁴ Comments of Spectrum Bridge, Inc., ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 2, 2015) (“Spectrum Bridge Comments”) at 3.

also states that its TV bands database can support Channel 3 and 4 operations “with minimal impact.”²⁵

Although it agrees that use of TV interface devices operating on Channels 3 and 4 is “diminishing,” NAB recommends that the Commission defer relaxation of the existing prohibition.²⁶ As explained by WSA, however, it is not believed that any white space device manufacturer is currently producing commercial equipment that operates on Channels 3 and 4, and it will take some time for white space device manufacturers to develop such equipment. WISPA agrees, and believes that the amount of time needed to design, manufacture and deploy new white space devices that are capable of operating on these channels will, by itself, delay for some time the introduction of new devices that use these channels. Accordingly, the Commission should reject NAB’s request for an artificial, government-mandated delay and instead allow marketplace developments to govern, permitting deployment of devices operating on these channels consistent with the normal timetables required for equipment to be certified, produced and placed in operation.

B. The Record Supports Relaxation Of Adjacent-Channel Restrictions.

Operation at 4 Watts EIRP. Recognizing the overly conservative and limiting nature of rules adopted almost nine years ago, the Commission now takes a more realistic approach by proposing to allow fixed devices to operate at up to 4 Watts EIRP where there are just two contiguous vacant channels rather than three.²⁷

²⁵ *Id.*

²⁶ NAB Comments at 13.

²⁷ *See NPRM* at 12259-60.

WISPA and other commenters support this proposal.²⁸ Wi-Fi Alliance and Google agree that allowing 4 Watt operations where two contiguous channels are available will increase spectrum efficiency without increasing the potential of interference to television reception.²⁹ Microsoft notes that “[g]roups of three vacant television channels are scarce, and will become scarcer after the auction and repack, severely reducing the number of available white space channels for fixed operation.”³⁰ Further, WISPA and WSA asked the Commission to extend this principle to cases where there are more than just two adjacent white space channels,³¹ allowing for “deployments over a far greater range of scenarios.”³²

NAB objects to the Commission’s proposal, claiming that the studies cited by the Commission “are largely irrelevant” and that adjacent TV stations would suffer interference if the six megahertz of adjacent-channel guard band were reduced to three megahertz.³³ While there may be some differences in the interference-rejection capabilities of analog television versus digital television, WISPA and the vast majority of commenters continue to believe that the white space databases possess sufficient capability to protect broadcast television stations from interference through the simple mechanism of increasing the required separation distances, wherever needed.

²⁸ See WISPA Comments at 7-10.

²⁹ Wi-Fi Alliance Comments at 14; Google Comments at 44.

³⁰ Microsoft Comments at 45-46.

³¹ See WISPA Comments at 9 (“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”); WSA Comments at 10 (“the Commission should authorize similar operations over three adjacent channels”).

³² WSA Comments at 11.

³³ NAB Comments at 8.

Channel Bonding and Channel Aggregation. A large number of commenters urge the Commission to amend Sections 15.709(c)(1) and (2) to permit channel bonding (for contiguous channels) and channel aggregation (for non-contiguous channels).³⁴ As DSA points out, “channel bonding will allow more efficient use of white space without creating any risk of harmful interference to protected operations.”³⁵ WSA concurs with the Commission that channel bonding and channel aggregation “will allow the development of devices that transmit at higher data rates, thus making higher speed equipment available to service providers and consumers and promoting the efficient use of available white spaces.”³⁶ Runcom Technologies Ltd., a manufacturer of broadband equipment, states that software changes to incorporate channel bonding and any corresponding changes in out-of-band emission limits “are feasible and can be implemented with no[t] much trouble.”³⁷ Both Spectrum Bridge and Google confirm that the proposed rule changes would not require any significant changes to the TV bands database.³⁸

Only one commenter voiced opposition to the Commission’s proposed rule change.³⁹ Shure states that this proposal would reduce the amount of spectrum available for wireless microphones. WISPA disagrees, believing that sufficient wireless microphone spectrum will

³⁴ See Wi-Fi Alliance Comments at 18-20; WSA Comments at 14-15; DSA Comments at 6; Adaptrum Comments at 8; Microsoft Comments at 43; Google Comments at 45-46; Spectrum Bridge Comments at 4; Comments of Runcom Technologies Ltd., ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“Runcom Comments”) at 1.

³⁵ DSA Comments at 6. See also Google Comments at 45-46.

³⁶ WSA Comments at 14-15. See also Microsoft Comments at 44 (wider channels increases transmission bandwidth and throughput capacity).

³⁷ Runcom Comments at 1.

³⁸ See Spectrum Bridge Comments at 4; Google Comments at 46.

³⁹ See Shure Comments at 26-27.

remain available. WISPA therefore urges the Commission to proceed with the adoption of its proposals to permit efficient channel bonding and channel aggregation.

C. The Record Lacks Any Opposition To Proposed Rules That Will Enhance Operational Flexibility For White Space Devices.

Intermediate Power Levels. A large number of commenters endorsed the Commission's proposal to allow unlicensed TV white space operations at less than maximum power with appropriate adjustments in distance separation to promote greater operational flexibility.⁴⁰ Spectrum Bridge explains that "[t]he complexity required to implement the proposed changes is not a significant issue."⁴¹ Even NAB and Shure do not oppose adoption of rules allowing operations at lower intermediate power levels.⁴² There is no objection to the Commission's proposal, and it therefore should be adopted.

Directional Antennas. The record also reflects support for, and no opposition to, the Commission's proposal to let the TV bands databases accommodate directional fixed white space device antenna parameters.⁴³ In supporting this view, Spectrum Bridge states that "[t]he challenge will be to create a simple and easily verifiable set of antenna configurations that can

⁴⁰ See WISPA Comments at 10-11; WSA Comments at 11; Google Comments at 45; Microsoft Comments at 45; Wi-Fi Alliance Comments at 13; DSA Comments at 5; Motorola Comments at 4.

⁴¹ Spectrum Bridge Comments at 4.

⁴² See NAB Comments at 13; Shure Comments at 27. NAB supports an approach requiring automatic communication between the device and the database, with the power level fixed once communication is established. See NAB Comments at 13-14. WISPA presumes that such communication is implied when the database provides a list of channels and power levels at the proposed white space access point. See WISPA Comments at 11.

⁴³ See WISPA Comments at 11-12; Microsoft Comments at 47; Motorola Comments at 8; Adaptrum Comments at 5.

then be utilized by the database.”⁴⁴ The WISPA Comments suggest that the Commission define “simpler generic patterns that approximate commonly used antennas.”⁴⁵ WISPA believes that these parameters are easily verifiable and can be incorporated into the database without difficulty. With no objections in the record, the Commission should adopt its proposed rule change to allow the database to recognize and permit directional antennas.

D. The Record Demonstrates Overwhelming Support For Rules That Will Promote Greater Operational Flexibility For Fixed White Space Devices In Rural Areas.

Definition of Rural Area. WISPA, WSA and DSA support the Commission’s proposal to define a “rural area” as an area where at least half of the TV channels are unoccupied by TV stations and thus available for white space use.⁴⁶ Spectrum Bridge explains that this definition could be affected by changes to CDBS, the Broadcast Radio and Television Electronic Filing System, such that areas that are “rural” today may not be so in the future.⁴⁷ It recommends a geographic-based definition that is fixed but does not account for the number of vacant white space channels.⁴⁸ Similarly, Sennheiser argues that the definition should focus on population density rather than the number of unused channels,⁴⁹ while Shure also advocates an approach

⁴⁴ Spectrum Bridge Comments at 6.

⁴⁵ *NPRM* at 12271.

⁴⁶ *See* WISPA Comments at 14; WSA Comments at 12; DSA Comments at 7.

⁴⁷ *See* Spectrum Bridge Comments at 4.

⁴⁸ *See id.*

⁴⁹ Sennheiser Comments at 11.

that would at least take this factor into account.⁵⁰ Neither, however, makes any specific proposal.

WISPA agrees with Spectrum Bridge that the definition of “rural area” should not change over time. However, just as it does in other cases where the geographic unit for auctioned services can change,⁵¹ the Commission can establish “rural areas” based on the number of available channels that exist on the effective date of the new rules, without regard to any future changes. Thus, “rural areas” for purposes of the TV white space rules would consist of those areas, as of the effective date, where at least half of the TV channels are unoccupied by TV stations.

Relying on population density, as Sennheiser and Shure suggest, would be a less acceptable result because it could preclude more populated areas where there is significant white space spectrum available most of the time. Given the predictability of sporting events and worship services and the generally small areas in which wireless microphones would operate at those locations, temporally and geographically limiting fixed white space spectrum availability would result in overprotection of wireless microphones and underutilization of unlicensed spectrum.

Higher Power Operations. A number of commenters agreed with WISPA⁵² that the Commission should allow higher power fixed operations in rural areas, subject to availability as

⁵⁰ Shure Comments at 29-30.

⁵¹ See Comments of WISPA, GN Docket No. 12-354 (filed Dec. 5, 2013) at 16, *citing Amendment of Parts 21 and 74 of the Commission’s Rules with Regard to Filing Procedures in the Multipoint Distribution Service and the Instructional Television Fixed Service*, 10 FCC Rcd 9589, 9608 (1995); Comments of WISPA, GN Docket No. 12-354 (filed July 14, 2014) at 13-14.

⁵² See WISPA Comments at 14-16.

determined by the TV bands database. As Adaptrum explains, “[t]he present height and power limits severely constrain the number of potential customers that can be served by a base station making commercial operation of a TVBD by WISPs to serve rural residents impractical.”⁵³

Google suggests that increasing the power limit in rural areas “could also enable additional applications – such as vehicle tracking – that are not currently feasible under the existing rules.”⁵⁴ The Wi-Fi Alliance states that “[i]ncreasing the power limit will improve broadband service coverage in rural areas and will result in more efficient spectrum use since the power from the higher gain antenna will be concentrated in a narrower beamwidth, thereby decreasing the likelihood of interference.”⁵⁵

Audio-Technica opposes the Commission’s proposal, citing its general concerns with the potential for interference to wireless microphones operating in rural areas.⁵⁶ Audio-Technica suggests that the Commission instead require white space users to seek waiver any time they want to operate with higher power or at greater heights.⁵⁷ Without clear authority in the rules establishing a higher maximum power in rural areas, manufacturers will not produce higher-power equipment and the “cost savings” from deploying fewer base stations – which even Audio-Technica acknowledges⁵⁸ – will be lost. Even if higher-power equipment is available, it would be a poor use of the Commission’s scarce administrative resources to repeatedly consider

⁵³ Adaptrum Comments at 4.

⁵⁴ Google Comments at 46.

⁵⁵ Wi-Fi Alliance Comments at 16. *See also* DSA Comments at 7.

⁵⁶ *See* Audio-Technica Comments at 13-16.

⁵⁷ *See id.* at 15-16.

⁵⁸ *Id.* at 15.

waiver requests. The Commission's proposal strikes the appropriate balance among unlicensed uses.

Having determined that the overall record supports higher power operations in rural areas, the next question is what the power limit should be. WISPA asked the Commission to authorize 16 Watts EIRP in rural areas with corresponding changes to the distance separation criteria, in excess of the 10 Watts EIRP the Commission proposed.⁵⁹ WISPA stated that “[a]n 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.”⁶⁰ WISPA looks forward to Reply Comments from others to determine whether the record supports an increase in maximum power to 16 Watts EIRP in rural areas.

Operations from Higher Transmit Elevations. Likewise, commenters were nearly unified in supporting operations at higher elevations in rural areas.⁶¹ Microsoft emphasizes that allowing white space devices to operate above 30 meters above ground level and above 250 meters above average terrain “could significantly improve the availability of wireless broadband in rural areas where provision of wired broadband is not economically feasible.”⁶² No commenter expressed categorical opposition to the Commission's general proposal to allow operations from increased heights.⁶³

⁵⁹ See WISPA Comments at 16.

⁶⁰ *Id.*

⁶¹ See Wi-Fi Alliance Comments at 15; Google Comments at 46; Adaptrum Comments at 5.

⁶² Microsoft Comments at 46.

⁶³ Even Shure, which generally opposes a change in the antenna height rules based on unelaborated concern regarding the “potential for interference to wireless microphones,” nonetheless allows that increased antenna height “may have utility in rural areas,” a view

It appears that only WISPA made specific proposals concerning how much to increase the maximum height above ground level (from 30 meters to 100 meters) and how much to increase the maximum height above average terrain (from 250 meters to 500 meters).⁶⁴ WISPA explained that operations at these heights would still provide sufficient protection for incumbent licensed services through the white space database which would incorporate the appropriate increases in distance separation criteria. WISPA believes that the record will support such operations.

In sum, the combination of increased power and increased antenna height will promote the deployment of fixed broadband services in rural America. To quote Microsoft:

In general, combining increased antenna height with an increase in transmitted power will allow for greater broadband speeds farther away from the fixed WSD base station. The white space databases will be able to determine the list of available channels for fixed WSD operations in rural areas using an antenna higher than 30 m and/or at powers of 10 W EIRP and beyond.⁶⁵

The record shows strong support for rules that would allow increased flexibility with lower infrastructure costs in rural areas of the country. The limited opposition in the record fails to refute, and even recognizes, the public interest benefits that would stem from the Commission's proposals. The Commission thus should adopt its proposals to increase operational flexibility in rural areas, with the refinements discussed in the WISPA Comments and above.

consistent with the scope of WISPA's proposal. Shure Comments at 28-29. *See also* Audio-Technica Comments at 15 (acknowledging the benefits "in certain situations" of employing higher power levels and increased antenna heights to serve rural and isolated areas).

⁶⁴ *See* WISPA Comments at 14-15.

⁶⁵ Microsoft Comments at 47.

II. THE COMMISSION SHOULD REJECT EFFORTS TO PROHIBIT WHITE SPACE OPERATIONS WHERE 600 MHz LICENSEES HAVE NOT COMMENCED OPERATIONS.

WISPA supports the Commission's proposal to permit white space operations to continue using unoccupied spectrum "except in those areas in which a 600 MHz licensee commences operations."⁶⁶ WISPA also proposed a specific process by which 600 MHz licensees could rather easily provide advance notice of its commencement of operations so that WISPs and other white space spectrum users could have sufficient time to transition customers to alternative channels, spectrum or facilities so that interference to licensed 600 MHz facilities can be avoided.⁶⁷

Qualcomm, CTIA and TIA oppose the unlicensed use of licensed 600 MHz spectrum in all cases, even where the licensee may never build out.⁶⁸ They make several arguments, none of which have merit. First, Qualcomm and CTIA opine that the Spectrum Act does not permit unlicensed use of the auctioned spectrum that does not lie in duplex gap or guard bands.⁶⁹ But while the Spectrum Act does not specifically authorize unlicensed use of the licensed spectrum, neither does it expressly forbid such use. In fact, as Qualcomm and CTIA are well aware, the Commission is considering an approach in the 3550-3650 MHz band that would allow General Authorized Access (unlicensed or license-by-rule) until such time as Priority Access (licensed)

⁶⁶ *NPRM* at 12287. *See* WISPA Comments at 16 n.72.

⁶⁷ *See* WISPA Comments at 16-18.

⁶⁸ *See* Comments of Qualcomm Incorporated, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) ("Qualcomm Comments") at 19-20; Comments of CTIA – The Wireless Association, ET Docket No. 14-165, GN Docket No. 14-166 and GN Docket No. 12-268 (filed Feb. 4, 2015) ("CTIA Comments") at 36-40; Comments of the Telecommunications Industry Association, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) ("TIA Comments") at 15-18.

⁶⁹ *See* Qualcomm Comments at 19; CTIA Comments at 39.

users commence operations in a given area.⁷⁰ The Commission has general authority to allow shared use where the public interest justifies, and nothing “makes clear,” as CTIA erroneously states, that it is “impermissible for the Commission to elevate the rights of unlicensed services through the framework proposed in the [NPRM].”⁷¹

Second, Qualcomm and TIA contend that unlicensed use of 600 MHz licensed spectrum before a licensee deploys somehow would “undercut [the] basic purpose” of the incentive auction⁷² and the “exclusive spectrum rights” of the licensee.⁷³ Stated another way, Qualcomm and TIA would rather have the spectrum lie fallow and unused for years while licensees continue to meet construction and service rules that encourage legal warehousing. Given the declining amount of white space spectrum resulting from the incentive auction, repacking and secondary service displacement, adopting the Qualcomm/TIA warehousing proposal would put the nail in the coffin for TV white spaces. Operations would be confined to only TV band spectrum, further reducing the available spectrum for unlicensed use.

Third, Qualcomm bemoans a process of updating the TV bands databases as “particularly burdensome as mobile carriers are always modifying, densifying, extending, and upgrading their networks to meet consumer needs.”⁷⁴ Often times, however, these consumer needs apparently do

⁷⁰ See *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, FCC 14-49 (rel. Apr. 23, 2014).

⁷¹ CTIA Comments at 39.

⁷² TIA Comments at 15.

⁷³ Qualcomm Comments at 19-20.

⁷⁴ *Id.* at 20. See also CTIA Comments at 38. TIA blithely opines that “CMRS licensees usually have the privilege (and often, the obligation) to provide service throughout their license area.” TIA Comments at 16. Even a cursory review of the Commission’s service-specific “substantial service” standards shows this statement to be a total fallacy. Licensees are generally required to

not include expansion into rural areas, as evidenced by the standard practice of building out in urban and suburban areas and leaving the rural leftovers for a later point in time, if ever. By contrast, WISPs desire to meet consumer demand for fixed broadband service in rural areas, and the propagation characteristics of 600 MHz band spectrum is well suited to meet that need. What may be “interim or stop-gap” to TIA may mean years of fixed broadband service to consumers and businesses in rural areas that lack access.⁷⁵

Instead of adopting the spectrally efficient approach favored by the Commission and WISPA, CTIA and TIA suggest that the Commission simply require white space operations “to cease in a PEA as soon as the commercial licensee has initiated service anywhere in the market.”⁷⁶ The better solution is to develop a fair method by which spectrum can be used efficiently, unlicensed or licensed, to serve the needs of consumers in urban, suburban and rural areas without licensees experiencing harmful interference. As Mobile Future suggests, “administrators should update the white spaces database when carriers begin operating on particular frequencies in particular PEAs to inform unlicensed operators that white spaces devices may no longer operate on that spectrum.”⁷⁷ According to Spectrum Bridge, “a 600 MHz Licensee can use readily available GIS tools to generate a polygon, which would then be uploaded to the database as part of the registration process. This will allow the Licensee to

meet population-based benchmarks that are most easily satisfied by building out in densely populated areas, creating a disincentive to serve rural areas.

⁷⁵ TIA Comments at 15.

⁷⁶ CTIA Comments at 38; TIA Comments at 17 (“simply prohibit white space operations whenever a licensee begins any operations within its licensed area”).

⁷⁷ Comments of Mobile Future, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) (“Mobile Future Comments”) at 5.

incorporate whatever details are necessary, such as its licensed PEA boundary, without involving the database administrator in the specifics.”⁷⁸

WISPA has recommended an approach designed to minimize the burdens on licensees, maximize the benefits to consumers and ensure that 600 MHz licensees do not suffer harmful interference. The Commission should follow through on its proposal to allow unlicensed use of 600 MHz spectrum until such time as licensees actually commence operations.⁷⁹

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

In the *NPRM*, the Commission proposes a more than seventy-fold increase in the frequency with which white space devices must query the white spaces database in order to confirm channel availability, possibly requiring entire operational wide-area networks to cease operation in the event that the database cannot be successfully polled. WISPA⁸⁰ and other commenters strongly oppose this proposal because it would be unduly restrictive, and would cause loss of communications to unlicensed fixed wireless users even in the absence of actual need for spectrum for other uses.⁸¹ For example, in calling the Commission’s proposal “a huge

⁷⁸ Spectrum Bridge Comments at 6.

⁷⁹ In the WISPA Comments, WISPA proposed a definition of “commence operations.” See WISPA Comments at 17. See also Mobile Future Comments at 5 (“Commission must adopt a definition of ‘commences operations’ that protects licensees from harmful interference during the initial and testing phases of operations”). WISPA understands that the Commission is planning to initiate a separate rulemaking proceeding on this issue, and encourages the Commission to move forward.

⁸⁰ See WISPA Comments at 18-23.

⁸¹ See Wi-Fi Alliance Comments at 45 (the Commission should “revise its database requirements to focus on providing white space devices with channel validity duration and other permitted technical parameters based on device capabilities ... location accuracy, and other factors, rather than focus on re-check intervals”); Response of xG Technology, Inc., to *NPRM*, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015) at 7 (“if the Commission requires all devices to essentially go dark soon after loss of communications with the database, vast amounts

step backward,”⁸² MELD Technology explained that the dramatic increase in re-check frequency “would eliminate almost all possibility of continuity of operation for these customers. . . . Multiplying [the 24-hour re-check requirement] by 72 would be extremely cost prohibitive, likely rendering WSDs commercially infeasible for these customers.”⁸³ Microsoft agrees that the increased frequency of database re-checks “would serve no useful purpose.”⁸⁴

Only a few commenters express support for the excessive tightening of the database re-check interval. Shure and Sennheiser argue that the existing 24-hour re-check interval is not sufficient for “incumbent” wireless microphone users, who “cannot predict their spectrum needs or precise locations 24 hours in advance.”⁸⁵ But this argument ignores the fact that itinerant microphones used for ENG are 1) narrow-band devices with high immunity to possible interference from wide-band networks, 2) used for very short-distance communications (*i.e.*, a few feet), and (3) used for very short periods of time (*i.e.*, a few minutes), and therefore should not require wide-area broadband networks to shut down critical communications at a moment’s notice. This is especially true in rural areas where, as WISPA points out, “more frequent

of critical communications could conceivably be lost”); WSA Comments at 25 (“Shortening this time from 48 hours to a single polling interval of 20 minutes without a retry attempt is far too restrictive. A timescale including a configurable number of retry attempts which would allow for potential intermittent lack of connectivity should be proposed”).

⁸² Comments of MELD Technology, Inc., ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 3, 2015) at 1.

⁸³ *Id.* at 3.

⁸⁴ Microsoft Comments at 49.

⁸⁵ Shure Comments at 35. *See* Sennheiser Comments at 20.

database queries would serve absolutely no purpose, and would only reduce the network efficiency of WISPs and other users of unlicensed white space devices.”⁸⁶

WISPA suggests that, if the Commission adopts its proposal to increase the frequency of database re-checks, such rule be applied only in congested areas where ENG uses would be more prevalent.⁸⁷ As a better alternative to database re-checks every twenty minutes, WISPA agrees with WSA that the Commission could instead require the database to “push” information about wireless microphone use to the white space device.⁸⁸ As WSA states, such a requirement “would be far more efficient” and eliminate the need to increase the frequency of database re-checks.⁸⁹

IV. THE COMMISSION SHOULD CONTINUE TO PROMOTE UNLICENSED USE IN OTHER SPECTRUM BANDS.

CTIA asks the Commission to consider other bands as potential homes for unlicensed wireless microphones and white space devices.⁹⁰ It suggests that the 5 GHz band “should be closely examined” and that it “welcomes a discussion” about allowing such devices in the 3.5 GHz band.⁹¹ As the Commission is well aware, WISPA has actively participated in the proceedings leading to adoption of rules for the 5 GHz band and the 3550-3650 MHz band. WISPA agrees that the Commission should always be considering additional spectrum bands for short-range unlicensed devices, instead of potentially denying white space devices use of

⁸⁶ WISPA Comments at 22.

⁸⁷ *See id.*

⁸⁸ *See* WSA Comments at 7, 25.

⁸⁹ *Id.* at 7.

⁹⁰ *See* CTIA Comments at 41-42.

⁹¹ *Id.* at 41, 42.

spectrum in the TV bands, where superior propagation characteristics can enable WISPs to deliver broadband service to otherwise unserved customers in obstructed locations where the propagation limitations of higher-frequency spectrum would prevent the delivery of reliable broadband service.

Conclusion

The record supports adoption of Commission proposals that will increase the viability, utility and ubiquity of fixed wireless broadband deployments using TV white space spectrum. The Commission should adopt rules that will promote operational flexibility through intermediate power levels, directional antennas and, in rural areas, higher power and higher antenna elevations. The Commission should reject arguments by a few commenters that would undermine the white space ecosystem by prohibiting unlicensed operations on licensed 600 MHz spectrum when and where that spectrum is not being used for licensed services. The Commission also should reject its proposal to dramatically increase the frequency of database rechecks in a manner that would be disproportionate to the minimal intended benefit.

Respectfully submitted,

WIRELESS INTERNET SERVICE PROVIDERS ASSOCIATION

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