

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)	
)	
Unlicensed Use of the 6 GHz Band)	ET Docket No. 18-295
)	
Expanding Flexible Use in Mid-Band Spectrum)	GN Docket No. 17-183
Between 3.7 and 24 GHz)	
To: The Commission		

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

**WIRELESS INTERNET SERVICE
PROVIDERS ASSOCIATION**

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SUMMARY

WISPA's members have a strong interest in efficient access to more unlicensed spectrum to deliver fixed broadband access services. WISPA's members also use licensed 6 GHz spectrum intensively for licensed point-to-point communications. Thus, WISPA is uniquely positioned to understand both the necessity to protect incumbent licensees from harmful interference and the opportunities that exist for spectrum sharing for unlicensed users.

The record conclusively demonstrates that allocating an additional 1200 megahertz of spectrum for unlicensed use is in the public interest. Commenters have detailed a variety of technologies deployed in unlicensed spectrum to support a wide range of services and use cases and have documented both the explosive growth anticipated in such services and the inadequacy of the current unlicensed spectrum allocations to meet this demand.

To meet these needs, there is broad support for enabling higher-power, unlicensed access point and client device operations in the 5925-6425 MHz (U-NII-5) and 6525-6875 MHz (U-NII-7) bands under automated frequency coordination ("AFC"). This step will alleviate congestion in the 5 GHz band, mitigate the potential for interference among unlicensed U-NII devices, maximize rural deployment opportunities to bridge the digital divide, and meet increasing consumer demand for more bandwidth. The Commission should not limit the use of higher-power client devices to rural and underserved areas as there may be an even greater need for such operations in urban areas where current spectrum congestion is often more severe.

The record also strongly supports harmonizing the technical rules for unlicensed operations in the 6 GHz band with those already in place for the 5 GHz U-NII bands. Given the proximity of the two bands, as well as similar propagation characteristics, manufacturers are well positioned to adapt existing 5 GHz equipment quickly for use in the U-NII-5 and U-NII-7 bands.

To the extent that commenting parties oppose expanded unlicensed use at 6 GHz, the opposition predictably comes primarily from current spectrum users. But the Commission has already made plain its commitment to preserve and protect the important base of incumbent 6 GHz spectrum users. In an environment of increasing demand for spectrum, particularly in the bands below 10 GHz, it is essential that all affected parties come to the table not with a laundry list of justifications for maintaining the *status quo*, but with constructive input directed toward maximizing spectrum efficiency.

Indeed, several parties that express some initial reservations about the *NPRM* nonetheless constructively acknowledge that AFC could be a viable means of both ensuring the availability of spectrum for unlicensed use and protecting incumbent uses. There appears to be an emerging consensus on issues that will need to be resolved to make AFC a reality, including the adoption of appropriate “exclusion” or restricted zones, the means of analyzing propagation data and accurately calculating path loss, the correct technical considerations for establishing guard bands, ensuring improved transmitter and receiver parameter accuracy, and coordinating point-to-multipoint operations. Differences of opinion on these factors appear to be resolvable through the rulemaking process.

Finally, the Commission plainly concluded in the *NPRM* that it should focus on unlicensed use at 6 GHz due to the band’s proximity to the U-NII bands, and it sought no further input on new licensed use. The two mobile wireless industry commenters that perfunctorily contest this conclusion offer no additional substantive arguments to support an alternative approach. Because the United States and the European Union have both targeted these bands specifically for new unlicensed use, and not for licensed mobile operations, there is no merit to renewed consideration of this already rejected notion.

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The Wireless Internet Service Providers Association (“WISPA”), pursuant to Sections 1.415 and 1.419 of the Commission’s Rules, hereby submits Reply Comments in response to certain of the initial comments filed in the above-captioned proceedings.¹ As stated in its Comments, WISPA’s members have a strong interest in efficient access to more unlicensed spectrum to deliver fixed broadband access services.² At the same time, WISPA’s members are also making intensive use of licensed spectrum for point-to-point communications in the 6 GHz band.³ WISPA is therefore uniquely positioned both to understand the necessity to protect incumbent licensees from harmful interference and to recognize the opportunities that exist to enable spectrum to be shared for unlicensed uses.

¹ *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Proposed Rulemaking, ET Docket No. 18-295 and GN Docket No. 17-183, FCC 18-147 (rel. Oct. 24, 2018) (“*NPRM*”). The *NPRM* was published in the Federal Register on December 17, 2018. See 83 Fed. Reg. 64506 (Dec. 17, 2018).

² WISPA Comments at 1.

³ *Id.*

Discussion

I. THE RECORD SUPPORTS HIGHER-POWER UNLICENSED OPERATIONS IN PORTIONS OF THE 6 GHz BAND UNDER AFC CONTROL.

A. There is Broad Support for Introducing Unlicensed Operations at 6 GHz to Meet the Substantial Demand for Many Types of Services.

The Comments filed in response to the *NPRM* underscore the essential role of unlicensed spectrum and technologies in society today. Among other things, commenters describe a variety of standards-based and proprietary technologies that have been deployed on unlicensed spectrum to support a wide range of applications and use cases, from in-home device connectivity to health care to education to manufacturing, transportation, and energy efficiency.⁴ These commenters further describe the explosive growth anticipated in such applications and the inadequacy of the current, already congested allocations of unlicensed spectrum to meet this demand.⁵

B. Multiple Types of Unlicensed Devices Will Need to Operate at Higher Power to Meet Current Needs.

What must be kept in mind, however, is the equally-pressing need for higher-power unlicensed operations to provide the underlying broadband access necessary to enable these important services and innovations, particularly in rural and underserved areas where many Americans have little or no broadband access, as well as in more urban areas that are spectrally constrained. For example, GE Healthcare describes a multitude of innovative and advanced applications and technologies that can significantly enhance the quality of medical service and

⁴ See, e.g., Apple, Inc., Broadcom, Inc., *et al.* (“Apple/Broadcom Group”) Comments at 7-8; Boeing Co. Comments at 3-4; GE Healthcare Comments at 2-4; Midcontinent Communications Comments at 1-2; Netgear Comments at 1; Open Technology Inst. at New America, *et al.* (“Public Interest Org”) Comments at 8-13; Wi-Fi Alliance Comments at 2-5.

⁵ See Apple/Broadcom Group Comments at 8-9; GE Healthcare Comments at 5-6; Wi-Fi Alliance Comments at 5-7; Broadcom Comments at 25-26; Microsoft Corp. Comments at 2-3; Hewlett Packard Enterprise Co. (“HPE”) Comments at 5-6; Cisco Systems, Inc. Comments at 3-8.

care that hospitals and clinics can provide.⁶ However, these benefits cannot be fully realized if a hospital or clinic does not itself have access to broadband service, as is the case across many rural and underserved areas in America.⁷

Accordingly, WISPA again urges the Commission to allow higher-power, unlicensed fixed client, as well as access point, operations in the 5925-6425 MHz (U-NII-5) and 6525-6875 MHz (U-NII-7) bands under the control of an automated frequency coordination (“AFC”) system,⁸ a recommendation that is supported by many commenters in this proceeding in addition to WISPA.⁹ Enabling higher-power fixed client operations in this 850 megahertz of spectrum, subject to AFC to ensure incumbents are protected from harmful interference, will alleviate congestion in the 5 GHz band, mitigate the potential for interference among unlicensed U-NII devices, maximize rural deployment opportunities, and meet increasing consumer demand for more bandwidth. Given the Commission’s desire to maximize rural deployment and bridge the digital divide, authorizing higher-power operations in the U-NII-5 and U-NII-7 bands clearly will promote that objective. As the Public Interest Organizations state, “permitting higher-power operations in the U-NII-5 and U-NII-7 bands (under AFC control) provides the opportunity to use spectrum as public infrastructure to provide high-capacity broadband at affordable prices to rural, tribal and underserved areas across the country at no cost to the U.S. Treasury.”¹⁰

⁶ GE Healthcare Comments at 2-5. *See also* Public Interest Org Comments at 11.

⁷ *See, e.g.*, Computing Technology Industry Ass’n (“CompTIA”) Comments at 1; Public Interest Org Comments at 22-23.

⁸ WISPA Comments at 2.

⁹ *See, e.g.*, Apple/Broadcom Group Comments at 3 and 6-7; Broadcom Comments at 36-37 and 38-39; Starry Comments at 2-3; Public Interest Org Comments at 21-25; Wi-Fi Alliance Comments at 28; Facebook, Inc. Comments at 5 and 9; Charter Communications, Inc. Comments at 3; NCTA Comments at 3; Cambium Networks, Ltd. Comments at 3-5; Netgear Comments at 3.

¹⁰ Public Interest Org Comments at 24-25.

A significant number of commenters agree with WISPA that the Commission should allow higher-power outdoor use for both point-to-point and point-to-multipoint operations.¹¹ According to Broadcom, “[a]uthorizing outdoor point-to-point and point-to-multipoint operations in the 6 GHz band is in the public interest because it will support the efficient expansion of broadband services to rural and underserved communities.”¹² Starry states that point-to-multipoint deployments “are essential to fixed wireless providers,”¹³ while the Public Interest Organizations state that mid-band unlicensed spectrum for point-to-multipoint operations “can serve as the public infrastructure that enables high-speed broadband in underserved areas at a fraction of the cost of fiber and other wireline technologies.”¹⁴ Moreover, Broadcom and the Public Interest Organizations agree with WISPA that the AFC is capable of determining protection contours irrespective of whether the unlicensed operations are point-to-point or point-to-multipoint, and professional installation will ensure that point-to-multipoint access points and higher-power devices are properly oriented and installed.¹⁵

Finally, Starry, CompTIA, Cambium, and the Public Interest Organizations agree with WISPA that the Commission should not limit the use of higher-power client devices to rural and

¹¹ See WISPA Comments at 10-11; Broadcom Comments at 38-39; Facebook Comments at 8; Starry Comments at 2-3; Public Interest Org Comments at 21-22; Cambium Comments at 4-5. See also NCTA Comments at 10 (stating that NCTA “would support higher power operations on a fixed P2P or fixed point-to-multipoint (P2MP) basis in rural and underserved areas ...”).

¹² Broadcom Comments at 38. See also Public Interest Org Comments at 22 (“Nor is there a reason to preclude point-to-multipoint (P2MP) deployments, which are needed most in rural and underserved areas.”).

¹³ Starry Comments at 3.

¹⁴ Public Interest Org Comments at 24.

¹⁵ WISPA Comments at 10; Broadcom Comments at 39-40 (“In nearly every respect, AFC systems that work for conventional unlicensed operations will work in the same way for the outdoor point-to-point and point-to-multipoint operations WISPs require.”); Public Interest Org Comments at 21-22.

underserved areas.¹⁶ In urban areas, congestion is often more severe, and there may be a greater need for higher-power operations. WISPA agrees with Starry that “[t]his artificial geographic limitation is unnecessary” because these operations will require the use of AFC, and the AFC will be able to adequately protect licensed operations in the area.¹⁷ WISPA further agrees with Starry that “whether an area is ‘rural’ – however defined – has no direct correlation on whether the spectrum will be congested,” and that unserved or underserved areas “exist all over the country, including in urban areas.”¹⁸

Overall, there is broad support for enabling higher-power, unlicensed access point and client device operations in the U-NII-5 and U-NII-7 bands under AFC control, which will drive innovation, competition, investment and deployment that will accelerate access to fixed broadband services. As WISPA observed in its initial comments, this result would be consistent with a primary Commission objective: “The broad swaths that we propose making available in this frequency band could promote new technology and services that will advance the Commission’s efforts to make broadband connectivity available to all Americans, *especially those in rural and underserved areas.*”¹⁹

¹⁶ See WISPA Comments at 10; Starry Comments at 2-3; CompTIA Comments at 2; Cambium Comments at 4-5; Public Interest Org Comments at 2 and 21 (“[a]lthough rural broadband deployment would be a primary beneficiary of a rule permitting higher-power operations, the Commission should not impose any limitation that would prevent higher-power operations from being used wherever the AFC authorizes interference-free access.”).

¹⁷ Starry Comments at 3.

¹⁸ *Id.*; See also CompTIA at 2 (“[The 6 GHz] band can be used to expand coverage and increase capacity in rural areas while simultaneously providing high-speed wireless broadband in dense urban areas.”).

¹⁹ NPRM at 2 ¶ 1 (emphasis added).

C. The Commission Should Harmonize the Technical Rules for Unlicensed Operations at 6 GHz with the Existing Rules that Apply to the 5 GHz U-NII Bands.

The record also strongly supports harmonizing the technical rules for unlicensed operations in the 6 GHz band with those already in place for the 5 GHz U-NII bands, which “are proven to support real-world deployment scenarios and consumer needs.”²⁰ The W-Fi Alliance agrees with WISPA that, if the rules permit, existing 5 GHz U-NII equipment can be easily certified for operation in the U-NII-5 and U-NII-7 bands and fixed wireless broadband providers would quickly deploy service to relieve congestion in the 5 GHz band and provide higher quality service to consumers.²¹ Given the proximity of the 5 GHz U-NII band, as well as the similar propagation characteristics, manufacturers are well positioned to quickly adapt their existing 5 GHz equipment to operate in the U-NII-5 and U-NII-7 bands, and harmonization would enable manufacturers to leverage common technologies and economies of scale.²²

From the operator’s perspective, the propagation characteristics of the 5 GHz and 6 GHz bands are very similar and well known to WISPs and other spectrum users, making deployment and coverage more predictable, particularly if the rules for these bands are harmonized.²³ According to Broadcom, “[b]ecause WISPs already extensively use Part 15 operations in the neighboring (and congested) 5 GHz band, they will be able to quickly take advantage of the

²⁰ NCTA Comments at 9; *See also* WISPA Comments at 2-3 and 11-13.

²¹ Wi-Fi Alliance Comments at 32 (*quoting* Letter from Stephen E. Coran, WISPA Counsel, to Marlene H. Dortch, FCC Secretary, GN Docket No. 17-58, ET Docket No. 18-295 and GN Docket No. 17-183 (filed Oct. 17, 2018)); *See also* Boeing Comments at 4; Broadcom Comments at 39; Midcontinent Communications Comments at 2-3; Public Interest Org Comments at 21.

²² *See*, Apple/Broadcom Group Comments at 14 (“Our companies and organizations are committed to rapidly bringing products to market to allow consumers and businesses to realize the full potential of 6 GHz.”). *See also* Microsoft Comments at 4; NCTA Comments at 9.

²³ *See, e.g.*, Public Interest Org Comments at 21.

6 GHz opportunity by modifying their 5 GHz equipment and leveraging their knowledge of FS operations to design systems that maximize their Part 15 operations while still protecting fixed links.”²⁴ WISPA reiterates, however, that harmonization of the technical rules for the 5 GHz and 6 GHz U-NII bands should allow for both standard-based (*e.g.*, Wi-Fi, LTE) and proprietary equipment to foster different use cases, most notably in rural areas.²⁵

II. THOSE OPPOSING UNLICENSED USE IN THE 6 GHz BAND HAVE NOT PROVIDED A CREDIBLE BASIS TO REJECT THE COMMISSION’S APPROACH TO THE BAND.

To the extent that commenting parties oppose expanded unlicensed use, these opponents are predictably composed primarily of currently licensed incumbents and unlicensed wideband and ultra-wideband users operating in the band.²⁶ Unfortunately, a number of these commenters devote lengthy, ultimately superfluous sections of their filings simply to reiterating the breadth and importance of existing spectrum uses,²⁷ matters that were raised in response to the *NOI* and

²⁴ Broadcom Comments at 39.

²⁵ WISPA Comments at 2-3 and 12. *See also* Verizon Comments at 11-12 (“As long as new entrants comply with FCC rules and implement techniques to coexist with other unlicensed users, the Commission should maintain its longstanding policy of technological neutrality with respect to unlicensed devices.”).

²⁶ *See, e.g.*, Association of American Railroads Comments at 1 (“Introduction of unlicensed services into the 5.925-7.125 GHz band ... will create an intolerable risk of interference to incumbent communications systems”); Joint Comments of Los Angeles County, California, the City and County of Denver, Colorado, the City of Kansas City, Missouri, Ozaukee County, Wisconsin, San Bernardino County, California, the Regional Wireless Cooperative and the Government Wireless Technology & Communications Association (the “Joint Comments”) at 6 (“The Joint Commenters are adamantly opposed to any ‘sharing’ of the 6 GHz band in which their microwave links exist”); Globalstar Comments at 1 (“any benefits from adding the 6875-7125 MHz band to the Commission’s inventory of unlicensed spectrum would be far outweighed by the significant harms resulting from this action”); UTC Comments at i & 3-5 (“Any benefit from the expansion of unlicensed operations in the 6 GHz band is outweighed by risking interference to mission-critical communications and therefore is not in the public interest”); AT&T Comments at 4; Alteros, Inc. Comments at 1-2; Ultra Wide Band Alliance (“UWB Alliance”) Comments at 3-4.

²⁷ *See, e.g.*, Critical Infrastructure Coalition Comments at 2-9; City of Los Angeles Comments at 4-10; Joint Comments at 1-5; UWB Alliance Comments at 4-8.

both acknowledged and extensively discussed in the *NPRM*.²⁸ The Commission has already made plain its “commitment to preserve and protect the important base of incumbent users in these frequency bands.”²⁹ Given the realities of modern spectrum use and demand, however, it should go without saying that the mere existence of significant existing deployments is an insufficient justification for obstructing necessary, pragmatic efforts to facilitate spectrum sharing and maximize the utility of each frequency band. Blanket objections and claims to hegemonic dominion over particular bands to the exclusion of potentially compatible uses does not serve these public interest goals.

Also unhelpful in considering the issues raised in the *NPRM* are efforts to limit artificially the scope or operating parameters available to unlicensed fixed wireless users by either unnecessarily constraining such uses to specific bands³⁰ or arbitrarily limiting power levels without regard to specific use situations.³¹ Once the subject bands are authorized for unlicensed use, the extent of operations should be governed not by rigid *a priori* conditions but by what is feasible based on coordination through AFC of existing uses and proposed unlicensed operations within a relevant geographic area. This is simply sound policy given wide disparities in current use conditions in different 6 GHz sub-bands and in different areas of the country, differences that

²⁸ See *NPRM* at 4-6 (¶¶ 8-13)

²⁹ *NPRM* at 2 (¶2).

³⁰ See Alteros Comments at 9 (“Alteros urges the Commission to allow new unlicensed broadband authorizations only in the 5.925 – 6.1 GHz portion of the 6 GHz band”); AFCCE Comments at 2 (“AFCCE urges the Commission not to permit unlicensed operations in any of the bands authorized for mobile broadcast”); SBE Comments at 10 (“the Commission should proceed cautiously (as it did with UWB sixteen years ago) by making available only the band 5.925-6.100 GHz for unlicensed mobile broadband use”).

³¹ See Sirius XM Radio Comments at 13 (“Under no circumstances should the Commission open the door to higher power or to outdoor operations in the U-NII-8 band”); Critical Infrastructure Coalition Comments at 14; Decawave Comments at 8; NXP USA Comments at 4; Zebra Technologies Comments at 5.

are not dictated simply by urban or rural locations but by unique existing usage patterns within each band.

Several ultra-wideband (“UWB”) vendors raise objections to operating unlicensed devices above 6100 MHz.³² UWB devices already operate on an unlicensed basis under Part 15F of the Commission’s Rules. As an unlicensed service, UWB is not afforded protection against interference; it is instead required to protect licensed services, just as the proposed AFC will. Unlicensed devices have always evolved to coexist with one another. Today’s 5 GHz devices are considerably more advanced than those available during the initial years of the band’s availability under Parts 15C and 15E. WISPA sees no reason to afford UWB applications enhanced protection not currently provided in the Commission’s Rules against the slight risk of interference that may arise from the development of other unlicensed operations. The proposal of the Ultra Wide Band Alliance (“UWB Alliance”) and others to essentially limit operating parameters to those already available under UWB rules³³ ignores the very real market requirements of both the fixed and portable devices that now make use of the U-NII bands.

UWB’s objections are particularly ironic. UWB technology was originally touted as a technological advancement precisely because it could coexist with other users of the same frequencies.³⁴ By spreading its power across a wide swath of spectrum with a very low power

³² See, e.g., Alteros Comments at 9 (“Alteros urges the Commission to allow new unlicensed broadband authorizations only in the 5.925 – 6.1 GHz portion of the 6 GHz band”)

³³ See UWB Alliance, Revised Comments, at 3 (“Specify out of band emissions not to exceed -61 dBm/MHz” or “[1] Include maximum transmit duty cycle requirements for use of standard-power operation, and [2] Specify lower power levels for the remainder of the band (6.1 to 7.125 GHz)”).

³⁴ UWB devices are “capable of spreading the signal levels over such a wide bandwidth that the emissions would appear to be similar to background noise” and “UWB systems are able to employ gain processing on the received signal and can operate in the presence of higher-powered transmission systems without receiving interference.” *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, Notice of Inquiry, 13 FCC Rcd 16376, 16378 (¶ 4) & 16379 (¶ 9) (1998).

spectral density, it would have a negligible impact on other users. Now that UWB operations have become established as niche applications, however, providers appear to seek the very same type of exclusionary protection that UWB was intended to overcome, only over that very wide swath of spectrum that it has found useful.

In an environment of increasing demand for spectrum, particularly in the bands below 10 GHz, it is essential that all affected parties come to the table not with a laundry list of creatively embroidered justifications for maintaining the *status quo*, but with constructive input directed toward maximizing spectrum efficiency. This is not a circumstance where, as argued by AT&T, those seeking to introduce new operations into the band uniquely “bear the burden of demonstrating, by clear and convincing evidence, that the proposed uses would cause no harmful interference.”³⁵ While proponents of a new allocation must make a sound case for spectrum sharing that avoids harmful interference to the existing users, all parties bear a burden to come forward with information that positively serves the goal of enhanced spectrum use. Parties with existing operations cannot simply dig in their heels and resist.

Some parties expressing reservations about the proposal advanced in the *NPRM* nonetheless constructively acknowledge that establishing AFC procedures is a reasonable means of both ensuring the availability of spectrum for unlicensed use and protecting incumbent licensees.³⁶ This recognition of the need for creative problem-solving is laudable and should be a launching point for further refinement of the AFC proposals outlined in the *NPRM*. Even Fixed Service (“FS”) users and entities representing their interests recognize that a well-designed

³⁵ AT&T Comments at 4.

³⁶ See, e.g., National Public Safety Telecommunications Council Comments at 10-11; Southern Company Services Comments at 13 *et seq.*

AFC can protect incumbent users. Some differences – which WISPA believes are resolvable – continue to exist with respect to the details of AFC, but there is significant agreement with this general concept, as detailed below.

III. THE COMMISSION CAN ESTABLISH AN AFC CAPABLE OF PREVENTING HARMFUL INTERFERENCE TO INCUMBENT SPECTRUM USERS FROM WIDELY-DEPLOYED UNLICENSED DEVICES.

As noted in a recent study released by the Dynamic Spectrum Alliance (“DSA”), “the use of databases to coordinate more intensive and efficient spectrum sharing has emerged as a critical regulatory tool ... to manage real-time assignments in shared bands and to protect incumbent operations (including military and public safety systems) from harmful interference.”³⁷ A diverse range of commenters are at least open to the concept of AFC.³⁸ Given the general acceptance and emerging necessity of such mechanisms, it is unsurprising that the Fixed Wireless Communications Coalition (“FWCC”), which represents a broad array of incumbent FS interests, has among the most detailed suggestions on how to implement AFC, including the following overarching approach:

- (1) map out the three-dimensional “exclusion zone” around each FS receive antenna within which a Radio Local Area Network (“RLAN”) could cause interference;
- (2) determine whether each RLAN that seeks to transmit is within one or more of those zones;
- (3) if so, use local propagation data to assess whether the RLAN signal threatens interference to an FS receiver; and

³⁷ Dynamic Spectrum Alliance, “Automated Frequency Coordination: An Established Tool for Modern Spectrum Management,” at 6 (March 2019) (“DSA AFC Report”).

³⁸ See, e.g., Apple/Broadcom Comments at 4-5 & 39-49; Alteros Comments at 13; Association of American Railroads Comments at 5-9; DSA Comments at 3 *et seq.*; HPE Comments at 22-28; Idaho Power Co. Comments at 6-7; Lincoln County Sheriff’s Office Letter at 1; Microsoft Comments at 15-21; Motorola Solutions Comments at 2 *et seq.*; National Public Safety Telecommunications Council Comments at 10-11; Qualcomm Comments at 3-4 & 11-12; UWB Alliance Comments at 8.

(4) if so, prohibit the RLAN from operating on interfering frequencies.³⁹

WISPA's initial comments described a similar approach, at least in general terms.⁴⁰

“Exclusion Zones.” WISPA agrees that the “exclusion zone” should be a three-dimensional space that considers antenna elevation. The term “exclusion zone,” however, requires some clarification, inasmuch as operation should not necessarily be entirely excluded from such a zone, but should be subject to further scrutiny.⁴¹ Any proposed unlicensed operation would then be mapped to a relevant zone to determine which FS operations it potentially would interfere with, and which are therefore subject to the additional testing.

Propagation Data. WISPA agrees that propagation between the unlicensed transmitter and the FS receiver needs to be modeled by the AFC to determine if sufficient path loss exists. If path loss is low enough that interference is possible, then the unlicensed operation would need to avoid that FS receiver's frequency range.

Given WISPA's agreement with this model approach at a fundamental level, a primary issue to be settled in this proceeding is the nature of the AFC's propagation model. This undertaking will involve resolution of some complex issues, but significantly fewer than the Spectrum Access System (“SAS”) now being tested for the Citizens Broadband Radio Service (“CBRS”).⁴² Because the AFC is far simpler to design and implement than the SAS, the time to

³⁹ FWCC Comments at 4.

⁴⁰ See WISPA Comments at 16-26.

⁴¹ See, e.g., DSA AFC Report at 48 (noting “increasing move toward ‘dynamic protection areas,’ rather than the rigid and overly-protective ‘exclusion zones’”).

⁴² *Id.* at 40 (“Because the incumbent radios licensed in the 6 GHz band are fixed and change very infrequently, the coordination process for the 6 GHz band is expected to be simpler and more streamlined than the dynamic SAS used to coordinate sharing with Navy radar in the 3550-3700 MHz CBRS band”).

market should be significantly less and the market price for AFC-protected service is likely to be lower than for the SAS.

Path Loss Calculations. The primary concern for AFC, therefore, is not that it is too costly, but that it could be required to use overly-simplified models that underestimate path loss and thus limit the use of frequencies that would, in practice, be harmless. FWCC agrees that “[t]he calculation can take into account any obstacles known to be in the path, such as buildings, terrain, and curvature of the Earth.”⁴³ It is also preferable that other clutter, including natural ground cover, be considered, when known, as foliage causes very high attenuation at 6 GHz. FWCC agrees to an extent here as well, but also states that “where the path details are not known, then the interference calculation must assume free-space propagation.”⁴⁴ To achieve maximum accuracy, however, the better course is for terrain always to be considered, given the fact that terrain data is readily available, and a reasonable estimate of clutter loss based on known factors should be acceptable in the absence of specific data. For instance, outside of urban areas, the National Land Cover Database available from the U.S. Geological Survey, classifying land cover by the arc-second, should provide a sufficient level of clutter detail to allow a higher path loss than free space to be used in many areas. As noted in the recent DSA AFC Report, “database coordination creates an opportunity to achieve more intensive and efficient use of a band by incorporating detailed GIS data (e.g., on terrain and clutter) and even dynamic data (e.g., from spectrum sensing) that reflect the real-world spectrum environment on a very localized basis and thereby support far more sophisticated propagation and interference modeling.”⁴⁵ Exact

⁴³ FWCC Comments at 13.

⁴⁴ *Id.* at 14.

⁴⁵ DSA AFC Report at 11.

details of how this is factored in to the path loss calculation is something best left to either AFC operators or a multi-stakeholder group.

Database Query Interval. WISPA disagrees with FWCC's preference that devices should be required to query the AFC every 24 hours.⁴⁶ While the AFC database should be updated daily, changes in FS licensing do not occur immediately. Most applications take more than a month to process fully. If the AFC is updated as applications are filed and rejects authorization of frequencies that are expected to be brought into use in the near term, then a longer polling interval should suffice. This approach would help keep the cost of the AFC down.

Guard Bands. FWCC calls for a guard band between the frequencies assigned to an RLAN by the AFC and the frequencies used by FS.⁴⁷ The selectivity of current-generation FS receivers, which make use of digital signal processing as well as traditional filters, should be the basis of any guard band requirement. The same considerations should also govern the relevant signal levels. The AFC should be able to factor in both a standard selectivity curve for the FS receiver and the actual out-of-channel slope for the proposed unlicensed device. The spectrum mask of Wi-Fi devices varies considerably from the nominal standard. Other Part 15 devices, including some systems used by WISPs, have a tighter spectrum mask, and thus put less of a signal into adjacent channels. Accordingly, WISPA disagrees with FWCC's speculation that "case-by-case calculations that may be too involved for an automatic AFC system."⁴⁸ Of course, adjacent-channel AFC-controlled operations must be prevented from causing harmful interference to FS users, but excessive protection based upon imprecise assumptions about

⁴⁶ FWCC Comments at 13.

⁴⁷ *Id.* at 25-28.

⁴⁸ *Id.* at 27.

device performance will reduce spectrum efficiency. Spectrum masks are routinely tested as part of the Commission's equipment authorization process and optional mask-test parameters for AFC-controlled devices could be reported to the AFC. This would also provide manufacturers with an incentive to improve their signal purity.

Parameter Accuracy. FWCC questions the adequacy of data in the Commission's Universal Licensing System ("ULS") to perform automated coordination functions protecting receivers.⁴⁹ WISPA understands that there may be inaccuracies in ULS and has called for a window for FS licensees to correct their entries in a manner similar to efforts recently undertaken and ongoing to improve the accuracy of the International Bureau's database of satellite Earth stations operating in the C-band downlink frequencies. FS operators should not be required to pay a filing fee in order to protect themselves against unlicensed operations, but they should be required to maintain accurate information. FWCC states that "[a]pplication filing fees being statutory, we understand the Commission would have to seek the necessary relief from Congress."⁵⁰ Nonetheless, "[t]he Commission may waive or defer payment of an application fee in any specific instance for good cause shown, where such action would promote the public interest."⁵¹ Correcting accumulated errors before they are put into use in AFC clearly serves the public interest, and thus a waiver of fees should be acceptable. The National Association of Broadcasters points out that in 1999, when some fixed Broadcast Auxiliary Service ("BAS") licenses were imported into the new BAS database, receiver locations were lost.⁵² This may not have seemed critical at the time, but protected receiver locations do need to be available to the

⁴⁹ *Id.* at 28.

⁵⁰ *Id.* at 29.

⁵¹ 47 U.S.C. §158(d)(2).

⁵² NAB Comments at 14.

AFC, especially if any of the U-NII-8 band is to be made available for AFC-controlled use.

These licensees should of course should not need to pay an application fee in order to correct such errors or omissions.

Point-to-Multipoint Operations. Finally, FWCC states its “doubt that point-to-multipoint RLAN systems can be coordinated reliably.”⁵³ This assertion is made without any supporting analysis. AFC can coordinate the higher-powered client devices of a point-to-multipoint system the same way it coordinates the access point. If one or more potential clients cannot use a given frequency that is available to the access point, then those clients should be allowed to briefly connect to the access point, be informed by the AFC that the frequency is unavailable, and then either discontinue transmission or only transmit on frequencies that the AFC does make available to them. Prefix puncturing, carrier aggregation, and other state-of-the-art air interface features can allow clients to operate on subsets of the frequencies available the access point. A similar brief transmission is used by TV White Space devices under Part 15 of the Commission’s Rules.⁵⁴

WISPA’s remaining disagreements with FWCC are largely a matter of nuance and detail that should be capable of resolution through further discussion and analysis. Other commenters, however, have made broad critiques of AFC-controlled operation that would greatly exceed what is necessary to protect their existing operations. Southern Company, for example, states that it “does not believe that it is prudent or possible to introduce unlicensed devices in the 6 GHz band without unwarranted risk of interference to the critical licensed systems.”⁵⁵ It then immediately

⁵³ FWCC Comments at 34.

⁵⁴ See 47 C.F.R. §15.711(c)(ii)(2)(iv).

⁵⁵ Southern Company Comments at 13.

suggests, in the context of discussing the possibility of AFC, that the AFC operator must itself be responsible for verifying the location of all of its customers' devices.⁵⁶ Such a requirement is not practical in real-world operations. The party that operates the device must be responsible for the accuracy of information that it provides to the AFC. Unreasonable requirements imposed on an AFC operator would create disproportionate legal disincentives to performing the AFC function, and would impose potential liability on the wrong entity.

Microsoft takes the position that the AFC should not be standardized, but that instead, equipment should be certified "with its controlling AFC as a pair."⁵⁷ This is the model employed for TV White Spaces, but it has not proven optimal, especially as some white space database operators exited the business. The multi-stakeholder standard model used in CBRS, where standard SAS interfaces have been defined by the Wireless Innovation Forum, allows users more choice, and protects users if a SAS ceases operations. While WISPA does not necessarily wish to prohibit decentralized or vendor-specific AFC operators, the Commission should allow devices to be approved against an industry-standard interface, as is done for CBRS.

Computational complexity should not be a problem for AFC. Path calculations from a controlled higher-power unlicensed device to a protected FS receiver within an exclusion zone that includes the device are computationally trivial by today's standards. To give an example, generating a coverage area map for the purpose of filling out a Form 477 requires computing path loss from a base station to thousands, perhaps millions, of points. This is typically done within minutes on a standard personal computer. The DSA correctly notes the existence of "significant improvements in computer power to efficiently and rapidly run advanced

⁵⁶ *Id.* at 13.

⁵⁷ Microsoft Comments at 21.

propagation analyses and coordinate devices and users in near real-time.”⁵⁸ FS operations do not change in real time; nightly calculations based upon the day’s application updates from ULS should be sufficient to verify which frequencies will remain available to higher-power unlicensed users in the near term. WISPA agrees with DSA that monthly checks should suffice⁵⁹ and disagrees with those entities that argue that unlicensed devices would need to poll daily, as discussed above. Accordingly, the polling rate to the AFC, even with millions of devices, will not be very high, in stark contrast to the five-minute heartbeat interval required in CBRS.

* * * * *

As detailed in the DSA AFC Report: “There is no question that today we have the technical ability to automate frequency coordination and thereby lower transaction costs, use spectrum more efficiently, speed time to market, protect incumbents from interference with greater certainty, and generally expand the supply of wireless connectivity that is fast becoming an input into every other industry in advanced economies.”⁶⁰

IV. CONSIDERATION OF THE UPPER 6 GHz BAND FOR LICENSED MOBILE USE WAS PROPERLY REJECTED AT THE INQUIRY STAGE AND THERE IS NO BASIS IN THE RECORD FOR RESURRECTING THIS NOTION.

The Commission queried in its *Notice of Inquiry* whether licensed mobile use might be appropriate in a portion of the 6 GHz band.⁶¹ In the *NPRM*, however, the Commission made plain its conclusion that it would instead “focus on unlicensed use due to the band’s proximity to the U-NII bands, which have hosted extensive unlicensed device innovation and deployment.”⁶²

⁵⁸ DSA Comments at 4.

⁵⁹ *Id.* at 10.

⁶⁰ DSA AFC Report at 7.

⁶¹ *See Mid-Band NOI*, 32 FCC Rcd at 6383-84 (¶ 31).

⁶² *NPRM* at 8 (¶ 19).

Despite this focus, and the absence of any further Commission inquiries regarding licensed, exclusive-use mobile operations in the band, two commenters continue to press for such use – CTIA and just one of its several hundred members, Ericsson.⁶³ CTIA goes so far as to advocate initiation of a separate rulemaking to consider licensed use in all of the subject bands other than the U-NII 5 band at 5925-6425 MHz,⁶⁴ a step that would substantially undermine the Commission’s efforts and preliminary conclusions in this proceeding.

Notably, none of the other prominent CTIA members that filed initial comments reinforced the trade association’s isolated view. T-Mobile did not file comments in this round. AT&T was silent on the issue.⁶⁵ Nokia focused its comments on the appropriate implementation of an AFC to protect incumbent users.⁶⁶ And while Verizon included a brief section at the end of its comments calling generally for additional mid-band spectrum allocations for licensed use, it does not suggest that such opportunities should be made available within the spectrum bands that are at issue in this proceeding.⁶⁷

CTIA’s own references to other countries that have recently made additional mid-band spectrum available for licensed use do more to undermine than support its argument for such use at 6 GHz, as it is unable to assert that any of these other administrations have made such allocations in the 6 GHz range.⁶⁸ To date, both the United States and the European Union have

⁶³ See CTIA Comments at 7-9; Ericsson Comments at 5-16.

⁶⁴ See CTIA Comments at 9-10.

⁶⁵ See AT&T Comments 4-5 (focusing its comments on protection of existing fixed point-to-point backhaul links in the 6 GHz band).

⁶⁶ See Nokia Comments at 1-5.

⁶⁷ See Verizon Comments at 12-14.

⁶⁸ See CTIA Comments at 4-5 and Analysys Mason Report cited therein, David Abecassis, Janette Stewart, Michael Kende & Chris Nickerson, *Final report for CTIA Mid-band spectrum global update*, ANALYSYS MASON (Nov. 2018), at 2-3 and 5-6, available at <https://api.ctia.org/wp-content/uploads/2018/12/Analysys-Mason-Mid-Band-Spectrum-Global-Update.pdf>

targeted the 6 GHz bands only for new unlicensed use. Accordingly, there is no basis in the record for the further notice of proposed rulemaking that CTIA advocates, or any outcome other than the present focus on unlicensed operations that the Commission has proposed.

V. CONCLUSION

The record demonstrates that the public interest would benefit from an additional 1200 megahertz of unlicensed spectrum; 850 megahertz should be made available for higher-power use to support rural broadband deployment, industrial Internet of things and other innovative services. No commenter has argued effectively that a simple AFC cannot perform the vital interference protection functions that incumbent licensees, including many WISPA members, will require. Spectrum sharing is no longer an engineering and policy vision, but a proven reality that is necessary to meet consumer demand.

Respectfully submitted,

**WIRELESS INTERNET SERVICE
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