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Via Electronic Filing

October 31, 2019

Marlene Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: **Ex Parte Communication**

ET Docket No. 18-295: *Unlicensed Use of the 6 GHz Band; and*

GN Docket No. 17-183: *Expanding Flexible Use of Mid-Band Spectrum Between 3.7 GHz and 24 GHz*

Dear Ms. Dortch:

In my recent meetings with Commission staff, I emphasized that it would be contrary to the public interest to mandate the use of automatic frequency coordination (“AFC”) for unlicensed access to the 5925-7125 MHz (the “6 GHz”) band for *all* use cases.^{1/} Doing so would effectively preclude use of the 6 GHz band for years, while commercially-available AFC systems are developed and certified, halting the growth of the Wi-Fi ecosystem and undermining the Commission’s goals of advancing broadband connectivity and securing U.S. leadership in the next generation of wireless services. And the record demonstrates that because low power indoor (“LPI”) and very low power (“VLP”)^{2/} devices do not pose a risk of interference to incumbent 6 GHz operations, access to the 6 GHz band should not be conditioned on the use of an AFC system for these applications.^{3/}

^{1/} Letter from Alex Roytblat, Senior Director of Regulatory Affairs, Wi-Fi Alliance, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-295 (filed Oct. 16, 2019).

^{2/} LPI devices address the majority of the consumer segment, which are deployed singly or in very small groups, exclusively indoors, while VLP devices address short-range, high-bandwidth scenarios like Fifth Generation (“5G”) wireless gigabit mobile tethering (including automotive use cases), as well as new “last meter” applications like augmented reality, virtual reality, Internet of Things, and direct peer-to-peer connections.

^{3/} See, e.g., *Reply Comments of Wi-Fi Alliance*, ET Docket No. 18-295 at 9-16 (filed Mar. 18, 2019) (“WFA Reply Comments”).

Nevertheless, Wi-Fi Alliance recognizes that unlicensed access to the 6 GHz band through an AFC will best protect incumbent operations in *standard power use cases*.^{4/} As it has noted, AFC rules for standard power use cases should be focused on performance-based requirements that ensure protection from harmful interference for licensed incumbents, rather than mandates as to the manner in which an AFC system achieves the desired level of protection.^{5/} In order to facilitate the Commission’s consideration of rules governing AFC system operations for standard power unlicensed devices in the 6 GHz band, Wi-Fi Alliance offers the following proposals.

General Obligations on AFC Systems and AFC System Operators

Wi-Fi Alliance expects that the Report and Order in this proceeding will establish the general framework pursuant to which AFC systems will be deployed, and that the Commission will ultimately be required to develop criteria under which it will consider applications or proposals from entities that wish to serve as AFC operators. The following are the general principles that the Commission should establish in the Report and Order regarding AFC operations:

- While the Commission has proposed that AFC-controlled standard-power operations be permitted in the U-NII-5 and U-NII-7 bands,^{6/} the use of an AFC also will allow such operations in the lower 100 megahertz of the U-NII-8 band (*i.e.*, the 6875-6975 MHz band).^{7/}
- AFC systems should enable protection of licensed incumbents from emissions from both standard power access points (“AFC devices”) and associated client devices^{8/} based on information contained in the Commission’s public databases, with no requirement to use additional, third-party information.
- AFC systems should update licensed incumbent information every 24 hours, synchronizing with the Commission’s databases.

^{4/} Standard power, AFC-controlled access points are expected to address enterprise and service-provider segments, deployed with on-premises or cloud controllers. Reference to “AFC devices” means standard power access point devices required to communicate with an AFC system.

^{5/} See, *e.g.*, *WFA Reply Comments* at 23. Wi-Fi Alliance has described three basic models for AFC implementation using centralized and decentralized architecture. See Letter from Alex Roytblat, Senior Director of Regulatory Affairs, Wi-Fi Alliance, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-295 (filed Aug. 12, 2019). Flexibility in enabling both centralized and decentralized architecture will ensure a vibrant AFC ecosystem and enable continued innovation to allow higher levels of competition and lower cost services for consumers. Flexibility is essential to enable different use cases – a centralized model may be most appropriate for service/provider enterprise deployments, while a decentralized model may be more appropriate for consumer and IoT implementations. Wi-Fi Alliance is developing compliance specifications to cover both architectures.

^{6/} See *Unlicensed Use of the 6 GHz Band, et al.*, Notice of Proposed Rulemaking, 33 FCC Rcd 10496, ¶ 22 (2018); *id.* at App’x B, proposed rule 47 C.F.R. § 15.407(k)(1).

^{7/} The U-NII-5 band is at 5.925-6.425 GHz, U-NII-7 is at 6.525-6.875 GHz, and U-NII-8 is at 6.875-7.125 GHz.

^{8/} To manage potential interference from client devices, the AFC must include an additional buffer in its calculation of the permitted-frequency list to account for client devices that may be operating at the outer boundaries of the AP’s own range (*i.e.*, a worst case assumption).

- Incumbent licensees should be responsible for ensuring the accuracy of this information, with opportunities afforded as necessary to update their licenses without any application fee.
- AFC systems should operate autonomously without any sharing or synchronization requirements.
- Multiple entities should be permitted to operate AFC systems. Different AFC system implementations will be optimized to support different market segments, and AFC operators may emerge that are optimized to the economics and technical requirements of specific markets. AFC systems should not be required to serve any particular AFC device.
- AFC operators should have the flexibility to determine the appropriate implementation model(s) for their AFC system, provided incumbents are protected. The Commission should regulate AFC system functionality, not implementation.
- AFC operators should be authorized for 5-year terms, with a requirement of 30-days' notice to the Commission before ceasing operations. In the event an AFC system ceases operations, there should be no requirement that it transfer any information to another AFC operator. The associated AFC devices will transition consistent with the AFC re-check requirement.

Specific Criteria for FCC Approval of AFC Systems and AFC Devices

The Commission should *not* require that a multi-stakeholder entity administer AFC requirements, standards, or compliance. These can be developed by the Commission with input from the public without the addition of an unnecessary layer of administration. The following are the criteria that Wi-Fi Alliance proposes that the Commission use to certify AFCs and AFC devices.

Communication Between AFC Systems and AFC Devices

- AFC systems should be required to demonstrate that they –
 - Communicate to AFC devices either a range of available (whitelist) or unavailable (blacklist) frequencies.
 - This communication may include authorizing frequencies at reduced power, and may involve frequency availability rather than specific channel assignments.
 - AFC devices should be required to re-check with an AFC system at least every 30 days, with a 48-hour grace period at the end of the 30-day period, in order to permit continued operations. If the re-check cannot be performed by the end of the grace period, then the AFC device should be precluded from operating on U-NII-5, U-NII-7, or U-NII-8 frequencies.
- Certifications of AFC systems should *not* require that applicants demonstrate –
 - A particular type of communications interface between AFC systems and devices;
 - That they can collect AFC device capabilities or operational parameters;
 - That they can register AFC devices;
 - Capability to transmit unique identifiers;
 - A specific method of calculating available or unavailable frequencies, provided the AFC system ensures incumbent protection; or

- The ability to positively control an AFC device's channel selection.

Position Determination for AFC Devices

- AFC devices should be required to demonstrate –
 - That they can report, at a minimum, two-dimensional position coordinates (and optionally, three-dimensional coordinates) at a 95% confidence level to the AFC system.
 - In the absence of three-dimensional positioning information, an alternative resolution should be provided as to device height, but there should be no mandated “typical height.” For example, the required confidence level may be implemented through a location uncertainty declaration (in meters).
 - Their method of location determination, through a declaration or certification.
 - AFC devices should be permitted to choose from a variety of location determination methods, including geolocation, professional installation, or street address, provided the 95% confidence requirement is satisfied.
- AFC devices should *not* be limited to –
 - A particular level of uncertainty.
 - AFC devices should be permitted to report a greater level of uncertainty than they obtained, at a cost of potentially reduced spectrum availability, particularly in the case of mobile AFC devices.
 - A particular maximum height.
 - A particular method of position determination.
 - As long as AFC device position determination can be certified, there is no need to regulate its implementation.

AFC System and Device Security

- AFC systems and devices should be required to demonstrate –
 - Their use of industry-standard security methods for communications between them to avoid interception, modification, or spoofing.
 - Security requirements should be as generic as possible to avoid constraining innovation.
 - Security capabilities against tampering, including the modification of software.
 - Existing best-practices, required by the Commission's rules for unlicensed national information infrastructure devices, are sufficient for this purpose.

Adjacent Channel Protection and Out-Of-Band Emission Limits

- AFC devices should be required to demonstrate compliance with unwanted emissions limits at the lower and upper edges of their operational range.
 - There should be no unwanted emissions limits between 6 GHz sub-bands.

Protection Criteria of Incumbents

- AFC systems should be required to demonstrate –

- That they will protect licensed incumbent operations from co-channel interference with an I/N threshold of 0 dB as proposed by the Commission.^{9/}
- In order to demonstrate these capabilities, AFC systems should be permitted to use the propagation models specified in the tables below. To determine whether the geographic area is urban, suburban, or rural the AFC can employ the most current version of the National Land Cover Database^{10/} at a one arcsecond accuracy.
- AFC systems should be permitted to apply the clutter models specified below and clutter database(s), with clutter height cutoff above 50 meters.
- AFC systems should be permitted to use three dimensional path analysis.
- AFC systems should be permitted to use digital terrain and elevation model(s) and land use categorization database(s).
- AFC systems should be permitted to take into account building entry and other typical losses for both indoor and outdoor cases based on Recommendation ITU-R P.2109-0.^{11/}
- AFC systems should be permitted to use actual antenna patterns and orientations for both incumbent and AFC devices. If an incumbent's antenna information is not available, then AFC systems should be permitted to use "average" antenna pattern for a class.
- AFC systems should be permitted to identify available frequencies for AFC device specified transmit power or a range of transmit power levels. Alternatively, in the cases where an AFC system implementation does not account for transmit power of the AFC device, the AFC system should use the maximum permissible power in the subject U-NII sub-band.

^{9/} See *NPRM* at ¶ 43

^{10/} *National Land Cover Database (NLCD) 2016*, MULTI-RESOLUTION LAND CHARACTERISTICS CONSORTIUM, <https://www.mrlc.gov/national-land-cover-database-nlcd-2016>.

^{11/} INT'L TELECOMM. UNION, RECOMMENDATION ITU-R P.2109-1, PREDICTION OF BUILDING ENTRY LOSS (Aug. 2019) https://www.itu.int/dms_pubrec/itu-r/rec/p/R-REC-P.2109-1-201908-I!!PDF-E.pdf.

Urban and Suburban Propagation Models

Distance	Propagation Model	Clutter
$0 \text{ m} \leq d < 1000 \text{ m}$	WINNER II ^{12/} Combined Urban (C2) ; <i>or</i> WINNER II ^{13/} Combined Suburban (C1)	<i>n/a</i>
$d \geq 1000 \text{ m}$	ITM plus digital elevation model (1as resolution)	Recommendation ITU-R P.2108-0 ^{14/} (p=50%)

Rural Propagation Model

Distance	Propagation Model	Clutter
$d \geq 0 \text{ m}$	ITM plus digital elevation model (1as resolution)	Recommendation ITU-R P.452-16 ^{15/}

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^{12/} See PEKKA KYÖSTI, *ET AL.*, IST-4-027756 WINNER II D1.1.2 V1.2, WINNER II CHANNEL MODELS (Updated Feb. 4, 2008) <https://www.cept.org/files/8339/winner2%20-%20final%20report.pdf>.

^{13/} See *id.*

^{14/} INT'L TELECOMM. UNION, RECOMMENDATION ITU-R P.2108-0, PREDICTION OF CLUTTER LOSS (June 2017) https://www.itu.int/dms_pubrec/itu-r/rec/p/R-REC-P.2108-0-201706-I!!PDF-E.pdf.

^{15/} INT'L TELECOMM. UNION, RECOMMENDATION ITU-R P.452-16, PREDICTION PROCEDURE FOR THE EVALUATION OF INTERFERENCE BETWEEN STATIONS ON THE SURFACE OF THE EARTH AT FREQUENCIES ABOVE ABOUT 0.1 GHz (July 2015) https://www.itu.int/dms_pubrec/itu-r/rec/p/R-REC-P.452-16-201507-I!!PDF-E.pdf.

Pursuant to Section 1.106 of the Commission's rules, a copy of this letter has been submitted in the record of the above referenced proceedings and a copy of this letter has been provided to the meeting participants. If there are any questions regarding the foregoing, please contact the undersigned.

Respectfully submitted,

/s/ Alex Roytblat

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