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## VIA ELECTRONIC FILING

August 8, 2018

Marlene Dortch  
Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, SW  
Washington, DC 201154

Re: **Ex Parte Letter, GN Docket No. 17-183**, *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*

Dear Ms. Dortch:

The record in the above-referenced proceeding provides overwhelming evidence that more mid-band spectrum is urgently needed for radio local area network (“RLAN”) technologies like Wi-Fi.<sup>1/</sup> Congress,<sup>2/</sup> along with current members of the Commission,<sup>3/</sup> have come to the same

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<sup>1/</sup> See, e.g., *Comments of All Points Broadband, Amplex, Apple, Blaze, Broadcom, Cambium, Cisco, Cypress, Dell, Extreme, Facebook, Fire2Wire, Google, Hewlett-Packard, Intel, Joink, MediaTek, MediaLINK, Microsoft, NewWave, Pixius, QUALCOMM, Rise, Ruckus, Snappy, Sony, Western, WISP Association, Wisper*, GN Docket No. 17-183 at 5 (filed Oct. 2, 2017) (noting that Wi-Fi is facing serious crowding); *Comments of Broadcom Ltd.*, GN Docket No. 17-183 at 25 (filed Oct. 2, 2017) (noting that additional mid-band spectrum is “critical to addressing the unlicensed spectrum crunch”); *Comments of Hewlett-Packard Enterprise Company*, GN Docket No. 17-183 at 2 (filed Oct. 2, 2017) (noting that Wi-Fi “will soon run out of spectrum.”); and *Comments of the Wireless Broadband Alliance*, GN Docket No. 17-183 at 7 (filed Oct. 2, 2017) (discussing a “profound and growing need for additional designations of mid-band spectrum for unlicensed operations).

<sup>2/</sup> See, e.g., *Consolidated Appropriations Act 2018*, Pub. L. No. 115-141, div. P, tit. VI, § 603 (requiring the Commission to identify a minimum of 100 megahertz of spectrum below 8 GHz for unlicensed operation by 2022); § 611 (requiring the Commission to evaluate unlicensed operations in guard bands); § 617 (making the promotion of unlicensed spectrum the official policy of the United States and charging the Commission with making unlicensed spectrum a priority); and § 618 (requiring the Commission to work with NTIA to draft a “National Plan for Unlicensed Spectrum” by September 23, 2020 which will lead to increased unlicensed spectrum access); and *Middle Class Tax Relief Act of 2012*, Pub. Law 112-96 §§ 6406 and 6407 (requiring unlicensed operations in the 5 GHz Band and guard bands). See also, Letter from Ben Guthrie and Doris Matsui, Co-Chairs, Congressional Spectrum Caucus to Ajit Pai, Chairman, Federal Communications Commission, July 11, 2018 and Letter from John Thune, Chairman, Senate Committee on Commerce, Science and Transportation to Ajit Pai, Chairman, Federal Communications Commission, June 29, 2018.

<sup>3/</sup> See, e.g., Michael O’Rielly, *This is World Wi-Fi Day, let’s celebrate the progress we’ve made*, The Hill, Jun. 19. 2017 (“To say that Wi-Fi is a critical component of Internet access in today’s always-connected society doesn’t do it justice...But more needs to be done to promote future opportunities. This includes making more spectrum bands available for unlicensed use to allow super-wide Wi-Fi

conclusion. That is why Wi-Fi Alliance is encouraged that Chairman Pai recently announced that he plans to ask his colleagues to consider a Notice of Proposed Rulemaking (“NPRM”) that would make spectrum available for RLANs and other unlicensed devices in the 5925-7125 MHz (“6 GHz”) band this fall.<sup>4/</sup> In this regard, Wi-Fi Alliance encourages the Commission to consider the points below, which reflect Wi-Fi Alliance’s current assessment of certain matters that will likely be presented in the NPRM.

***Protection of FSS Uplink Operations in the 6 GHz Band Can be Achieved with Established Pointing Constraints***

Wi-Fi Alliance recognizes the importance of protecting Fixed Satellite Service (“FSS”) uplink operations in the 6 GHz band and proposed various interference mitigation techniques in its reply comments to the Notice of Inquiry in this proceeding.<sup>5/</sup> Further evaluation since Wi-Fi Alliance submitted its reply comments suggests that two of those techniques are particularly useful in protecting FSS. *First*, outdoor access points with connectorized or high gain antennas and fixed point-to-multipoint devices should be professionally installed. There is no reason to require professional installation for devices with low gain antennas (i.e., less than 6 dBi) because such antennas do not provide for sufficient signal directivity to present an interference risk. *Second*, installers and operators should be required to ensure that the direction of maximum radiation of outdoor access point device antenna maintain a minimum separation angle of at least 2 degrees with respect to geostationary satellite orbit (i.e., geostationary arc). This geostationary orbital arc avoidance requirement in conjunction with the professional installation obligation will provide ample protection for FSS. As Wi-Fi Alliance noted previously, fixed service (“FS”) stations that operate co-frequency with FSS in the 6 GHz band are subject to the same constraint, as specified in Section 101.145 of the rules.<sup>6/</sup> Because this geostationary orbital arc avoidance technique has effectively facilitated coexistence between FS and FSS-uplinks for many years, with the FS transmissions at power-levels that are orders of magnitude higher than proposed U-NII transmissions, Wi-Fi Alliance is confident in the viability of this approach.

Wi-Fi Alliance initially commented that, in addition to the two mitigation techniques noted above, the Commission should consider limiting the maximum effective isotropic radiated power (“EIRP”) at any elevation angle above 30 degrees above the horizon.<sup>7/</sup> This comment was based on rules governing the U-NII-1 band. However, it is now evident that this additional,

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channels.”); Statement of Commissioner Rosenworcel before the House Subcommittee on Communications and Technology, Mar. 22, 2016 (“Before we overwhelm Wi-Fi as we know it, we need more efforts to secure more unlicensed spectrum.”); *Statement of Commissioner Ajit Pai, In Re Amendment of Part 15 of the Commission’s Rules for Unlicensed Operations in the Television Bands* FCC 15-99 (Aug. 11, 2015) (“I am a big proponent of making more spectrum available for unlicensed use”).

<sup>4/</sup> *Scoring a Victory for 5G*, FCC Blog Post, Jun. 20, 2018, available at <https://www.fcc.gov/news-events/blog/2018/06/20/scoring-victory-5g>.

<sup>5/</sup> *See, Reply Comments of Wi-Fi Alliance*, GN Docket No. 17-183 at 14-20 (filed Nov. 15, 2017) (“*Reply Comments*”).

<sup>6/</sup> *See*, 47 C.F.R. § 101.145.

<sup>7/</sup> *Reply Comments* at 20.

burdensome obligation is unnecessary. The U-NII-1 rules are specifically intended to protect non-geostationary satellite orbit (“NGSO”) transmissions in lower earth orbit. As their name implies, the NGSO satellites do not maintain a stationary position but instead move continually in relation to the Earth’s surface. A general elevation angle limit, therefore, is effective for the protection of NGSO satellites but is unnecessary for the protection of GSO FSS satellite transmission which predominate in the 6 GHz band.

Importantly, similar to the Commission’s rules, international regulations also rely on the 2 degrees geostationary satellite orbit separation angle for all terrestrial stations sharing with GSO satellites.<sup>8/</sup>

### ***6 GHz Wi-Fi Power Limits Should be Harmonized With U-NII-3 Rules***

As Wi-Fi Alliance and others have pointed out, one of the significant benefits of designating the 6 GHz band for RLAN and other unlicensed use is the proximity of the band to 5 GHz spectrum, which is already being used for those devices.<sup>9/</sup> That is why Wi-Fi Alliance urges the Commission to adopt rules that mirror those applicable to the 5.725-5.850 GHz (“U-NII-3”) band – the currently available U-NII band closest to 6 GHz – to the extent possible. Doing so will result in manufacturing and design efficiencies, leading to cost savings for manufacturers, test facilities, and ultimately, consumers and users of these devices.

In particular, the Commission should ensure that the 6 GHz band rules incorporate conducted output power and power spectral density (“PSD”) limits in the same way that Section 15.407(a)(3) of the rules does for the U-NII-3 band.<sup>10/</sup> In setting the U-NII-3 PSD rules, the Commission took into consideration how the use of PSD limits can accelerate testing and approval of devices.<sup>11/</sup> The same rationale – along with the benefits of creating rules that can result in products harmonized across the U-NII-3 and U-NII-5, -6, -7 and -8 bands – should compel the Commission to extend the limits in Section 15.407(a)(3) to 6 GHz band devices. It is also important to emphasize that the U-NII-3 power limits are significantly lower than other authorized uses in the band that successfully share the 6 GHz band with primary services (e.g. Earth Station on Vessel (“ESV”) operations, which have successfully operated in the 6 GHz band for more than a decade).<sup>12/</sup>

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<sup>8/</sup> See, *International Telecommunication Union Radio Regulations, Edition of 2016*, Article 21.2.

<sup>9/</sup> See, e.g., *Reply Comments* at 10.

<sup>10/</sup> See, 47 C.F.R. § 15.407(a)(3).

<sup>11/</sup> See, *In re Revision of Part 15 – Permit U-NII Devices in the 5 GHz Band*, Report and Order, 29 FCC Rcd. 4127 at ¶ 102 (2014) (“This will allow measurements of unlicensed devices being certified for operation in the U-NII-3 band to be performed in a timely manner, resulting in efficiencies and cost savings for manufacturers, test facilities, and ultimately to consumers”).

<sup>12/</sup> See, 47 C.F.R. § 25.221; *Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands*, Report and Order, 20 FCC Rcd 674 (2005).

### ***Low-Power Indoor Access Points Should Be Permitted to Operate Without Frequency Coordination***

As Wi-Fi Alliance noted in its Reply Comments, the concept of indoor-only class devices is already established in the FCC rules.<sup>13/</sup> Wi-Fi Alliance now proposes that these low power indoor-only access points be permitted to operate with 250 milliwatts of conducted power, provided that the maximum antenna gain does not exceed 6 dBi. Since these devices operate at low-power levels with their signals further attenuated by structure shielding they present minimal potential for interference. The attached Appendix contains a Minimum Coupling Loss analysis that demonstrates the vast majority of residential deployment scenarios would present no risk of interference to FS operations. In fact, these consumer-grade devices would generate signals substantially below the -6 dB I/N interference criteria presented in the *ex parte* submitted by the Fixed Wireless Communications Coalition.<sup>14/</sup> These low power indoor access points should not be required to implement the type of automated coordination mechanism to which Wi-Fi Alliance referred in its Reply Comments.<sup>15/</sup> Loading these consumer-grade devices with mechanisms to avoid interference simply raises costs and complexity without contributing to the protection of incumbents.

For regular-power indoor and outdoor access point operations, Wi-Fi Alliance continues to suggest that the Commission consider some form of automated frequency coordination (“AFC”) or similar mechanism to prevent the unlikely event of direct line-of-sight interference to microwave operations.<sup>16/</sup> However, such a requirement is unnecessary and burdensome for lower-power access points operating indoors. These devices, with the limitations suggested above, would present little interference risk to fixed links operating at far higher power. In contrast, the cost of incorporating AFC or related technology into these consumer-grade devices may delay their deployment to consumers, undermining the potential of this spectrum to close the unlicensed spectrum crunch.

### ***Conclusion***

There is no dispute that there is an urgent need for more unlicensed spectrum. Wi-Fi depends on access to this spectrum to make the modern wireless ecosystem function, and as more devices and more uses come online every day, spectrum crowding will be the result. Wi-Fi Alliance looks forward to the Commission’s consideration of rules that will make the 6 GHz band available to meet the documented demands for unlicensed spectrum capacity, consistent with the suggestions outlined above.

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<sup>13/</sup> *Reply Comments* at 14.

<sup>14/</sup> *See*, attachment to Letter from Cheng-yi Liu, Counsel for the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 17-183, Jul. 17, 2018 (“*FWCC Letter*”) at 14.

<sup>15/</sup> *Reply Comments* at 14.

<sup>16/</sup> Notably, the Fixed Wireless Communications Coalition concurs that some form of AFC is appropriate to protect microwave operation. *See, FWCC Letter* at 13-16.

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Pursuant to Section 1.1206(b)(2) of the Commission's rules, an electronic copy of this letter is being filed in the above-referenced docket. Please direct any questions regarding this filing to me.

Respectfully submitted,

*/s/ Alex Roytblat*

**WI-FI ALLIANCE**

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## APPENDIX

A Minimum Coupling Loss (MCL) Analysis was completed to determine the risk of harmful interference into a 6 ft, 10 ft, and 12 ft UHX antenna, Winner II propagation model, and the RLAN transmitter is directly below the FS receiver boresight (i.e., azimuth angle is 0°). The detailed model assumptions are as follows:

Parameter	Unit	
RLAN Azimuth Angle to FS	degrees	0
RLAN Bandwidth	MHz	80
RLAN Tx Power (dBm)	dBm	24
RLAN Antenna gain*	dB	6
RLAN Building Entry Loss	dB	20
RLAN Height	meters	1.5
FS BW	MHz	30
FS Noise Figure	dB	5
FS Protection Criteria (I/N)	dB	-6
FS Height**	meters	43
FS Center Frequency	MHz	6200

\* 24 dBm conducted + 6 dBi antenna gain was used, but the typical dipole antenna is 1.8 dBi, so a more typical EIRP would be 26 dBm EIRP

\*\* Average FS receiver height in ULS is ~43 meters

The graph below demonstrates that in the vast majority of residential deployments, indoor low power would be substantially below the I/N of -6, posing limited risk of harmful interference to FS receivers.

