

June 19, 2019

**Via Electronic Filing**

Marlene H. Dortch, Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street SW  
Washington, DC 20554

**Re:    Unlicensed Use of the 6 GHz Band, ET Docket No. 18-295  
      Expanding Flexible Use in Mid-Band Spectrum between 3.7 and 24 GHz,  
      GN Docket No. 17-183**

Dear Ms. Dortch

The undersigned companies submit this letter to inform the Commission of a number of material inaccuracies with the technical analysis in RigNet Satcom's Filing in the above-referenced dockets.<sup>1</sup> For the reasons provided below, the FCC should disregard the RigNet Filing and dismiss RigNet's request that the agency afford greater protections to the company's backhaul systems situated along the bordering coastline and within the Gulf of Mexico, such as a 35-mile exclusion zone around its Fixed Service ("FS") links. The Automated Frequency Coordination ("AFC") framework the FCC has proposed in the NPRM will fully protect licensed incumbents, including RigNet's FS links, from harmful interference due to new unlicensed operations.

*First and foremost*, the RigNet Filing misunderstands how the AFC system would operate. The AFC system would allow an unlicensed device to begin operations in the vicinity of a potential victim FS receiver only after determining that the unwanted energy from the unlicensed device would not exceed the defined FS protection threshold. The AFC system would use as inputs the geographical location, antenna height and directionality, transmit power level, and other relevant technical operating parameters for all incumbent licensed FS links operating in the 6 GHz band, including RigNet's FS links. Based on these inputs, the AFC system would not permit high-powered unlicensed operations within the vicinity of licensed FS systems if the unlicensed operations would cause harmful interference to any licensed FS link. The AFC system certainly would not permit a high-powered unlicensed device to operate co-channel at 36 dBm EIRP while within the boresight of an incumbent FS link, as presented in the RigNet filing.<sup>2</sup>

RigNet's assumption that the unlicensed device is operating directly within the main beam of the FS receiver is extremely unlikely, as we have explained in this docket.<sup>3</sup> The unlicensed device

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<sup>1</sup> See Reply Comments of RigNet Satcom, Inc. (Feb. 15, 2019) (the "RigNet Filing"). RigNet has reiterated the false conclusions of its inaccurate study in recent meetings with Commission staff. See RigNet *Ex Parte* Letter (May 14, 2019).

<sup>2</sup> See RigNet Filing at 4.

<sup>3</sup> See Reply Comments of Apple Inc., Broadcom Inc., Cisco Systems, Inc., Facebook, Inc., Google LLC, Hewlett Packard Enterprise, Intel Corporation, Marvell Semiconductor, Inc., Microsoft Corporation, Qualcomm Incorporated, Ruckus Networks, an ARRIS Company at 21 (Mar. 18, 2019) ("RLAN Group Reply Comments"). The undersigned companies support the

transmissions would have some offset into the FS receiver antenna boresight, most likely in the azimuth direction, resulting in a substantial amount of signal attenuation due to the FS receive antenna's sidelobe. The link RigNet analyzes uses a 6-foot antenna for which the sidelobe attenuation is more than 40 dB for virtually all places unlicensed devices would be located.

*Second*, devices operating without AFC will not affect RigNet's FS network. The FCC has proposed rules for low-power indoor ("LPI") unlicensed operations without the use of an AFC system that allow only up to 30 dBm EIRP. For these LPI operations, which would be further attenuated by building material losses of at least 20-25 dB (and in many cases much greater losses),<sup>4</sup> the maximum antenna gain would not be directed towards the FS receiver. Also, typical indoor devices will operate using much lower transmit power than the 30 dBm EIRP limit (comprised of 24 dBm conducted power with a 6 dBi antenna gain). A more appropriate but still conservative value is 22 dBm EIRP, which has been used in this docket (by combining a 24 dBm maximum conducted power for indoor operations with a -2 dB antenna gain),<sup>5</sup> and yields an additional 14 dB reduction in unwanted signal energy.

*Third*, RigNet uses a 20 MHz operating channel bandwidth for the unlicensed device,<sup>6</sup> which will be quite uncommon. While 20 MHz channelization is allowed under the IEEE 802.11ax "Wi-Fi 6" standard, it is expected that at least 80% of all 6 GHz operations will use 80 MHz or 160 MHz bandwidths.<sup>7</sup> These wider bandwidth channels provide much greater throughput and spread the signal power over a wider bandwidth, placing substantially less unwanted energy into the FS link's channel of operation. For example, the maximum overlap of any 80 MHz IEEE 802.11ax device with the link in the RigNet Filing would be 37 MHz and would lessen the level of unwanted noise in the FS channel by 3.4 dB.

*Fourth*, RigNet's analysis does not include antenna polarization mismatch losses. The FS receiver RigNet uses is a horizontally polarized antenna,<sup>8</sup> while typical unlicensed devices, like indoor devices that use low transmit power, do not use a fixed polarization. This polarization mismatch would further lessen the impact of unlicensed transmissions and should be included in the analysis. A median value of 3 dB of additional loss is typically included.<sup>9</sup>

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FCC's proposal to not allow the use of the 6 GHz band for unlicensed communications with unmanned aerial vehicles to further protect licensed FS links.

<sup>4</sup> See RLAN Group Reply Comments at 21-22, App. A.

<sup>5</sup> See RLAN Group Reply Comments at 24 (using -2 dB antenna gain); *see also* NPRM, App. B (proposing 24 dBm maximum conducted power for indoor operations).

<sup>6</sup> See RigNet Filing at 4.

<sup>7</sup> See RKF Engineering Services, *Frequency Sharing for Radio Local Area Networks in the 6 GHz Band* at 24, Table 3-9 (Jan. 2018) ("RKF Study"), *as attached to* Letter from Paul Margie, Counsel, Apple Inc., Broadcom Inc., Facebook, Inc., Hewlett Packard Enterprise, and Microsoft Corporation, GN Docket No. 17-183 (filed Jan. 26, 2018).

<sup>8</sup> See RigNet Filing, Ex. B.

<sup>9</sup> See Fixed Wireless Communications Coalition (FWCC) Letter, Att. at 5 (Aug. 28, 2018).

In sum, as explained above, the AFC system will not allow a high-powered 36 dBm EIRP unlicensed device to cause harmful interference to any licensed FS link.

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Thank you for your consideration of this filing. The undersigned companies strongly encourage the Commission to move forward to open the 6 GHz band for unlicensed use as soon as possible in accordance with our Comments and Reply Comments in this proceeding.

Respectfully submitted,

Apple Inc.  
Broadcom Inc.  
Cisco Systems, Inc.  
Facebook, Inc.  
Google LLC  
Hewlett Packard Enterprise  
Intel Corporation  
Marvell Semiconductor, Inc.  
Microsoft Corporation  
Qualcomm Incorporated  
Ruckus Networks, a Business Segment of CommScope

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